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**Building and  
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## BUILDING AND MONITORING A RISK-CONTROLLED PORTFOLIO

*Using risk modelling for better mandate construction and investment compliance monitoring*

June 2011

Risk management and ongoing compliance monitoring have become more important to institutional investors in the aftermath of the global financial crisis. The massive market dislocations that began in 2008, along with the resultant volatility, caused investors to reassess their investment objectives and the effectiveness of their mandates. With this heightened risk awareness, the construction of investment mandates has become more closely tied with effective risk budgeting, particularly with a focus on the risk taken to achieve return targets. Along with that, investors are realizing the importance of constructing appropriate compliance guidelines – including daily monitoring for investment compliance – to ensure that the pursuit of these targets is in accordance with their expectations.

### THE GROWING TREND TOWARD PASSIVE MANAGEMENT

Another trend that arose from the global financial crisis is the shift by many investors from active to passive management of their portfolios. This shift has been driven by many factors, including the relative performance of active strategies during and after the market dislocations of 2008 and 2009, a focus by investors on operational efficiency and cost management. In many instances, institutional investors have reviewed their asset

allocation post-crisis and moved to a beta replication or passive strategy for the core of their investment portfolios, reserving the alpha generation for the satellite portion of their investment programs.

For the investor, when choosing between active or passive management, the major concern centers not just on the chosen benchmark, but on the risk budget given to the manager. For an

active mandate, the overriding concern is the **optimal use of tracking error** – how much excess risk over the benchmark the mandate is allowed to take. For a passive mandate, however, the focus is on minimizing tracking error and constraining it within the mandate's parameters. Because of the importance of tracking a benchmark in passive portfolio management, guidelines for passive mandates nearly always reference the benchmark.

Integrating risk management and monitoring at the portfolio construction level allows guidelines to be more risk-aware and risk-controlled so that you can achieve a balance between your goals and the investment manager process.

### CONSTRUCTING THE MANDATE

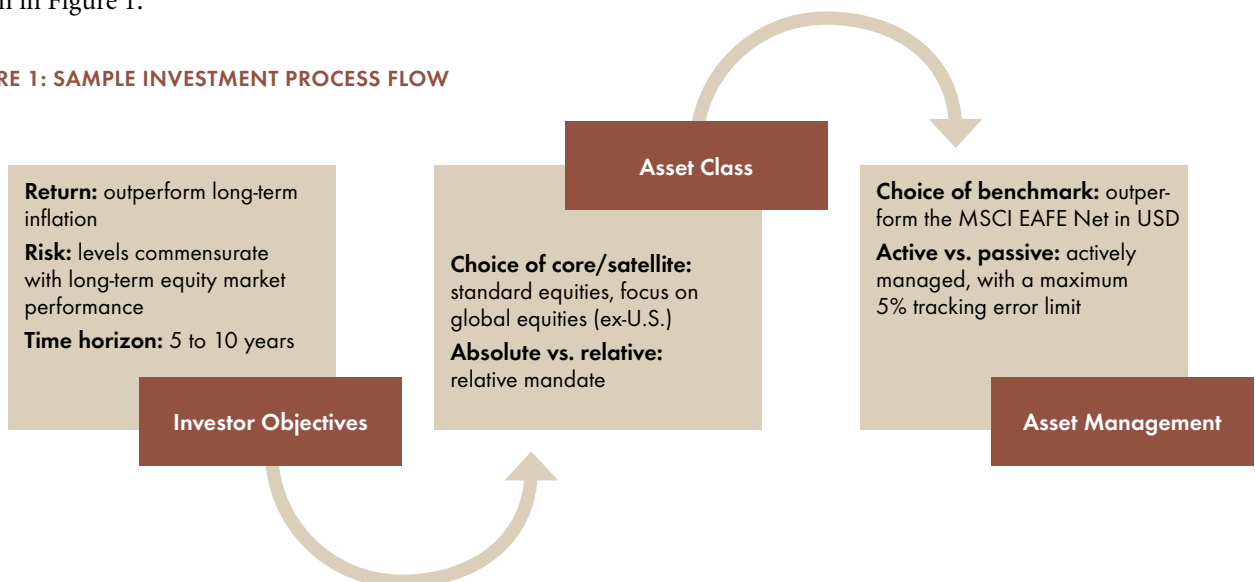
Effective risk management and monitoring begins with the construction of your mandate. When building your investment manager agreements, key steps you may want to consider include:

- Stating the mandate’s objective. Is the mandate to be managed on an absolute basis or relative to a benchmark?
- Determining whether the mandate will be passive or active. Are you trying to replicate a benchmark to obtain a certain market beta (a passive mandate) or beat this benchmark (an active mandate)?
- Articulating the actual parameters chosen for the guidelines. These are more commonly a function of the risk budget’s size, and are often distilled down from a portfolio-level tracking error or volatility target.

