

## Special Report

## Enhancing Reporting Practices in Asset Management

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### ■ Summary

The gloomy environment that followed the Internet bubble bursting in 2000 made the search for alpha a higher priority than ever for institutional investors, leading them to reconsider the outsourcing of their assets. They turned towards new asset allocation strategies and investment products, potentially more complex and more risky. Looking for recognised experts in every asset class, they no longer hesitated to challenge the long-standing relationship they had with some asset managers. Their shift from balanced to specialised mandates resulted in a multiplication of the providers used and a decrease in the size of mandates. Thus, their relationship with asset managers radically changed, becoming more fragile and challenging. This, combined with a changing legal environment, made it even more crucial for them to have an accurate aggregate view on their assets – but also more complicated.

Asset managers had to adapt to this new environment to protect their book of business. While for many years asset gathering had been the driving force in a rosy environment, asset managers suddenly woke up to the necessity to respond to, on the one hand, more demanding investors, puzzled by the low return environment and, on the other hand, to increasingly fierce competition. As never before, they found themselves compelled to detail their investment strategies and justify their investment choices. At the same time, they were forced to explore ways to differentiate themselves from their peers, struggling against the growing success of both hedge funds and passive managers.

In that context, client reporting, which was long regarded as a by-product of asset management services, gained a new importance among institutional investors and asset management organisations, serving at the same time the former's growing demand for more transparency and the latter's need for more differentiation. As illustrated by several recent industry surveys,<sup>1</sup> institutional investors increasingly consider reporting as a key concern when selecting and evaluating asset managers, requiring more detailed and sophisticated information.

Producing high-quality reporting is not an easy task, though. It requires a full skill set and is becoming increasingly demanding. While its basic purpose remains to inform investors about the past performance of their assets, it is clear that reporting serves many other purposes, which should not be overlooked by asset managers. In such circumstances, how should reporting documents be articulated and which type of information should they offer? How should past performance be presented? Why have reference indices a key role to play? What risk indicators should be preferred to best reflect portfolio risks? In other words, how can reporting best allow investors to assess portfolio managers' skills and understand the risks they are exposed to? Finally, where is the right balance for asset managers between serving investors' needs and providing the most relevant information, while maintaining efficiency? Many institutional investors may ask for detailed, comprehensive and customised reporting, but some of them might not be ready to pay the price for it.

## ■ Which Reporting Standards as of Today?

As a preamble, it is important to remember that any reporting, as transparent, detailed and thorough as it may be, will not be worth much unless it is based on accurate and reliable data. In such circumstances, the recourse to dedicated reporting software and data warehouses for reporting production is with no doubt a plus, in the sense that it helps reduce manual handling and thus potential for errors. To prevent any potential conflict of interest and to avoid any temptation to disguise actual performance, it is obviously preferable to have the production of reports in the hands of a dedicated team that is fully independent from portfolio managers. Additionally, the growing complexity of investment strategies and reporting requirements requires the team to be experienced and focused. Some asset managers have chosen over the past few years to outsource their reporting functions with a view to reduce costs and boost efficiency. Externalising such functions requires close and ongoing supervision, not to forget a thorough selection process.

Beyond the production process itself and the necessity to rely on accurate data, the content, format and layout of reporting documents are subject to numerous debates. One of the trickiest questions is how to deal with investors' requests, especially with regards to less sophisticated investors, unfamiliar with financial technical terms and primarily focused on past performance. Some may argue that reporting documents should merely answer the explicit requirements expressed by investors, for the simple reason that additional information will in any case be disregarded or even misinterpreted. However, it is difficult to ignore the educational role that asset managers should play towards their clients.

Likewise, detailed reporting documents might prove useful for asset managers to prevent legal action from unhappy investors and protect their reputation. In the past some asset managers have been forced to compensate investors for poor performance, as the latter claimed, among others, that they had not been properly made aware of the underlying risks; one of the most famous cases was brought by Unilever against Mercury Asset Management in 2001. Offering detailed reporting documents that clearly put forward portfolio breakdown, risk level and performance drivers can help prevent such situations. Additionally, reporting documents constitute a privileged means of communication between asset managers and investors and certainly plays a key role in establishing trust between the parties.

