



June 2016

Northfield News

A Newsletter for the Friends and Clients of Northfield

Special Points of Interest:

- ▶ **Main Article: Risk Assessment of Alternative Investments**
- ▶ **Tech Tip: Round Lots in Optimizations**
- ▶ **State Street and Northfield Partnership Announcement**
- ▶ **Second Article - Custom Risk Models**



[Click Here](#)

Inside This Issue:

- ▶ **June Webinar: Global Wealth Management and the Panama Papers**
- ▶ **Recent Event Wrap-Ups, Newport, Europe and Recent Webinars**
- ▶ **New WealthBalancer video available**
- ▶ **Staff Speaking Engagements**

Risk Assessment of Alternative Investments

By Dan diBartolomeo

To the extent that the illiquid nature of most alternative investments “locks” investors in for long periods, it can be reasonably argued that risk assessment of alternative investments is even more important than for portfolios of traded securities. However, the proper assessment of risk in alternative investments is widely neglected in the community of institutional asset owners *because it is hard to do well*. There are several reasons for this. First, illiquid alternative investments are “marked to market” based on estimated appraisal values rather than observed transactions. This makes assessment of statistical properties such as volatility and correlation much less reliable. The second is that while financial data on stocks and bonds is widely publicly available as a matter of regulation, the details of most alternative investments are private, and often left in the hands of agents such as general partners and asset managers. Most asset owners simply do not have detailed information on their illiquid holdings (e.g. who are the major tenants in the five shopping malls of which we own 40%). Finally, many of the most successful hedge funds simply refuse to disclose anything about their holdings, and such lack of transparency must be accepted by investors as a condition of participation.

Let us start with a discussion of intrinsically illiquid assets such as private equity, venture
(Risk, Continued on page 4)

Custom Risk Models

By Jason MacQueen

A long time ago (actually 1994), in a galaxy far, far away (actually London), my colleagues and I at QUANTEC built the first ever Global Equity risk model. It had taken us nearly two years, and it chanced that shortly after it was released, I had lunch with my friend Jack Treynor at a meeting of the Q Group. I was very full of myself, and keen to impress him, so I spent about twenty minutes telling him about all the interesting problems that had arisen, and all the clever ways in which we had solved them. Finally, I sat back, feeling very pleased with myself, and said “Well, Jack, what do you think?”

To my knowledge, Jack Treynor never answered a question without thinking about it seriously, and after a few minutes thought, he replied “Well, it’s just another way of parsing the covariance matrix,” and as far as he was concerned, that was all there was to say about it. At the time I felt very deflated, but once I’d gotten over my hubris, I realised that he was right. Jack died recently, very shortly after attending the Q Group’s 50th anniversary meeting in Washington D.C., and I shall miss him.

What, you may ask, has this to do with Custom Risk Models? Many people in the investment business suppose, probably without giving it too much thought, that with compli-
(Custom, Continued on page 8)

Recent and Upcoming Events

Webinar - Global Wealth Management and the Panama Papers

June 30, 2016 • 11:00 AM EDT

Northfield President Dan diBartolomeo will be hosting a webinar on June 30, 2016

Abstract

In 2010, I was among multiple speakers at a large CFA wealth management conference in Singapore that warned the audience of the financial services equivalent of a "time bomb." The thesis was that the globally common practice of wealthy individuals evading taxes in their home countries by diverting money into offshore shell corporations would eventually blow up. With the recent public release of thousands of documents hacked from Panamanian law firm Mossack Fonseca, the first explosion has been realized, with substantial negative publicity for both financial firms and myriads of high profile clients. In this presentation, we will first review common practices in terms of offshore corporations both for individual private investors, and for collective vehicles such as hedge funds. While heavily tainted with the stain of tax evasion there are legitimate benefits of such vehicles. The wealth management industry in some countries such as USA and Australia has made extensive progress toward broad availability of tax sensitive investing. Even Harry Markowitz, Nobel prize winner for pioneering work in portfolio theory recently published research work on "tax cognizant" portfolio allocation (with Kenneth Blay, Journal of Investment Management, 2016). Unfortunately wealth management organizations in the rest of the world have remained in denial, choosing continued reliance on secretive offshore vehicles to tread the thin line between legal tax avoidance and illegal tax evasion. The presentation will conclude with an overview of how the techniques of tax sensitive investing can be adopted quickly by non-US financial firms so as to prosper in the "post Panama papers" world of wealth management.

