Maximizing the Benefit of Risk Analysis

By Thomas Gillespie, PhD, and Bruce Curwood, CIMA®, CFA®

If there is one lesson to be learned by all investors since the global credit crisis of 2007–2009, it is the need to better understand the risks of their investments and the liabilities of their plans. One way investors are addressing this need is by a detailed risk analysis of the assets, the liabilities, and the total enterprise. But faced with the challenges of detailed risk analysis over multi-asset portfolios and complex liability profiles, many question the actual value for the effort involved. This article highlights the importance of risk analysis (also known as risk measurement) in modern portfolio construction and how it can drive an enhanced decision-making process that improves risk-adjusted returns. These activities of risk measurement and risk management are part of an overall risk process.

The article discusses the following:
• Overview of a risk process that entails five key elements: risk governance, risk measurement, risk assessment, risk management, and risk compliance.
• The benefits of risk analysis in detail through the example of a typical Australian balanced fund. While the benefits of a detailed risk analysis are expected to be delivered through returns, investors also are faced with increased public scrutiny of their decisions and increased legislative/regulatory oversight.

Overview of a First-Rate Risk Process
For any investor, a risk process is much more than just the software used to calculate risk statistics (the risk system) or a detailed report of the computed risk statistics. Accurate, appropriate, and complete risk measurement is a key competency of a risk process, but the value is delivered by risk management in a framework regulated by risk governance. Figure 1 shows the five key parts of a risk process:

Risk governance. Good risk management can be based only on sound judgment, effective governance, and a comprehensive risk-measurement system that includes good risk tools. Curwood (2007, 2010) discusses the topic of risk governance extensively. In summary, risk governance is a matter of identifying critical parts of the decision structure that give rise to material risks for fund beneficiaries, determining acceptable/achievable/parsimonious risk and return objectives, and developing a risk-management culture and process with clear delegations and measures of success.

Risk measurement. For a large multi-asset investor with or without liabilities, risk measurement must be a) complete, b) accurate, and c) appropriate. While it is appropriate for investors to implement the type of risk mea-

![Figure 1: Overview of a Risk Process](image-url)
urement that is specific to their objectives/assets-liabilities/constraints/governance, a risk measurement initiative will answer the following four key questions:

1. What is the current level of risk?
2. How has this risk level changed through time?
3. Where does this risk come from?
4. How will the assets/liabilities perform in different market environments?

We discuss these questions below and highlight examples. Gillespie and Curwood (2012) highlighted the complexities of risk measurement for multi-asset portfolios. Many investors come at risk measurement from the perspective of equities for a defined contribution fund or fixed interest for a defined benefit fund. Neither approach is really satisfactory because most funds have a comprehensive set of assets and liabilities/objectives. Measuring risk for many assets, such as equities and some conventional fixed-interest portfolios, is straightforward. But most portfolios have high turnover, opaque investments such as hedge funds, or appraisal-based private investments such as direct property, infrastructure, and private equity. All of these asset classes need to be accurately monitored and integrated into an overall risk analysis. Asset owners need to be able to understand the diversification of assets, amount of equity beta in hedge fund investments and the like, how well the assets hedge liabilities, etc.

**Risk assessment.** Investors typically are mandated to take risk and will not meet objectives without some risk taking. But which risks should they take and what is their cost? Risk measurement identifies the risks and quantifies the magnitude of the risks, and risk assessment evaluates the appropriate risks to take in the current investment environment and the price of hedging those risks. For this step to be productive, investors need to compare risk and return equally and as different dimensions of the same investment decision—a process that is all too rare in modern investing. Russell’s Strategic Tilting process is a good example of a dynamic process that considers each investment on the future risk and return profile under a range of potential scenarios.