All these arguments clearly speak for thorough and comprehensive reporting. Judging from the

increasing human and material resources allocated to reporting departments and their growing internal recognition, which Fitch has observed while rating asset managers, most asset managers have clearly acknowledged the importance of reporting. More generally, the increasing sensibility to communication and marketing practices within the asset management industry that emerged over the past few years has enhanced the clarity and quality of reporting. Yet, while some common practices have tended to emerge, the asset management industry still lacks recognised reporting standards. Performance and risk indicators in particular need to be looked at with care, as they may be computed according to different methodologies and can therefore have different meanings. More generally, reporting quality is still uneven amongst players, making it difficult for institutional investors to find their way around and compare results across asset managers and to gain an aggregate view of their delegated assets.

## ■ Performance Presentation Pitfalls

Performance presentation practices have been widely debated in the recent past as awareness grew about the need for higher standards that would allow greater comparability and transparency while protecting investors from misleading practices. In that respect, the introduction in 1999 of the Global Investment Performance Standards ("GIPS") and its subsequent worldwide development have been a remarkable step forward for the implementation of globally recognised good practices through self-regulation. With GIPS, which require firms to use certain calculation methods, disclosures and presentation standards, the asset management industry has drawn the basis for accurate and consistent investment performance data, which can then be used in marketing and reporting documents. However, while most global asset managers are now certified GIPS-compliant, it is not necessarily the case for smaller or boutique-like asset managers. Also, GIPS certification does not encompass all reporting aspects.

In the first place, for the reporting to be fully transparent to investors with regards to performance, any sort of window dressing through period picking should be completely avoided, e.g. presenting portfolio results only over the least volatile time frame or over rising market periods with a view to displaying positive returns only. Similarly, any preliminary testing period, back-testing simulation or other portfolio track record should be excluded from the performance presented.

Of equal importance is the breadth of the periods under consideration. In addition to results for recent periods (such as quarterly or year-to-date data, which

present the excess return delivered since the previous reporting), client reporting should display the performance achieved over a long-term horizon. Although three and five years are generally accepted standards, what can be considered long term is open to debate. A theoretical fund with an expected tracking error of 3% and an annualised average relative return of -1% still has, according to the normal distribution law, a 22% probability of outperforming its benchmark by 1% over three years and a 15% probability of outperforming by 2% over five years. This clearly illustrates that even funds performing poorly over the long term can display a positive relative performance for shorter periods purely by chance. Additionally, specific and short-lived market conditions have a significant impact on portfolio performances. It is therefore critical for the reporting to look beyond cyclical market movements and to present a view of the portfolio over its recommended investment horizon.

Investors should also be aware that even long-term performance periods can depict very different pictures depending on the way they are looked at. First need to be highlighted the shortcomings of static perspectives, focusing on point-to-point analysis. This is often a drawback of client reports that limit their analysis to calendar periods, driven by calendar years or mandate anniversary dates. Displaying portfolio performance solely at fixed dates may not be a representative picture of the portfolio life, as it is a static representation of a continuously evolving object. A flat yearly relative performance figure for a calendar year, for example, may hide periods of gains and losses, as illustrated in the table below. In this example, the relative performance for 2004 is +0.5%, but only -1.2% over the one-year period ending in November 2004 and -0.5% over that ending in February 2005.

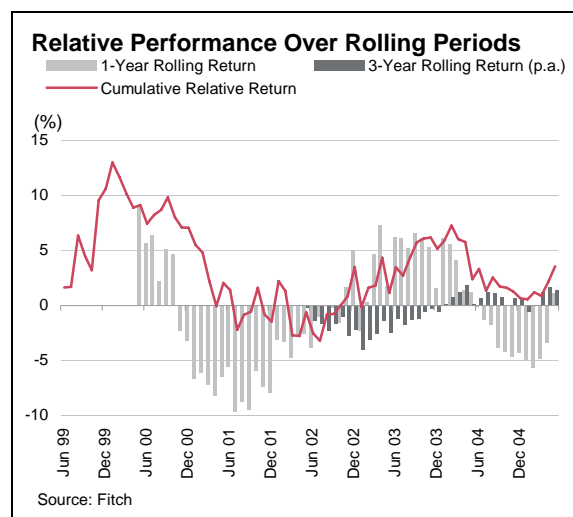
### Drawbacks of Calendar-Period-Focused Analysis