Visit <https://northinfoevents.webex.com> to register. There is no charge to register. If you cannot attend the live session, please register and we will send you the post webinar recording.

Attilio Meucci's Advanced Risk and Portfolio Management Bootcamp

August 15-20, 2016 • New York University • New York City

The ARPM Bootcamp provides an in-depth understanding of buy-side modeling from the foundations to the latest advanced statistical and optimization techniques, in nine intense, heavily quantitative hours each day, with theory, live simulations, review sessions and exercises. 40 CE units CFA Institute, 40 CPE units GARP

Topics include portfolio construction, factor modeling, copulas, liquidity, risk modeling, and much more.

Visit <http://www.arpm.co/bootcamp/registration/> to register, and view the detailed program information. There is a discounted Northfield affiliate rate available. A short video is also available: <http://www.youtube.com/watch?v=BUngjNxBWK>.

Webinar Wrap-up: Making Lifetime Investing Planning a Reality

May 24, 2016 • 11:00 AM EDT

Northfield President Dan diBartolomeo hosted a webinar on Tuesday, May 24th where he discussed the inability of wealth management organizations to deliver on the promise of a customized investment plan for each client household. Instead, wealth managers provide recommendations only for the *current* asset allocation of the investment portfolio with the only "plan" being to revisit the allocation in a year or two. The presentation then illustrated a process to create the "maximum likelihood" forward time series of expected asset allocations through the investor's lifetime using the life balance sheet concept described in Wilcox (2003), the non-parametric preference functions from Bolster and Warrick (2008), and a process to combine these two disparate concepts

The presentation slides are available at <http://www.northinfo.com/documents/693.pdf>. Contact your Northfield Sales Representative if you are interested in viewing the full presentation recording of the event.

2015 Newport Annual Summer Seminar Wrap-up

Tennis Hall of Fame • Newport, Rhode Island • June 3, 2016

Northfield's annual summer seminar took place at the International Tennis Hall of Fame, in Newport, RI on June 3rd. The seminar presented recent research and technical advances to an audience of Northfield clients and friends.

The agenda consisted of six presentations including: "Back-testing: A Useful Tool or 'Financial Charlatanism'?", "Custom Hybrid Risk Models," "Direct Real Estate and REITS the Saga Continues," "Eurozone Developments," "Global Wealth Management and the Panama Papers" and "Unified Theory of Credit Spreads and Defaults with Empirical Results."

As is customary, the seminar coincided with the USA Professional Championship of Court Tennis. Following the presentations, attendees viewed a Semi-Final Match between Australia's Rob Fahey and Ben Taylor-Matthews of the UK. Court Tennis, or "real tennis" is the medieval sport that is the progenitor of all modern racquet sports. Fahey won the match. To learn more, visit the US Court Tennis Association site at <http://www.uscourttennis.org>. After tennis on Friday evening, everyone enjoyed a relaxing oceanfront dinner party at The Ocean Cliff in Newport. The complete proceedings have been posted to our website at <http://www.northinfo.com/research.php>.

There is no charge for participation in any aspect of this event. We will accept any donation you might care to make on behalf of Pine Street Inn, Boston's primary homeless shelter. If you would like to make your donation online, please visit http://www.pinestreetinn.org/donate/donate_now or you can make a check payable to Pine Street Inn and mail to Kathy Prasad at Northfield. Should you have any questions please feel free to contact Anna Kelley at 617-892-9176.

Northfield Europe Seminar Series Wrap-Up

London • Paris • June 2016

Northfield hosted our EMEA Region Seminar Series with two highly successful events in London and Paris. The London seminar took place on June 15th and Paris took place on June 21st. The purpose of the seminars was to showcase our research on various topics in investment and risk management to our growing list of Europe Region clients and prospects.