**Risk management.** Risk management is built on sound risk measurement and risk assessment, and it aims to deliver enhanced risk-adjusted returns to members and plan sponsors by making investment changes governed by trustee-approved delegations. Gillespie and Harman (2011) discussed a number of risk-management strategies (predominantly derivative-based and dynamic strategies) and thus we will not cover them in this article.

**Risk compliance.** In a period of increased regulatory scrutiny, risk compliance provides effective reporting on fund risks. Moreover, the compliance side of risk also establishes that managers and service providers are performing within delegated bounds.

It is helpful to examine a couple of the recent high-profile failures of risk processes. Rogue trader losses are a manifest failure in both risk governance and risk compliance. One of the first in recent memory was the Barings Bank losses of 1995, which led directly to bank failure. This event should have been a wake-up call, but it soon was followed up by a string of similar failures, including the Sumitomo copper trading scandal of 1996, the National Australia Bank foreign exchange option losses of 2004, Société Générale’s stock index futures losses of almost €5 billion in 2008, and UBS’s losses of more than $2 billion in stock index futures uncovered in 2011.

JP Morgan’s recent $2 billion loss is an entirely different affair because to date there has been no suggestion of unauthorized trades. JP Morgan’s loss points to a manifest failure in some or all of risk governance, risk measurement, and risk compliance. Finger (2012) notes:

Risk Governance Matters ...

Models can be useful. But they sometimes need to evolve and always need to be monitored. A governance framework where both modellers and traders can be challenged is crucial to avoiding surprises.

The rest of this article will predominantly be concerned with investment risk. Funds typically expose members and plan beneficiaries to a variety of risks (regulatory, compliance, operational, liquidity, counterparty, reputational, peer relative, benchmark relative, inflation relative ...), but investment risk by far is the most significant for the majority of funds. Australian superannuation funds lost almost 18 percent in the two years to June 2009 and it would be reasonable to suggest this was almost exclusively investment risk (APRA 2012). A first-rate risk process must recognize these risks and consider their significance when assessing the total risk of the fund. Additionally, some risks such as liquidity and counterparty risk are connected to investment risk by some market mechanism—e.g., counterparty risk of foreign-exchange forwards will vary with exchange rates. Russell’s Total Fund Evaluator product is an example of a holistic approach to fund liquidity risk—this tool projects not only investment liquidity but also member-driven liquidity demands into the future.

**Benefits of a Risk Process**

We see a number of key reasons why investors should care about risk analysis and how they should use it:

1. Members and beneficiaries loathe losses more than they love gains. There is a direct relationship between investment performance and member/beneficiary satisfaction (Cashman et al. 2012).
2. Regulatory changes in many jurisdictions are placing a greater emphasis on detailed risk analysis of assets and liabilities. For example the legislative...
and regulatory environment for Australian pension funds is going through a generational change that now sees risk at the heart of what is a minimum standard expected by the regulator. Detailed reporting on stress tests, risk factor analysis, and sources of diversification are now expected on a periodic basis.

3. Investors are able to gain valuable insights through a detailed and holistic risk analysis of their portfolios, so they are in a position to make better investment decisions and take advantage of market opportunities. For example, investors are able to embrace more-innovative portfolio-construction techniques and risk-management strategies with a sound risk analysis.

4. Treatment of new asset classes, currency hedging as an investment risk, embracing risk parity, and risk budgeting methods of asset allocation are possible only when based on a complete risk perspective. More overt strategies such as dynamic asset allocation and derivative overlays are effective only when an investor can understand the risks across the whole portfolio: How much equity beta is in the alternative portfolio? How much diversification are the defensive assets providing? A complete and comprehensive risk process will answer these questions and provide a platform for this decision making.