We can use a simple example to illustrate the process. Let’s say you want to allocate part of your investment capital to a *growth strategy with some income generation*. You could then refine this generic high-level objective into specific targets, such as a target return or a risk-adjusted return outcome over a certain time horizon. In this case, let’s say you have stated your objectives as seeking to outperform long-term inflation while keeping risk levels commensurate with long-term equity market performance. Your stated time horizon to achieve these objectives is five to 10 years.

To achieve these targets, you then could specify a particular asset class or combination thereof that best provides the ability to match your desired return and risk in your time horizon. In our example, let’s say you have specified investments in standard equities, with a global focus (ex-U.S.). Because, for our illustration, your goal is to actively outperform a benchmark, your mandate will be actively managed. In this case, let’s say you have chosen a relative guideline of a maximum 5% tracking error. This investment process flow is shown in Figure 1.

FIGURE 1: SAMPLE INVESTMENT PROCESS FLOW



## CHOOSING THE COMPLIANCE MONITORING GUIDELINES

Now that you've established the core guidelines for your investment mandate, you need to determine what combination of investment parameters will help measure and monitor your portfolio's risk budget. These also should be included as guidelines in your investment manager agreement.

Broadly, investment compliance guidelines can be categorized as either absolute or relative; absolute guidelines aim to measure, quantify and monitor the mandate's exposures to various market characteristics in isolation. Relative guidelines monitor exposures in relation to a benchmark, and would require explicit reference to the benchmark. Table 1 highlights some of the more common absolute and relative guidelines.

*Broadly, investment compliance guidelines can be categorized as either absolute or relative.*

**TABLE 1: TYPICAL PERFORMANCE GUIDELINES**

	Absolute Guideline	Relative Guideline
1	Cash limits	Investments in securities/sectors/countries that are not constituents of the benchmark
2	Rating limits	Portfolio country or regional bloc exposure limits
3	Rating minimums	Currency exposure limits
4	Authorized countries/currencies	Security exposure limits
5	Authorized investments (per asset categorization)	Sector limits
6	Maturity limits	Duration limits
7	Prohibited short sales	Equity characteristic monitoring (i.e., P/E ratio, dividend yield, market capitalization)
8	Counterparty exposure limits	Rating limits
9	Counterparty rating limits	Rating minimums
10	Prohibited borrowing	Maturity limits
11	Asset allocation	Asset allocation
12	Prohibited actions	Authorized investments

Getting back to our previous example of the actively managed global equity mandate, measured against the MSCI EAFE, the example mandate has a maximum tracking error target of 5% per annum. This mandate uses relative guidelines that blend the need to measure and monitor absolute exposures as well as benchmark-aware limits.

## CREATING STRONG, FLEXIBLE GUIDELINES

When constructing investment mandates, relative guidelines can be used to measure and monitor portfolio exposures on an absolute basis, and absolute guidelines can be used relative to a benchmark, making the designation of relative versus absolute somewhat fluid. To see how this works, we can examine two sets of guidelines that are important to investors: *cash limits and exposure limits*.

Although we categorized cash guidelines as absolute in Table 1, they can have particular resonance for relative mandates. Cash limits are common to both actively or passively managed mandates. In either case, the mandate needs to maintain a certain cash exposure as a matter of practicality, given market volatility and investor liquidity needs.