The presentations were given by Northfield's Dan diBartolomeo, Jason MacQueen, Mike Knezevich and Arun Soni. London featured a guest speaker presentation by Louis Scott, Founder, Head of Risk and Quant Research at Kiema Advisors. Marielle de Jong, Head of Fixed-Income Quant Research at Amundi, gave a presentation at the Paris seminar.

The presentations included: "Meeting Client Suitability Requirements in Robo-Investing," "Scenario Analysis," "Risk Systems That Read[®]," "Custom Hybrid Risk Models," "Reconciliation of Default Risk and Spread Risk in Fixed Incomes" and "A Fundamental Bond Index Including Solvency Criteria."

There was no cost to attend, however, donations to the Save the Children Fund were encouraged. To donate visit <https://secure.savethechildren.org.uk/donate/>. The proceedings have been posted to <http://www.northinfo.com/research.php>.

Webinar Wrap-up: Custom Hybrid Risk Models

April 28, 2016 • 11:00 AM EDT

Northfield's Director of Research, Jason MacQueen hosted a webinar on Thursday, April 28th where he discussed the advantages of using custom hybrid risk models (CHRM) over standard equity models. Unless the factors in the standard risk model correspond to the factors used to select stocks and rebalance the portfolio, the manager will not be able to identify and quantify the factor bets clearly. To do this, the manager needs a CHRM which mirrors the investment process used to manage the portfolio.

The presentation discussed the benefits of using a custom model in detail, and provided a number of examples of CHRMs built for different clients.

The presentation slides are available at <http://www.northinfo.com/documents/692.pdf>. Contact your Northfield Sales Representative if you are interested in viewing the full presentation recording of the event.

(Events, Continued)

Webinar Wrap-up: Real Estate and Diversification, Part II

March 29, 2016 • 11:00 AM EST

Northfield's Emilian Belev and Rick Gold hosted a webinar on Tuesday, March 29th. Part I of this presentation was presented in July 2015 and discussed a Northfield study that revealed an unequivocal and statistically significant link between real estate and both stocks and bonds. Part II demonstrated the practical implications of the study to an investor pursuing an efficient diversification strategy. Rick and Emilian also discussed the implications for hedging real estate from the perspective of a fund investor whose payoffs are based on appraised values (an open-ended real estate fund), as well as an investor whose payoff depends on the arm's length transaction of the underlying property itself.

The presentation slides for part I are available at <http://www.northinfo.com/documents/656.pdf> and part II slides are available at <http://www.northinfo.com/documents/691.pdf>. Contact your Northfield Sales Representative if you are interested in viewing the full presentation recordings of both presentations.

(Risk, Continued from page 1)

capital, and infrastructure. At Northfield, our basic concept is to analyze the economic properties of a given investment and create a proxy portfolio of liquid instruments that matches the illiquid asset. Many of the details of how we are able to assess risk across all asset classes in a single factor model can be found in diBartolomeo and Importico (2013). We believe this process provides the crucial advantage that an investor's entire portfolio, both liquid and illiquid, public and private can be analyzed in a consistent framework opening up new opportunities to make good asset allocation decisions and manage portfolio risk across the enterprise. A good discussion can be found in diBartolomeo (*Journal of Performance Measurement*, 2015).

The other popular approach is to collect estimated returns (based on appraisal values not actual transactions) on a large number of assets, then construct some kind of return index. Several data vendors in the investment industry that specialize in collecting data on private equity, real estate and infrastructure investments for the construction of such indices naturally assert the value of having lots of data. Once you have a performance return index, you carry out statistical adjustments to compensate for the well-known biases as described by Fisher and Geltner (2000). The most basic adjustments may not be sufficient when the asset valuations are not synchronous in time as discussed in Cho, Kawaguchi and Shilling (2001). However, the academic literature in this area suggests that time series data is wholly inadequate for the purpose. Even if you "gross up" the volatility of the time series data to account for the serial correlation induced by "soft" marks to market, you still can't properly capture private equity or real estate risk.

