INVESTMENT PERFORMANCE COUNCIL (IPC)

INVITATION TO COMMENT:
Global Investment Performance Standards (GIPS®)
Guidance Statement on the Use of Leverage and Derivatives

The Investment Performance Council (IPC) and CFA Institute seek comment on the proposed GIPS Guidance Statement addressing the Use of Leverage and Derivatives set forth below. For information on the Guidance Statement process, please see http://www.cfainstitute.org/standards/pps/process.html.

Comments must be submitted in writing and be received by CFA Institute no later than 31 December 2004. All comments and replies will be put on the public record unless specifically requested. It is preferable that comments be submitted in electronic form with settings that do not restrict the ability to 'cut-and-paste' text from the comment letter. Comments are also accepted in hardcopy and should be addressed to:

CFA Institute
CFA Centre for Financial Market Integrity
Reference: Guidance Statement on the Use of Leverage and Derivatives
P.O. Box 3668
Charlottesville, Virginia 22903
Fax: +1-434-951-5320
E-mail: standardsetting@cfainstitute.org

Effective Date

This guidance statement will apply to all firms from the Effective Date forward. The proposed Adoption Date for this Guidance Statement is June 2005 and proposed Effective Date is 1 January 2006.

Executive Summary

Strategies that utilize derivative instruments and/or leverage (gearing) are often very complex. These strategies tend to behave differently than traditional strategies and generally have additional risks associated with them. As a result, prospective clients that invest in strategies that **materially** employ leverage and/or derivatives need additional information. It is difficult to identify specific measures that are relevant and meaningful in all situations. The objective is to provide prospective clients with the crucial data to aid in a better understanding of the firm's strategy, performance history, and risk profile.

Comment Requested

CFA Institute seeks public input on the proposals set forth in this document. Issues to consider in conjunction with this proposal include:

1. Do you agree with the principles established in the Guidance Statement?
2. Are there other elements involved in the use of leverage and derivatives that are not included?
3. Do you agree with the guiding principles provided to firms employing leverage and/or derivatives?
4. Do you agree with the proposed Effective Date?

If commentators suggest other proposals, CFA Institute requests that they explain the rationale behind their proposal.

Proposed Adoption Date: **June 2005**
Proposed Effective Date: **1 January 2006**
Retroactive Application: **No**
Public Comment Period: **Oct 2004 – Dec 2004**

INVESTMENT PERFORMANCE COUNCIL (IPC)

Guidance Statement on the Use of Leverage and Derivatives

Introduction

Strategies that utilize derivative instruments and/or leverage (gearing) are often very complex. These strategies tend to behave differently than traditional strategies and generally have additional risks associated with them. As a result, prospective clients that invest in strategies that **materially** employ leverage and/or derivatives need additional information. It is difficult to identify specific measures that are relevant and meaningful in all situations. The objective is to provide prospective clients with the crucial data to aid in a better understanding of the firm's strategy, performance history, and risk profile.

Because asset classes such as real estate and private equity utilize leverage and/or derivatives differently than traditional asset classes, they are not subject to this guidance statement. Instead, leverage and derivatives for private equity and real estate are addressed through other GIPS guidance.

Guiding Principles

This guidance can be separated into three major guiding principles (as listed below) followed by three appendixes incorporating calculation guidance.

1. *Creation of a Leverage Policy*
2. *Composite Construction for Portfolios Utilizing Leveraged Strategies*
3. *Risk Measure Disclosure and Reporting*

Creation of a Leverage Policy

In general, a portfolio is considered to be leveraged if certain instruments or strategies are implemented to **materially** alter the return impact that a unit move in certain underlying securities markets will have on the portfolio to an extent otherwise unachievable without the use of such instruments or strategies. Some examples of instruments or strategies that might apply leverage include financing assets through liabilities or using futures, options, or other derivative instruments.

Since each firm's definition of leverage will most likely be different it should rest with each firm to create its own ex ante **leverage policy.** This policy should discuss in detail the types of leveraged strategies implemented across the firm and more importantly discuss what constitutes materiality for each strategy/composite. Materiality should be thought of as the threshold that a firm sets to distinguish when a strategy/composite is considered leveraged. (i.e. in a growth equity composite portfolios may use derivative instruments; in regard to a portfolio's investment policy, a 120% or greater exposure to the S&P 500 undeniably constitutes materiality). It is sensible for firms to establish in advance certain criteria to identify at what point the risk/return profile for a composite becomes materially altered and to establish and document policies as to what disclosures must be made for the composite.