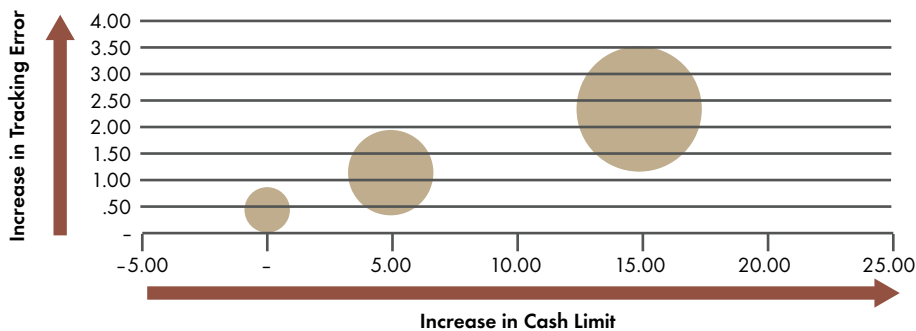
An active mandate may allow more discretion over how much cash it can hold to allow the manager to selectively allocate or “time” the market to exploit mispricing or market inefficiencies. This allows the manager to take more risk when the market environment suits the manager’s style, dialling down the risk in less favorable environments<sup>1</sup>. To achieve this, you might construct your mandate with guidelines such as: *“The portfolio is allowed to hold investments in cash and cash equivalent securities, up to and including a maximum of X% of the total portfolio market value.”* Active mandates often have cash limits up to 10% to 20% of the total market value, depending on asset class and strategy style. For a passive mandate, on the other hand, the percent limit will likely be small, perhaps in the region of 0% to 0.5%. But this type of wording takes perhaps a simplistic approach that doesn’t consider the effect the cash limits can have on other guidelines.

Using risk analysis can help you understand the effects your chosen limits may have on other guidelines and better shape your cash limit. By modelling the range of outcomes with respect to the effect on tracking error, you can help ensure the guidelines are not only realistic and achievable by the manager, but also appropriate for the manager’s needs. Factors to consider in the modelling of the limit would include:

- Liquidity of the mandate’s asset class;
- Relative market volatility in the asset class; and
- Market impact, a function of the size of the mandate relative to the asset class.

### FIGURE 2: EFFECT ON TRACKING ERROR FROM CHANGING CASH LIMITS

As the portfolio’s cash limit is raised, the tracking error grows exponentially, from below 0.5% to nearly 3%.



<sup>1</sup> Passive mandates maintain as much as possible a “fully invested” portfolio and keep small cash exposures purely to fund ongoing rebalancing. This is effectively to keep the tracking error as low as possible.

Incorporating risk analysis, you can refine your guidelines to be more risk-aware, such as: *“The portfolio is allowed to hold investments in cash and cash equivalents, up to and including a maximum of X% of the total portfolio market value. Where ex ante market volatility, as measured by the mandate benchmark over rolling X periods, falls within a range of A% to B%, the cash limit can be extended to Y%. Where ex ante market volatility exceeds a limit of C%, cash limit can be extended to Z%. A cap on the cash limit is set at G% regardless of market factors.”*

Exposure limits are crucial in managing the portfolio’s exposures to sectors, countries or even stocks so that the manager achieves your goals in a risk-controlled manner. You can construct an exposure limit with reference to a benchmark or in isolation. Generally, if your aim is to constrain tracking error, the exposure limits would explicitly reference the benchmark to ensure that the mandate tracks the benchmark closely. However an exposure limit focused on sectors, for example, for an active mandate can reference the benchmark while giving the asset manager leeway by specifying larger ranges.

For an active portfolio, a pro forma sector limit guideline could be: *“The manager must manage the portfolio’s sector exposures within a range of X% to Y% relative to the benchmark exposures, categorized by the GICS<sup>2</sup> classification scheme.”*

The parameters you choose for limiting your exposure to a sector often can be a function of your risk profile – for example, how much concentration risk are you willing to bear, in terms of being exposed to one sector, in volatile markets? A simple example is shown in Table 2. This portfolio, which has a passive mandate, was built allowing a cursory 0.5% range for sector allocation to help the asset manager navigate through volatile markets and allow optimal rebalancing. As a result, the tracking error is minimized to less than 0.5%.

For an active mandate, the asset manager could theoretically overweight one sector, such as information technology, by 5% (in effect doubling the allocation). This would increase tracking error to nearly 2%, or nearly six times that of the passive mandate. In between these two, you also could model a constrained mandate. Here, a 1% active range doubles the tracking error from the passive mandate, but is still far lower than the active mandate.

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**TABLE 2: ABSOLUTE AND RELATIVE RISK**

<b>Passive</b>	IT +/-0.5%	Benchmark	Portfolio	Active
	<b>Total Portfolio</b>	<b>9.84</b>	<b>9.96</b>	<b>0.34</b>
<b>Constrained</b>	IT +/-1%	Benchmark	Portfolio	Active
	<b>Total Portfolio</b>	<b>9.84</b>	<b>10.02</b>	<b>0.76</b>
<b>Active</b>	IT +/-5%	Benchmark	Portfolio	Active
	<b>Total Portfolio</b>	<b>9.84</b>	<b>10.59</b>	<b>1.98</b>

2 GICS refers to the Global Industry Classification Scheme.

For an active manager with a risk budget to work with, this may not be an issue. However, for a passive or constrained mandate, investors put tighter limits in place to deliberately restrict the effect on tracking error.