Monthly Relative Performance Over 1-Year Period (%)							
Dec-03	(2.0)						
Jan-04	0.7	0.7					
Feb-04	1.3	1.3	1.3				
Mar-04	(1.2)	(1.2)	(1.2)	(1.2)			
Apr-04	2.1	2.1	2.1	2.1	2.1		
May-04	0.1	0.1	0.1	0.1	0.1	0.1	
Jun-04	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Jul-04	(1.9)	(1.9)	(1.9)	(1.9)	(1.9)	(1.9)	(1.9)
Aug-04	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Sep-04	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)
Oct-04	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)
Nov-04	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
Dec-04	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Jan-05			0.3	0.3	0.3	0.3	0.3
Feb-05				0.6	0.6	0.6	0.6
Mar-05					0.4	0.4	0.4
Apr-05						(1.3)	(1.3)
May-05							1.1

1-Year Relative Performance (%)							
At end	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05
	(1.2)	0.5	0.1	(0.5)	1.1	(2.3)	(1.4)

Source: Fitch

Performance evaluation based on fixed-date periods may also create unusual investment behaviour, as portfolio managers' attention is distracted from their primary investment objectives and long-term investment horizon onto maximising their performance as at specific dates. This phenomenon often translates into portfolio managers trying to lock in gains and reducing active portfolio bets prior to client reporting periods or, conversely, attempting to recover from previous losses and thus increasing portfolio risk. These biases resulting from point-to-point analysis are somewhat mitigated when quarterly or even monthly consecutive investment results are displayed to clients. A robust alternative is to use statistical measures such as rolling returns, which implies calculating returns over a fixed length of time at consecutive starting dates. This points out whether the portfolio manager has been able to achieve consistent results over a set investment horizon, regardless of calendar periods or the mandate starting date, as illustrated in the graph below.



### Why is a Reference Needed

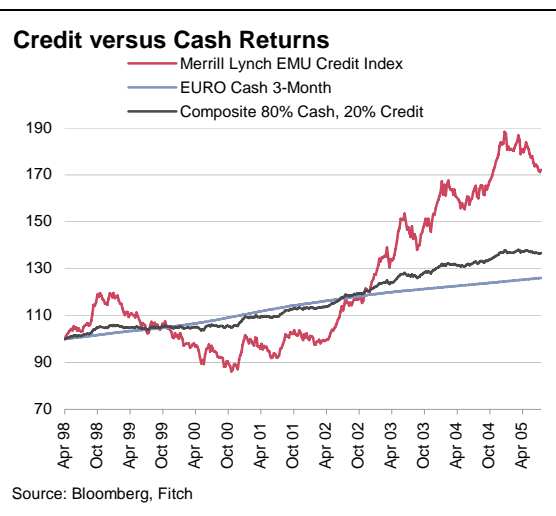
Reporting documents should make clear to investors what investment strategies are being pursued, the risk and return targets, and the reference index, i.e. the "benchmark" against which the performance of the portfolio will be measured. One should not mix up the concept of a reference index with that of indexed-investing. Current criticism against the indexed-investment approach and the growing interest for absolute return strategies should not belittle the role of a benchmark, which remains crucial in all cases. Comparing portfolio performance to the benchmark actually enables investors to differentiate alpha generation from beta or, in other words, to assess the value added by portfolio managers, be it under favourable or adverse market conditions. The definition of a relevant

benchmark, however, is far from being as trivial as it seems at first sight.

First and foremost a benchmark has to be appropriate both to the investors' objectives and to the investment style pursued, and needs to reflect as closely as possible the risks taken within the portfolios. It should also be unambiguous to both parties – hence the need for a joined effort between investors and portfolio managers – and specified at the time the mandate is set up with a view to avoiding any future litigation or any temptation for the asset manager to behave unethically. Similarly, it should be investable and measurable. To that extent, parameters such as the breadth of the benchmark used, any style orientation, size bias, liquidity filters, currency policy (hedged or not), income treatment (dividends and coupons reinvested or not) or tax implications should be considered very carefully, in investors' best interests.