Our first objection to the index approach is that the cross section of private equity and venture capital returns is extremely wide relative to the mean. Basically, what the asset class index does in terms of an average return has very

little explanatory power on how a given investor investing in a given fund does. This result was carefully documented in Kaplan and Schorr (2005). Like Northfield, they use a "public proxy" approach in order to get sensible results. The second problem is that the cross-section of private equity and venture capital returns has extremely high positive skew. This is widely regarded as "received wisdom" among venture investors. For example, [http://www.angelblog.net/Venture Capital Funds How the Math Works.html](http://www.angelblog.net/Venture%20Capital%20Funds%20How%20the%20Math%20Works.html) discusses the assumption that "the returns are from 20% of the investments." A similar assertion was made at a Chicago Quantitative Alliance meeting by Rafe Furst (CEO of Crowdfunder) in September 2014 that documented that close to 90% of all VC dollar profits go to the investors in the 10% of VC funds that happened to have the best returns in a given year. Put simply, the mean return (index) is much, much higher than the median return (the midpoint in a ranked list of investor returns). Basically, the traditional indices are not representative of the outcome of the typical investor.

The most extensive academic study of venture capital returns was that of Cochrane (2000) for the National Bureau of Economic Research. This study found that venture capital investments in aggregate behave not much differently than small cap stocks. To the extent that private equity sits between venture capital and small cap stocks in the evolution of firms, the "venture capital to public small cap" spectrum must also subsume private equity. A good summary of most of these issues was recently presented at Harvard Law School by Josh Lerner.

Now let us turn to risk analysis of hedge funds. Our current process involves creating two separate estimates of the risk of a hedge fund. The first process is to do a standard risk decomposition reporting using "last known" fund holdings (if available) which produces an estimate of risk at a specific point in time. Depending on how old the hold-

(Risk, Continued on page 5)

(Risk, Continued from page 4)

ings data is, we can utilize the “near horizon” or long horizon versions of our risk models. The second process is to analyze the returns of the fund over time to estimate fund volatility and exposures to factors of our Everything Everywhere model. To the extent that some information is reliably known about the fund (e.g. it invests in European convertible bonds), the return based process can be refined. The returns based process is described in detail at <http://www.northinfo.com/Documents/508.pdf>. This return based process is consistent with the pioneering work of Fung and Hsieh (2002) and Weisman (2001). Once we have the two separate representations of risk, we blend the two estimates in a standard application of Bayes’s Theorem.

Other risk vendors have tried to popularized the idea that hedge fund risk is best assessed by having an “immediate and transparent” look through to the hedge fund holdings that are being held at the fund’s prime broker. While we agree that having recent holdings information is helpful, the currently available services utilize this information in a fashion that is not suited to the needs of asset owners. The first issue here is for a prime broker or other margin lender whose concern is very short horizon in nature. They are worried about the fund having a substantial collapse in asset value over the next day or two. Beyond that, they can force a “margin call” or sell out fund securities to pay off loans.

Investors on the other hand have time horizons far longer than a day or two. Almost all hedge funds require investors to make withdrawal requests at least a month in advance and many funds have “lock up” provisions that require the investor to commit their capital for multiple years. *How much risk a given fund is taking on a given day is usually irrelevant because the investors cannot do anything about it.* Having a return based process that analyzes the *average behavior of the fund over time* is much more relevant to an investor that is locked in for months or years. This sort of analysis is much more likely to inform sensible strategic decisions about capital allocations to funds or across a set of funds than knowing something like “one day Value at Risk” based on today’s positions.

To further complicate the issue, having daily risk transparency could be theoretically counter-productive if acted upon by investors. Most hedge funds are operated as limited partnerships. The concept of a limited partner is that the investors have no say in management in return for having no liability if the fund went into debt. If an investor became aware that their fund was taking too much risk and complained, this would be often perceived as overstepping their rights as a limited partner, opening the investor up to potential liability for fund debts. This is entirely counter to the purpose of risk management.