During periods of high market volatility, some sectors may face even heavier risk loads. As can be seen in Table 3, the information technology sector was one of the most volatile in the early part of the decade, and as of 2009, generated similar levels of risk. An investor may not be comfortable with exposure to this sector and may choose to constrain the manager from investing in this sector.

**TABLE 3: ANNUAL SECTOR VOLATILITY FOR THE MSCI EAFE**

	2009 Standard Deviation	2008 Standard Deviation	2007 Standard Deviation	2006 Standard Deviation	2005 Standard Deviation	2004 Standard Deviation	2003 Standard Deviation	2002 Standard Deviation	2001 Standard Deviation	2000 Standard Deviation	1999 Standard Deviation
Consumer Discretionary	24.5	23.1	10.6	10.6	10.4	9.5	14.7	19.4	24.7	14.5	17.6
Consumer Staples	18.6	19.4	8.1	6.5	7.2	12.0	13.5	13.8	10.8	14.4	9.5
Energy	20.8	31.8	14.9	18.1	16.6	11.1	18.9	18.5	15.9	21.8	24.5
Financials	39.8	32.0	12.0	8.9	10.2	11.2	19.5	25.4	18.4	17.5	14.5
Health Care	20.1	16.5	9.0	8.3	9.4	5.9	15.2	12.9	9.9	16.4	11.5
Industrials	25.9	33.0	11.1	12.3	11.0	11.3	14.1	20.6	19.9	12.8	13.0
Information Technology	23.7	30.3	9.2	12.0	15.5	19.0	18.7	32.6	44.7	27.3	34.2
Materials	28.9	39.3	13.5	13.3	17.2	11.8	17.3	19.5	19.8	19.7	19.2
Telecommunication Services	19.0	23.2	13.1	12.1	9.3	12.1	16.1	33.6	31.4	24.2	22.6
Utilities	21.9	21.1	9.9	8.2	7.1	8.1	13.8	14.5	11.0	14.3	8.0
<b>Total</b>	<b>24.6</b>	<b>26.0</b>	<b>9.3</b>	<b>8.9</b>	<b>9.6</b>	<b>9.1</b>	<b>14.0</b>	<b>18.2</b>	<b>16.4</b>	<b>13.0</b>	<b>12.1</b>

You can control for these types of additional risk by using risk modelling to develop a more detailed guideline, such as: *“The manager must manage the portfolio’s sector exposures within a range of X% to Y% relative to the benchmark exposures, categorized by the GICS classification scheme. In market cycles where ex ante market volatility is in the range of*

*A% to B%, the manager has authority to extend the range for sectors 1, 2 and 5 by F%. If ex ante market volatility exceeds a threshold of D%, the manager must neutralize the active sector positions in aggregate to the benchmark exposures, subject to prevailing liquidity in the sectors. The manager is authorized to use index-traded derivatives (exchange traded funds, options and futures) to manage the exposures. The manager has X days to trade the portfolio to neutral if it cannot use derivatives to manage the exposures.”*

#### SETTING THE STAGE FOR AN OPTIMAL OUTCOME

Using a few simple risk-modelling techniques can significantly improve the language in an investment manager agreement and provide a more optimal outcome with guidelines that are relevant and provide better measurement of the manager’s sources of risk in managing the mandate through different market cycles.

As the financial markets continue to be subject to higher levels of volatility, the convergence of investment compliance and investment risk analysis is an important development to help investors and asset managers. A risk-controlled approach to portfolio construction and the design of investment manager agreements results in more informed portfolio construction, and better transparency in the monitoring and measurement of the manager’s abilities in managing the mandate, all leading to a more optimal outcome for investors.

#### DATA MANAGEMENT A CRUCIAL ELEMENT OF SUCCESS

A scalable and efficient compliance-monitoring platform means that investors benefit from daily accuracy, optimal implementation of guidelines and stringent data management, both for the portfolios and for the indices and benchmarks, vital in managing the mandate.

For investors moving from active to passive mandates, choice of benchmark is crucial. Data management plays a significant role in this regard; for optimal monitoring of a passive mandate’s guidelines, appropriate benchmark sourcing and integration into the compliance process is a must.

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