Although common practices have improved significantly in recent years, some abuses are still happening. Size- or style-biased portfolios may, for example, be benchmarked against broad indices and credit portfolios against government bond indices. As far as absolute return strategies are concerned, they are in most cases only compared with cash returns on the basis that, by definition, they do not have a benchmark. Fitch believes that the performance of any portfolio should be compared to that of the most relevant market index (if need be, several indices), i.e. the one that reflects the most accurately the structure of the portfolio and its risks.

To illustrate this, take the example of an absolute return strategy aiming at exceeding cash by 2%, primarily through investments in the euro credit market. Although the benchmark is cash plus 2%, just comparing the performance achieved with that of cash appears of little relevance and can even be misleading. As shown in the graph below, delivering a return exceeding cash by 2% in favourable credit market conditions can be easily achieved through the portfolio's beta exposures to credit. Conversely, credit markets can prove very volatile and be subject to liquidity crises. In such circumstances, the performance of a credit-invested portfolio can very rapidly deteriorate and exhibit a rate of return far below that of cash. Hence the necessity to compare the portfolio performance with that of a recognised euro credit index, which will certainly help investors identify the true risk of the portfolio and understand whether the asset manager displayed real skills in managing credits or simply benefited (suffered) from the good (bad) run of the credit market.



Finally, it is common sense that the benchmark should be defined with a long-term perspective. Amendments should only happen if there is strong case for it – such as a change in the overall investment philosophy or in the market environment – to avoid the use of a benchmark that would present the most favourable picture for every reporting period. In cases where the benchmark has been amended since the mandate/portfolio inception, the reporting should highlight the various benchmarks that have been applicable through time and the portfolio's performance must be compared with those historical benchmarks.

## ■ Assessing Performance Sources

Informing investors about the performance delivered, in absolute and relative term, is fine, but it does not tell much about the way performance has been achieved. Performance attribution analysis provides an efficient answer to this question, as it highlights the primary drivers to positive or negative relative performance according to specific effects. It can therefore tell what have been the most or least successful investment decisions and whether the portfolio manager actually displayed the skill set he is putting forward. In concrete terms, the performance attribution aims at analysing, in isolation from each other, the impact of every type of investment decisions, be it qualitatively or quantitatively driven, such as stock picking, sector selection, asset allocation, currency, duration or curve positioning, to name but a few. These are captured through pre-identified attribution effects, which to fulfil their role properly have to be cautiously defined according to the steps driving investment decision-making. Too often still in client reporting, the effects displayed are not in line with the investment process and thus do not have much explanatory power.

Although performance attribution can prove to be a powerful tool to evaluate the quality of performance delivered, it is not yet used as much as it deserves to be in client reporting. This is particularly true for fixed-income portfolios, which suffered in the past from the lack of efficient and flexible attribution tools capable of accurately dissecting their relative performance. Attribution accuracy is of particular importance in the case of bond portfolios, in view of the smaller magnitude of their relative performance. Over recent years, software providers and in-house developers have somewhat bridged that gap, allowing a gradually increasing number of asset managers to compute performance attribution on bond strategies. The expanding recourse to more sophisticated investment instruments and practices also represents a challenge to traditional attribution methodologies, which have to be enhanced accordingly.

In some investment houses, the relative performance calculated through performance attribution may not fully reconcile with the official one. This may result from two things, which are often combined. First, if the attribution tool is fed with portfolio and/or benchmark data that differ from those controlled at the middle and back offices and then used in portfolio valuation, discrepancies will arise as a result of discrepancies in the underlying data used. This illustrates the importance of data quality. Secondly, holding-based attribution methodologies – as opposed to transaction-based – may not capture all the factors that will be integrated in the portfolio valuation. It covers primarily part of the trading impacts and costs, as most holding-based systems are based on daily market prices and hence do not capture intra-day price movements or induced trading costs. These holding-based tools offer the advantages of being simpler to update and providing powerful analytical functionalities. As a result they are often favoured by investment professionals and installed in the front office. They may also be used for client reporting, provided the gap between official and approximated relative returns is treated in an appropriate manner. Any sort of fudging must be avoided.