Finally, in a traditional long only fund, most of the return arises from the return to the asset class with the manager trying to add some alpha to the return. Similarly, most of the absolute volatility of a long only fund arises from the market risk of the asset class, with a small portion of the absolute risk coming from active management decisions. In most hedge funds, the predominant influence on cumulative returns is active management decisions, *so the magnitude of the cumulative longer horizon risk is much more related to the skill of the manager* than to the VaR associated with day to day fund positions. Changes in the perceived skill level of the manager cannot be readily obtained over the short run, irrespective of position transparency. While there are some approaches to this question that can utilize position data (see diBartolomeo, *Journal of Performance Measurement*, 2008), it is widely done using the CUSUM process already incorporated in our returns based analyses. It was this sort of analysis that lead to our immediate conclusion in 1999 that the Bernard Madoff fund was fraudulent, as described in <http://www.northinfo.com/Documents/364.pdf>.

Staff Speaking Engagements

Northfield President Dan diBartolomeo presented “An Optimized Approach to Scenario Driven Risk Simulations” at the London Quant Group meeting on May 12th.

Dan presented “Organizational Behavior Effects in Investment Risk” at three recent industry events including:

- The Performance Measurement, Attribution and Risk (PMAR) Conference in Philadelphia on May 17th.
- At the Charles River Development Client Conference in Boston on June 13th.
- The Performance Measurement, Attribution and Risk (PMAR) Europe Conference in London on June 16th.

Later in the day on June 16th, Dan discussed Regional Politics and ESG Investing by Public Funds” at the Inquire UK seminar in Reading, UK.

Northfield Research Director Jason MacQueen will be presenting “Rules-based Style Rotation” at the New York QWAFEFW meeting on September 7th.

Jason will be at the London Quant Group Autumn Seminar in Oxford, England from September 11-14, where he will discussing “The Myths of Fund Management.”

On June 21st, Northfield’s Emilian Belev will be presenting “Non-Bank Perspective on Country Risk” at the IIF Global Seminar on Country and Sovereign Risk Management in New York City.

Tech Tip: Round Lots in Optimizations

By Steve Dyer

For asset managers that are required to trade in whole shares or larger lot sizes, the Northfield Optimizer allows the user to intelligently convert their optimal portfolio into round lots. The rounding process isn't just rounding up or down to the nearest share – the program takes into account risk characteristics of each security to minimize changing the risk of the portfolio, as well as considering several practical trading implementation concerns. This Tech Tip will show you how to enable rounding, describe the logic of the rounding algorithm, and point out the different output and reporting features.

Enable Rounding

The screenshot shows the 'Round Lots' configuration window. It includes the following fields and options:

- Enable Rounding Adjustments**
- Lot Size:** 1.00 (with a file selection button and 'LotSize.csv' selected)
- Ticket Charge:** \$2.00
- Withhold Cash for Transaction Costs**
- Withhold Cash for Taxes**
- Free Cash Buffer:** .00

To enable rounding, check the “Enable Rounding Adjustments” checkbox on the Round Lots screen to display the input fields. You can set the global lot size that applies to all securities, and you can optionally input a file to set different lot sizes for individual securities, which will override the global value. This file has two columns: the first column has the security ID, and the second column has the security’s lot size. If you want to trade round lots of some securities but not others, setting a lot size of zero will disable rounding for that security, but will still apply the ticket charge. The ticket charge is a flat transaction cost that is applied to each name that is traded, regardless of the number of shares traded.

The three remaining inputs relate to the amount of “free cash” generated, which is the difference between the values of the rounded and unrounded portfolios. Free cash is separate and distinct from any currency holdings in your portfolio. You might find it useful to round down slightly more often than rounding up in order to cover transaction costs and tax costs by checking those boxes, and you can also set a free cash “buffer” for the system to target.

Rounding Algorithm

After the optimization has completed and constraints are resolved, the rounding algorithm begins. The rounding algorithm has three stages.