6. A mature risk process prepares a fund for the next crisis and allows the fund to capitalize on the investment opportunities that crises pres-

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<th>FIGURE 2: SAMPLE INVESTMENT RISK DASHBOARD</th>
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<td><strong>Change in Asset - Inflation Target Value</strong></td>
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<td>Change in Asset - Inflation Target Value</td>
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| **Change in Asset - Inflation Target Value** | **Risk Weight** | **Diversification** |
|---------------------------------------------|
| **Risk Weight** | **Diversification** |
| Change in Asset - Inflation Target Value | Change in Asset - Inflation Target Value |
| 0% | -18.4% | -8.7% |
| 1% | -14.1% | -6.7% |
| 2% | 2.2% | 6.4% |
| 3% | -4.6% | -4.4% |
| 4% | -4.6% | -2.6% |
| 5% | -8.1% | -2.1% |
ent to the nimble and astute investor. Infrequent and severe financial crises are the norm for markets and it is too late to start thinking about risk when markets are already in crisis.

Investors have long acknowledged a need to become more risk-aware in the way they manage their investments, but for the majority this translates to risk measurement rather than risk management. A recent Russell survey concluded that only 17 percent of respondents have made no change to their governance over the past 12 months, with the vast majority taking steps such as increasing monitoring and supervision (Russell Investments 2012). But over the same period, 67 percent of respondents have made only “minor tweaks” or no changes at all in their portfolio due to risk measures. Nevertheless, 53 percent of respondents believe they will take additional risk-management steps in the next 12 months.

For example, consider a typical Australian balanced defined contribution fund. These data are sourced from the Chant West strategic asset allocation survey for December 2011. These funds will in general invest in most asset classes but will have approximately 40 percent invested in listed and unlisted equities. Approximately 80 percent of Australian funds are defined contribution with most having a real return objective (APRA 2012, table 16); for the purpose of this article we have used an objective of inflation (consumer price index) + 3.5 percent.

A one-page risk dashboard is the place to start when detailing risk level for investors. This risk dashboard should be customized to each investor and audience to impart appropriate top-level risk information. Figure 2 shows a sample utilizing asset allocation data for a typical Australian balanced fund. No one dashboard works for all investors or funds; the dashboard design depends on the audience, its financial sophistication, the fund profile, and the particular features and risks that need to be conveyed to dashboard users.

Risk analysis can be a useful tool for identifying concentrations in risk level within the portfolio at an asset class level. Moreover, risk analysis also will quantify the amount of diversification within an actual portfolio that is a result of asset class weights as well as the co-relationship of those asset classes. Figure 3 shows the typical disparity between capital allocation and risk allocation due to the vast disparity in riskiness of the asset classes.

Risk analysis and decomposition is the analysis step within risk budgeting/risk parity investment approaches. Risk budgeting is the allocation of assets based upon their risk exposure rather than capital weights and is a consistent approach that can be applied to sizing all asset classes, including unfunded ones such as foreign-exchange hedges. Risk parity is a stricter approach to asset allocation that equalizes (to the extent possible) the risk in different asset classes and often requires broad definitions of asset classes and leverage in low-risk asset classes. The use of these techniques, among other issues, may challenge relevant governance and regulatory constraints for many investors.

Diversification has been the cornerstone of portfolio construction for the past 60 years, since Markowitz’s seminal 1952 paper. Two issues all investors need to understand are the following:

1. How large is the diversification benefit?
2. What is the propensity for diversification to protect in tail events?

Figure 4 shows the magnitude and breakdown of diversification for a typical Australian balanced fund. The left-hand side of figure 4 shows diversification of a typical fund in light blue—the extent to which the actual risk (volatility of return) is less than it would be if all the assets were perfectly correlated. Figure 4 shows that diversification reduces the overall portfolio volatility by approximately 2 percent or between one-fifth and one-third over the past decade. Moreover, figure 4 shows the decline in diversification over a long period of time for such a fund and the lack of protection afforded through the spike in portfolio risk during 2007–2009. The right-hand side of figure 4 shows the breakdown of the diversification (currently 2 percent versus portfolio risk of 6 percent approximately), which for a typical balanced fund comes from the fixed-income and equity parts of the portfolio.