In the absence of performance attribution systems, or for absolute return products, a more simple contribution analysis can prove an interesting alternative, albeit that it has less explanatory power. In any case, whether relative performance is explained through an attribution or a contribution analysis, such information becomes truly beneficial when placed in the perspective of an investment decision's rationale. Therefore an attribution table should be complemented by an investment comment, which explains the figures and additionally

demonstrates that the portfolio manager understands the actual impact of his investment decisions. Although this may sound rather simple, investment comments and attribution, when displayed, still remain disconnected in most reportings.

#### ■ Risk and Asset Managers' Skills

As mentioned above, a portfolio strategy is defined through its risk and return profile. In efficient markets, higher long-term return implies an increased level of risk and, conversely, more risk should be rewarded with a higher yield. Standard performance attribution does not highlight the fact that portfolios can be riskier than their benchmarks and thus that additional excess return may not derive from managerial skill but rather from additional risk taken. It is therefore important for investors to be able to understand what performance has been achieved for what degree of actual risk.

*Ex-post* volatility indicators measuring the dispersion of returns around their mean are the most commonly used measures of risk in reporting documents. They measure portfolio risk in absolute terms or relative to the portfolio benchmark in the case of tracking error. Based on these volatility indicators, risk-adjusted performance ratios, such as the information or Sharpe ratios, provide a good measure of the performance delivered in light of the risk taken. (Please refer to the appendix at the end of this document for definition and calculation of these measures.) Investors should, however, remain aware that, to be statistically significant, these measures have to be based on a large enough number of observations (at least 30) and a long enough history. It is therefore recommended that the reporting document should specify how many data points have been used so that the reader can evaluate the relevance of the indicator.

With a view to analysing further risk and performance sources and to assess whether the major contributors to risks have actually contributed the most to return generation, many asset managers are also working on implementing consistent risk and performance attribution models. As a result and provided asset managers do not retain this information as purely internal, investors should increasingly be able to properly assess asset manager's skills. Academic studies also propose to introduce risk-adjusted performance attribution analysis. Considering that performance attribution is mainly used for institutional portfolios, which are usually well diversified, Ankrim (1992) proposed a way of calculating risk-adjusted attribution, using the beta as risk indicator. In this approach, the risk-adjusted performance attribution is computed according to a three-step approach: (1) calculation of

the betas of the individual asset classes in the portfolio and the benchmark; (2) calculation of an expected return, using the Capital Asset Pricing Model, for each attribution effect; and (3) calculation of the differential return by subtracting the expected return from the realised return by attribution effect.<sup>2</sup> At this stage, however, very few asset managers seem to be ready to develop such an analysis. Though largely presented in an increasing number of reporting documents, risk and performance factors are still not jointly analysed in most cases.

## ■ Understanding Portfolio Risk Drivers

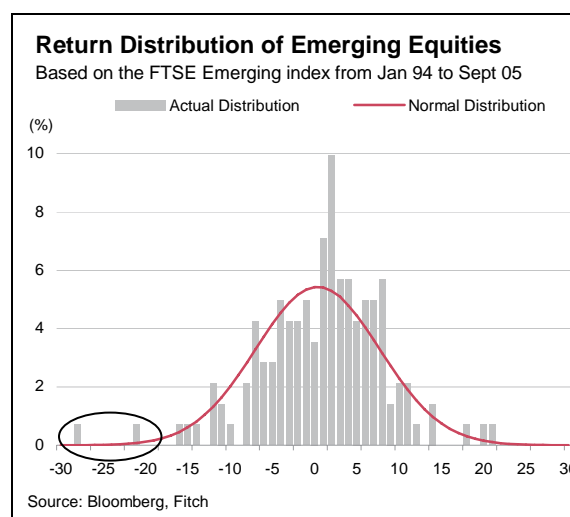
From *Ex Ante* Volatility Indicators...