Loop 1 – Initial Checks

The first thing the rounding algorithm does is apply the ticket charge to the securities that were traded. The ticket charge must be applied post-optimally because we don’t know how many shares are going to be traded until the end of the optimization, and the ticket charge is spread over the total number of shares. The optimizer checks to make sure the cost of the ticket charge is less than the economic value (utility) of the trade; if it isn’t, the trade is simply cancelled. The optimizer also excludes securities that were completely sold off during the optimization from being purchased back during the subsequent steps.

Loop 2 – Main Rounding Loop

Since different securities have different prices, the final value of the rounded portfolio could be far from the value of the unrounded portfolio if we simply rounded to the nearest share: rounding 3.49 shares of a \$5.00 stock down to 3 shares generates \$2.45; rounding 3.51 shares of a \$500 stock up to 4 shares costs us \$245. This is why the algorithm targets a value of free cash – by default, we want the value of rounding up to be the same as the value of rounding down, but you can optionally change this target to be the sum of transaction costs, tax costs, and the free cash buffer.

During this loop, the optimizer rounds all eligible holdings down to the nearest round lot. It checks if the free cash target has been reached (sum of transaction costs, tax costs, and buffer). If the free cash target hasn’t been reached, it sells an additional lot of each eligible security.

Loop 3 – Free Cash Loop

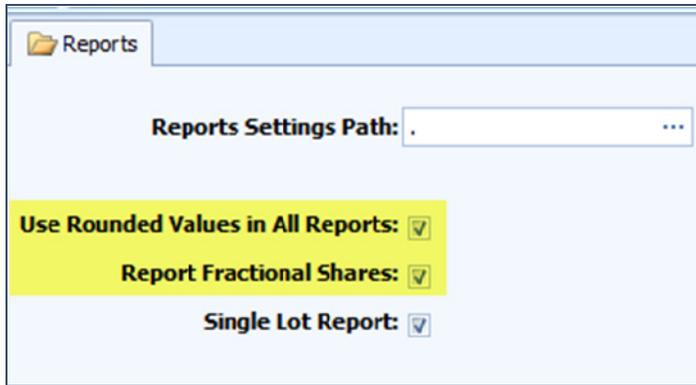
The amount of free cash is now greater than or equal to the free cash target. The optimizer now aims to make the free cash as close to the target as possible by buying back lots, which is really just rounding up. It iterates through each holding in the portfolio sequentially (in order of security ID) and buys a lot if the current free cash position is larger than the target **and** the security has a marginal variance less than the median marginal variance of the portfolio. This has the effect of rounding the riskiest securities down and the less risky securities up to minimize the impact of rounding on the risk of the portfolio. It continues iterating through the holdings and buying lots back until the free cash target is reached.

(Tech Tip, Continued on page 7)

(Tech Tip, Continued from page 6)

Reporting

There are two settings that affect how a rounded optimization's output is displayed, found on the Reports screen:



If you enable "Use Rounded Values in All Reports," all of your reporting on the optimal portfolio – tracking error, risk decomposition, etc. – will use the rounded positions rather than the unrounded values. Toggling this setting is a way you can determine how much rounding is affecting your optimal portfolio's characteristics. This setting is also found on the Holdings Summary screen.

Name [1,a]	InitWt(%)	OptSh	ChgSh	OptSh(R)	ChgSh(R)
ALPHABET 'A'	0.000	9.29	9.29	5.00	5.00
ALTRIA GROUP	0.000	39.12	39.12	35.00	35.00
AMAZON.COM	0.000	5.31	5.31	3.00	3.00
AMER.ELEC.PWR.	0.000	21.19	21.19	23.00	23.00
AMEREN	0.000	14.73	14.73	16.00	16.00
AMERICAN AIRLINES GROUP	0.000	22.88	22.88	23.00	23.00

When "Report Fractional Shares" is enabled and "Use Rounded Values in All Reports" is disabled, the Holdings Summary report will have both the rounded and the unrounded shares. The columns with rounded shares, the Change Shares and consequently Optimal Shares will have an (R) to distinguish them. Note that "Use Rounded Values in All Reports" has precedence, and enabling it will only display whole lots in the Holdings Summary. If rounding is disabled and Report Fractional Shares is disabled, the optimizer will display the nearest whole number of shares without invoking the rounding algorithm.