One way of understanding the tail risk within portfolios is to understand performance under a variety of stress tests or scenarios. This type of analysis...
is also useful to understand the factor exposure of portfolios and highlight significant beta risks. Figure 5 gives an example of this type of analysis by highlighting the concentration of risk into equity investments and the diversification offered by the currency exposure. These stresses are applied across the whole portfolio. Taking the first as an example, the portfolio has 21-percent capital exposure to Australian equities, which would account for a loss of 2.1 percent, but with the residual coming from other parts of the portfolio—in this case not the other direct equity investments, because the stress has constrained those to be unmoved. This analysis permits understanding of the risk factors that drive portfolio performance.

Figure 6 shows the results of stress tests under a variety of historic scenarios to demonstrate the potential drawdown in the fund through historic precedents for large left-tail events.

Conclusions
This paper has given a detailed answer to the important and valid question, “Is risk analysis worth the trouble?” In summary, the answer is a definitive “Yes!” We have further highlighted how investment risk measurement is part of an overall risk process that includes governance, measurement, assessment,
management, and compliance as key parts. Investors gain value from risk governance and risk measurement and to a lesser extent from risk compliance. But accurate and complete risk measurement and risk assessment are essential to these value-enhancing activities.

The section titled “Benefits of a Risk Process” highlighted the types of risk analysis that investors may find useful and demonstrated the benefits through the example of a typical Australian balanced fund. While typical investment risk reporting can be a lengthy detailed affair, we advocate a clear risk dashboard approach backed by detailed analysis that tiers the information in a meaningful way.

Remember, however, that risk measurement/analysis is just one aspect of creating a good risk system. And good risk management can be built only on good risk measurement. To be successful, the risk process should be part of a holistic culture of risk-adjusted decision-making.

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Endnotes
1 Russell’s Strategic Tilting is a “high conviction” approach to asset class timing to temporarily adjust, or “tilt” a portfolio’s risk exposure from its long-term default strategic asset allocation. Russell calls this “enhanced asset allocation” and makes a distinction with the more common “tactical asset allocation,” which is generally of a much–shorter time horizon.

2 For a particularly concise example of a total enterprise approach where the outcomes are not entirely dominated by investment risk, see Schmid and Nguyen (2012).

3 We make the distinction between counterparty risk and credit risk. Counterparty risk is the risk that a counterparty that has committed to a contractual obligation with you fails to honor that contract and obligation. Counterparty risk is a by-product of derivative transactions and the like, and it typically is unrewarded and market sensitive. Counterparty risk is distinct from credit risk, which is typically rewarded; bonds backed by guarantees of risky issuers trade at a discounted price comparable to risk-free bonds to compensate for the credit risk born by the holder. Credit risk is part of investment risk.

4 Russell’s Total Fund Evaluator is a sophisticated actuarial model of the trends in member demographics, member dynamics and investment cash flows, investment returns, and asset allocations under both steady state as well as a range of stress environments. The Total Fund Evaluator has the capacity to analyze the liquidity profile of both defined benefit and defined contribution funds and calculate contributions funds over both the long term and short term, with the ability to overlay a range of different investment or stress scenarios.

5 Risk budgeting typically is applied to allocate assets between asset classes or to allocate assets between managers. For a smattering of references on the use of risk budgeting as part of the asset allocation process, see Bruder and Roncalli (2012), de Bever (2003), Figelman (2004), and Mina (2005).

6 Chant West Data: The Chant West (Chant West Pty Limited, ABN 75 077 595 316) data is based on information provided by third parties that is believed accurate at the time of publication. Past performance is not a reliable indicator of future performance. Your objectives, financial situation, and needs have not been taken into account by Chant West and you should consider the appropriateness of this information having regard to your objectives, financial situation, and needs, and read the relevant PDS, before making any decisions. Chant West’s Financial Services Guide is available at www.chantwest.com.au.

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