Composite Construction for Portfolios Utilizing Leveraged Strategies

While there are a wide variety of strategies that involve leverage and the risk profiles of those portfolios are complex, calculation of returns for leveraged portfolios doesn't need case-by-case methodology and is basically the same as for non-leveraged portfolios. (Please see Appendix A for calculation examples of returns)

The GIPS standards require that firms construct composites based on investment strategy or style. Further, the Guidance Statement on Composite Definition states "In general, portfolios that use derivatives, leverage and/or hedging have a unique investment strategy from those portfolios that do not utilize these techniques or instruments. Accordingly, firms should consider whether portfolios that use leverage, derivatives, and/or hedging should be included in separate composites from portfolios that are restricted from using such instruments or strategies."

If the nature of the mandated usage of derivatives and margin borrowing is such that the firm does not have the ability to implement its intended strategy, then the respective portfolio might be considered non-discretionary and therefore must not be included in a composite.

Risk Measure Disclosure and Reporting

Disclosing proper risk measures is crucial for capturing the altered risk/return profile that a leveraged portfolio contains when compared with a traditional strategy. Presenting the prospective client with the risk measure that best captures a leveraged portfolio's altered risk/return profile must be stressed. At the composite level, the range and median value for the constituent portfolio risk measures will provide a prospective client with valuable insight into the overall composite's risk/return profile. Useful risk measures and information for leveraged strategies include the exposure, Value at Risk, the tracking error and the volatility of a composite, the percentage of composite assets which are not traded on a stock exchange or equivalent, the percentage of composite assets held in short positions and overlay assets of overlay strategy.

The following are descriptions of some recommended risk measures for leveraged strategies. In these descriptions some calculation methodologies are shown but are not necessarily definitive. Alternative methodologies can be used. Firms should disclose the methodology and/or system that is used to calculate the risk measure and information.

Exposure

Firms may present minimum, average, and maximum levels of exposure for each period. Exposure could be defined as the expected unit move in the portfolio divided by the unit move in the market. This information gives prospective clients an indication of the range of leverage that is employed during the period. The minimum, average, and maximum exposure should be calculated based on monthly (or daily if available) data points. Firms with leveraged multi-asset strategies should indicate which segments within the multi-asset strategy use leverage. Firms may also present the total exposure, which could be calculated as the sum of the weight of each segment multiplied by its respective exposure. While this aggregation of exposures is not a precise technical measurement it is a useful approximation of the total exposure. It would be more precise to present each of the segment's exposure relative to the underlying market (e.g., the stock segment relative to the stock market), but this would require the presentation of a great number of data points, particularly for composites with several segments. Firms are encouraged to present the exposure of each of the individual segments as supplemental information.

(Please see Appendix B for calculation examples of exposure)

Value at Risk
Firms may present the minimum, average, and maximum Value at Risk (VaR) ratio for the composite and the composite benchmark for each period presented. The VaR ratio is calculated as the weighted-average of the VaR ratios of the individual portfolios within a composite divided by the composite assets. Firms should base the VaR on the 95% confidence interval and one month (or daily, if appropriate) time horizon for comparison among composites. The firm can also present additional VaR ratios based on other parameters. The firm should also disclose the methodology or system that is used to calculate the VaR.

(Please see Appendix C for calculation examples of Value at Risk)

Tracking Error
Tracking error for the most recent three, five, and ten year (or since inception if inception is less than ten years) periods can be used to demonstrate a portfolio's variability to a benchmark. Due to the small number of data points, composites with less than three years of performance history should not disclose the tracking error. The tracking error is computed as the annualized standard deviation of the arithmetic or geometric difference between the monthly composite return and the composite benchmark return. While it is potentially problematic to annualize the standard deviation of leveraged returns, the use of an annualized figure allows for comparability with the other annual disclosures. When there is more than one portfolio in a composite, using the composite return and composite benchmark return will tend to under-estimate the tracking error of a typical portfolio in the composite because of the diversification effect. While it would be more suitable to calculate the weighted-average of the tracking errors of the individual portfolios within the composite to calculate the composite tracking error, problems can arise when portfolios are not included in the composite for the entire period. The use of the composite return and composite benchmark return is still meaningful, avoids the problem of portfolios moving into and out of composites, and is generally very easy for firms to calculate. It should be noted that when the dispersion of portfolio returns within a composite is higher, the tracking error of a typical portfolio in the composite will tend to be more under-estimated.