Beyond past performance, investors are increasingly eager to understand portfolio risk drivers with a view to better anticipating the forthcoming behaviour of their portfolios. Reporting should therefore not confine itself to *ex-post* risk measures but tend to provide indicators with more predictive power. As their name suggests, *ex-post* volatility indicators are computed from historical observations, reflecting historical portfolio positions that had probably long been liquidated at the time of reporting. As a result, as relevant as they may be to put past performance into perspective, their forecasting value is limited.

*Ex-ante* volatility indicators, by contrast, have the advantage of being based on the portfolio's most recent holdings. Computed from multi-factor risk models, they estimate portfolio risk on the basis of its current underlying constituents and their factor sensitivity. In doing so, however, they also use history to predict future and take some short cuts.

Multi-factor risk models used to compute *ex-ante* volatility indicators actually rely on the historical behaviour of the portfolio constituents and their sensitivity to risk factors. These models assume a stable correlation between the various instruments and risk factors and are based on historical observations that might as well not happen again or happen in such a distant time-frame that makes it pointless to consider for the time being. The breadth of data-point history used in the model may also be such that most recent events have a negligible impact on final statistics. Even though some models make up for this drawback through an exponential weighting of recent points, most risk measures still react poorly to market turnarounds. The lack of historical data can also be an issue when analysing some markets or instruments, as with European corporate credits, which may not have the necessary history to allow for a proper and thorough modelling.

Additionally, volatility indicators assume portfolio returns are normally distributed. Although this is an acceptable assumption in most cases, it is not suitable anymore when it comes to more sophisticated investment strategies or instruments, such as high-yield emerging-markets debt and equities or option-like instruments. For example, as shown in the graph below, the return distribution of emerging equity markets does not follow a bell-shaped curve. As a result, using volatility indicators to assess the risk pertaining in these markets would typically underestimate the downside risk highlighted on the left-hand side of the graph. In such cases it is necessary to look at risk through alternative measures or models that are not limited by such restrictive assumptions.



... To Value at Risk

In that context, the value-at-risk measure ("VaR") is increasingly recognised as a powerful alternative or complementary risk indicator. Usually stated in value terms, the VaR is defined as the maximum expected loss over a set period of time at a given level of probability. For example, a 95% one-week VaR of EUR10m indicates that one would not lose more than EUR10m over one week in 95 cases out of 100. By definition, VaR is highly dependent on the selected horizon period, which must therefore be defined in accordance with underlying assets liquidity and portfolio turnover. Generally used as an absolute measure of risk, it can also be measured on a relative basis, i.e. in comparison to a reference index.

Three distinct approaches can be identified for VaR computation: the variance-covariance method (also known as the analytical or parametric method), the historical method and the Monte Carlo simulation. As its name suggests, the first method relies on the variance-covariance matrix of the underlying investments and assumes that investment returns are

normally distributed. Relatively easy to implement, it conveys the same shortcomings as those of the *ex-ante* volatility indicators mentioned above. The historical method, which is based on the actual historical distribution of underlying asset returns, bypasses this issue of normal distribution assumption but requires more data administration and assumes that the past is a good proxy for the future. Finally, the Monte Carlo approach, which uses random simulations, is probably the most difficult to implement, as it involves sophisticated modelling and extensive computational capacities, but has the advantage of allowing users to come off from historical patterns as well as from distribution assumptions.

Few asset managers have gone as far as Monte Carlo simulation so far. Interestingly enough, historical VaR can prove a robust alternative to Monte Carlo. As long as historical VaR is based on past market events such as the 1997 Asian crisis, the 1998 Russian crisis or 11 September 2001, and allows a certain modelling latitude, it actually makes it possible to measure the consequences of extreme market scenarios on a given portfolio. As such, it can be considered an efficient means to stress test portfolios and largely enables getting rid of the shortcomings pertaining to a risk assessment based on past patterns only.

While non-parametric VaR is surely one of the most efficient ways to assess risk on an *ex-ante* basis – it is increasingly used by asset managers for internal risk monitoring purposes – one can wonder why it remains rarely seen in reporting documents.