Stock Value	\$500000.00
Trans. Costs	\$1604.55
Tax Costs	\$0.00
Free Cash	\$939.02
Tax Refund	\$0.00
Round Error	5.27%

Two values in the Holdings Summary are populated when rounding is enabled. "Free Cash" reports how much free cash was created from the rounding so you can see how close the system was able to get to the target. "Rounding Error" is a measure of how close the optimal unrounded portfolio is to the rounded portfolio. It is the sum of the absolute differences in weights of the rounded and unrounded positions. Note that if "Use Rounded Values in All Reports" is enabled, the rounding error will display as 0 because it uses the rounded portfolio for the optimal portfolio.

If you have any questions about how rounding is implemented in the optimizer or would like feedback on your results, users can contact Support. Technical Support in North America can be reached at 617.208.2080 or support@northinfo.com. European clients can contact: support-europe@northinfo.com or call +44-(0)- 20-7801-6260. In Asia, call +81(0)3 5403 4655 or +61(0)2 9238 4284 or contact support-asia@northinfo.com.

(Custom, Continued from page 1)

cated things like risk models, there must be a 'right' answer. Jack's observation makes the point that this is not so; there are many ways in which a covariance matrix can be parsed by using a multi-factor model. Clearly, there are many silly ways of doing it, but equally, there are many sensible ways also.

Many investors and fund managers use one of the standard, off-the-shelf risk models available from one of the small number of vendors. Most of these models can provide decent forecasts of portfolio risk or tracking error. They can tell you the beta of your portfolio to its benchmark, and they can tell you how much of the risk is factor-related, and how much is stock specific.

If you want to look deeper into the risk structure of the portfolio, they can also tell you how much each holding is contributing to the overall risk of the portfolio, in either absolute or marginal terms.

However, factor-based investing, (which has actually been around for a very long time), has recently become very fashionable, and many fund managers nowadays also want to be able to look at the risk structure of a portfolio in terms of the various factor bets they are making.

If you are lucky, the particular set of factors used to build whichever standard multi-factor risk model your firm uses will correspond quite closely to the factors you had in mind when you did your stock selection and rebalanced your portfolio. If you are not, then although the model can tell you all the things mentioned above, it will not be able to shed any useful light on the size of the factor bets you are making in the portfolio. And if you are relying on these factor tilts to generate a significant part of your outperformance of your benchmark, this could be a bit of a problem.

A few simple examples will illustrate the point.

If you are a Value manager (also very fashionable!), you may define Value differently from the way it is defined in your risk model. Or your version of Value may be conditioned only on Momentum and Quality, whereas your standard risk model has a version conditioned on many other factors as well.

Perhaps you have return expectations concerning particular industries: but if you like Biotechnology stocks, and don't like Pharmaceuticals, and have built your portfolio accordingly, your standard risk model will not be much use if it only has a Healthcare factor which covers both.

If you are managing a European portfolio, and your firm has bought a Global risk model that covers both Developed

and Emerging markets, you may find the behaviour of many of the factors in the model are somewhat different from the behaviour you expect of just European factors. A Global Banking factor is obviously going to behave differently from a European banking factor, and the risk contribution from such a factor can be very different from the risk you are actually incurring with your European bank holdings.

In cases such as these, the only real solution is to use a risk model in which the definition, ordering and construction methodology of the factors corresponds to those you have used in your investment process: in short, you need a custom risk model.

Custom (or customised) risk models can be built quite easily, as long as the investment process they are trying to capture can be well-defined. Note that there is an important difference between a 'pure' custom model, i.e. one built from scratch, and a 'customised' risk model.