#### One Does Not Fit All

As was already mentioned, risk indicators may be relevant for some asset classes or instruments but not for others, and should therefore be chosen carefully to make sure they are appropriate to portfolio specificities so that no major risk features remain hidden. Any risk indicator, as sophisticated as it may be, is of little help in understanding portfolio risk if it has not been adequately selected and properly computed. With regard to risk model results, investors should keep in mind that they depend heavily on the appropriateness of their underlying inputs and assumptions. They should therefore look beyond a couple of summary statistics. In that context asset managers have an active educational role to play.

Additionally overall risk figures are not sufficient to provide a complete picture of portfolio risks and should be complemented by detailed *ex-ante* risk-contribution analysis with a view to helping investors clearly identify what factors are contributing the most to the portfolio's overall risk level. Such factors can be isolated through a multi-factor risk model.

However, risk measures do not necessarily have to be highly sophisticated to reveal portfolios' risk drivers and more intuitive risk indicators may prove a relevant alternative, as long as they are used efficiently. A good way to highlight the market conditions in which the portfolio is likely to gain or lose value is to display the top five or 10 bets within the portfolio, the duration, the spread duration and their breakdown per country, sector, rating and duration bucket, for example, or style biases. These indicators would add more value if presented in a dynamic context, i.e. showing how these exposures fluctuated through time.

#### ■ Conclusion

Investors' requirements in terms of reporting have expanded significantly over the past few years. While investors had for long demanded little in terms of risk data and performance analysis, things have gradually changed, leading asset managers to communicate what was long considered internal information only. At the same time, asset managers are increasingly acknowledging the role played by reporting documents in educating investors, establishing long-term and trustful relationships with them and, more importantly, gaining a competitive edge.

With the enhancement of IT platforms and applications, most asset managers are now able to report large amounts of detailed information in a timely and efficient manner. However, unlike some asset managers that have a tendency to overwhelm clients with piles of information, one should not forget that the wide set of data available for external communication should be used with great care, as too much information tends to dilute the important messages and in the end can be very confusing. Cost constraints in any case encourage asset managers to carefully assess the incremental added value deriving from the additional information presented. Then, reporting is much more than just compiling investment comments and figures: it should aim to reflect a portfolio's true investment strategy, performance and risk profile, in investors' best interests. Only under such conditions will it really meet its objectives.

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## ■ Appendix 1 – Definition of Basic Risk Ratios

### Annualised Standard Deviation

The standard deviation measures the dispersion of portfolio returns around their mean. The higher the volatility of the investment returns, the higher the standard deviation, and hence the risk, will be.

$$\sigma = \sqrt{\sum_{i=1}^n \frac{(\text{Portfolio return}_i - \text{Average portfolio return})^2}{n-1}} \times \sqrt{k}$$

With  $k$  being the number of  $i$  periods in one year (e.g.  $k = 12$  if the calculation is based on monthly returns); with  $n \geq k$

### Annualised Tracking Error

The tracking error is the standard deviation of a portfolio's relative performance. It indicates how closely a portfolio follows its benchmark. The lower the number, the closer the portfolio is to its benchmark.

$$TE = \sqrt{\sum_{i=1}^n \frac{(\text{Relative return}_i - \text{Average relative return})^2}{n-1}} \times \sqrt{k}$$

With  $k$  being the number of  $i$  periods in one year; with  $n \geq k$

### Sharpe Ratio

Developed by William Sharpe, the Sharpe ratio measures a portfolio's performance induced by each point of volatility relative to a risk-free asset. The higher the Sharpe ratio, the more the portfolio remunerates the risk taken.

$$\frac{\text{Annualised portfolio return} - \text{Annualised risk free rate}}{\text{Annualised portfolio standard deviation}}$$

### Information Ratio

The information ratio measures how much excess return a portfolio has delivered, given the risk taken against its benchmark. The higher the information ratio, the better the portfolio manager's skills will be.

$$\frac{\text{Annualised portfolio return} - \text{Annualised benchmark return}}{\text{Annualised tracking error}}$$

<sup>1</sup> See annual survey by AF2I, AFG, Euronext and Invesco

<sup>2</sup> For any further details on risk-adjusted attribution please refer to *The Journal of Performance Measurement*, Spring 2005