In the latter case, what we are doing is adapting an existing risk model. The second generation of Northfield XRD models, which come in long-horizon and short-horizon versions, can be customised in various ways. We can change the number of Currency factors, we can substitute your own Style factors for some, or all, of our standard set (Value, Yield, Growth, Momentum, Liquidity and Quality), we can modify the definitions of the Market and Industry factors, and we can change the number of Statistical factors.

Alternatively, we can build a custom model from scratch. In this case, everything about the model can be customised.

A custom model will cover whatever Universe of stocks you are interested in investing in, and could also include indices, ETFs, macro-economic variables, commodities, and other types of securities.

Currency risks can be captured either by estimating Currency betas by time series regressions, or by using dummy variables so that the rest of the model is effectively in local currency terms. Some investors prefer to think about all foreign securities in their own base currency terms, in which case the custom model would have no Currency factors.

Style factors can be included, defined in whatever way you think best. If you wish to keep the exact definition of your Style (a.k.a. stock selection) factors secret, you can simply give us normalised Z-scores to use as the Style betas, and we can estimate the corresponding Style factor risks without ever knowing what the Styles actually represent.

(Custom, Continued on page 9)

(Custom. Continued from page 8)

Both **Market** and **Industry** factors can be defined as you wish. In a Global or Regional model, we can combine individual countries into regional factors if you like, and can use broad-based Sector factors or narrower Industry factors as you see fit. We have built models in which we had different Industry factors for large and small capitalisation stocks, and we have also built models in which some Industry factors are Global, and some are Local.

Finally, various other aspects of the risk model can be specified to suit particular requirements, including the periodicity of returns, the length of the look-back period, the time-weighting, the treatment of short-history stocks and IPOs, orthogonalisation of factors or not, and the inclusion of statistical factors to catch any significant residual systematic covariance not captured by the defined factors.

The most important point is that the custom model should reflect your investment process as accurately as possible; this allows you to explicitly identify and quantify the various deliberate factor bets you are making in the portfolio, and, possibly just as important, to see how big any unintended factor bets may be.

WealthBalancer Video Released

There is a new video on the Northfield website describing our WealthBalancer Service, Northfield's new personal-wealth planning solution for investment advisors.

Take a look at what makes WealthBalancer the most sophisticated solution available to firms for wealth planning. Visit <http://bit.ly/25JVYwJ> to watch the video.

Additional WealthBalancer information is available here: <http://www.northinfo.com/docs/wbalancer.pdf>

State Street to Integrate Northfield's Risk Factor Tools into its truView® Platform

State Street Corporation will work with Northfield to enhance its truView® Risk Management Platform - an online, end-to-end risk solution with broad multi-asset class coverage that includes data collection, exception handling and calculating of risk results.

State Street will integrate Northfield's risk factor tools into its award-winning risk and analytics solution, including risk factor decomposition; its equity and "Everything Everywhere" multi-asset class risk models; and its "optimizer," a risk analysis and portfolio rebalancing tool.

The joint services will allow investors to customize the future time horizon for risk assessment from a few days to many years. By embedding the Northfield analysis at State Street, costly duplicate data processing is eliminated, and data quality is enhanced by the inherent consistency between State Street and Northfield systems. The first release targeting asset owners will be available in late summer and cover client portfolios holding equities and equity derivatives with additional coverage added quarterly thereafter.

If you have any suggestions of what you would like to see covered in upcoming issues, please e-mail your ideas to general@northinfo.com

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

Boston Office

2 Atlantic Avenue, 2nd Floor
Boston, MA 02110
Phone: 617.451.2222
Fax: 617.451.2122
Sales: 617.208.2050
Tech Support: 617.208.2080

London Office

2 - 6 Boundary Row
London, SE1 8HP
Phone: +44 (0) 20 3714 4130
Tech Support: +44 (0) 17 2244 RISK

Tokyo Office

Shiroyama Trust Tower
4-3-1 Toranomom
Minato-ku
Tokyo 105-6027
Phone: +81 (0)3 5403 4655
Fax: +81 (0)3 5403 4646