Overlay Strategy Discussion
Firms with overlay strategies should disclose the overlay assets in addition to composite assets for the overlay composite. For example, if a firm is hired to implement an overlay strategy on an underlying portfolio of €100 million and is given €10 million to implement the strategy (e.g., for

margin requirements), then the €10 million is included in the composite assets and the €100 million is also reported as overlay assets.

Effective Date

This Guidance Statement is effective 1 January 2006. Firms currently coming into compliance should apply this guidance to all periods. Firms are encouraged, but not required to apply this guidance prior to the Effective Date.

APPENDIX A

Calculating Returns for Portfolios that Utilize Leverage

Standard 2.A.1 requires that a "total return, including realized and unrealized gains plus income, must be used." In addition, Standard 2.A.2 requires that "time-weighted rates of return that adjust for cash flows must be used. Period returns must be geometrically linked. Time weighted rates of return that adjust for daily weighted cash flows must be used for periods beginning 1 January 2005. Actual valuations at the time of external cash flows will likely be required for periods beginning 1 January 2010." A cash flow is defined as an external flow of cash and/or securities *(capital additions or withdrawals)* that is client initiated.

In general, calculating returns for portfolios that use leverage and/or derivatives is the same as calculating returns for non-leveraged portfolios. Returns are calculated by dividing the change in market value of the portfolio by the beginning market value of the portfolio. The market value of the actual client assets is used in the denominator. The return for the period is:

$$R = \left(\frac{x_1 - x_0}{x_0} \right)$$

where x_0 is the portfolio beginning market value and x_1 is the portfolio ending market value = (x_0 +Δx).

The market value includes the value of all current holdings including any accrued income and unrealized gains or losses. The market value of the portfolio can also be thought of as the cash value if all positions were liquidated (assuming zero transaction costs) including accrued income. The notional value of the derivative securities is not used to calculate the market value.

Example 1: Stock portfolio with long futures
At the beginning of the period portfolio consists of $90 long stocks, $10 margin deposited for futures and long futures position with $60 notional value. At the end of the period the value of long stocks is $96 and notional value of futures is $63. Interest received from the deposited margin is $0.02. Total value of the portfolio changes from $100 (= $90 + $10) to $109.02 (= $96 + $10 + $63 - $60 + $0.02).

$$R = \left(\frac{109.02 - 100}{100} \right) = 9.02\%$$

Example 2: Stock portfolio with short futures – full hedge case
At the beginning of the period the portfolio consists of $90 long stocks, $10 margin deposited for futures and a short futures position of $90 notional value. At the end of the period the value of long stocks is $84 and notional value of futures is $83.60. Interest received from the deposited margin is $0.02. Total value of the portfolio changes from $100 (= $90 + $10) to $100.42 (= $84 + $10 + $90 - $83.60 + $0.02).

$$R = \left(\frac{100.42 - 100}{100} \right) = 0.42\%$$

Example 3: Stock portfolio with options

Portfolio consists of $90 stocks and $10 call options at the beginning of the period. Valuations of the stocks and options are $95 and $25 respectively at the end of the period. Total value of the portfolio changes from $100 (= $90 + $10) to $120 (= $95 + $25).

$$R = \left(\frac{120 - 100}{100} \right) = 20.0\%$$

Example 4: Stock portfolio with short options

Portfolio consists of $110 stocks and $10 short call options at the beginning of the period. Valuations of the stocks and options are $117 and $15 respectively at the end of the period. Total value of the portfolio changes from $100 (= $110 - $10) to $102 (= $117 - $15).

$$R = \left(\frac{102 - 100}{100} \right) = 2.0\%$$

Example 5: Stock portfolio with partially short position

At the beginning of the period the portfolio consists of $130 long stocks and $30 short stocks. Then beginning market value of the total portfolio is $100 (=$130 - $30). If long stocks become $142 and short stocks become $27 at the end, then ending market value of the total portfolio is $115 (= $142 - $27).

$$R = \left(\frac{115 - 100}{100} \right) = 15.0\%$$

Example 6: Stock portfolio with margin borrowing

Portfolio consists of $100 long stocks and additional $50 long stocks bought on margin. Valuation of long stocks is $170 at the end of the period. Interest paid for margin borrowing is $0.20. Value of the portfolio that belongs to client at the beginning of the period is $100 (= $150 - $50). It becomes $119.80 (= $170 - $50 - $0.20) at the end of the period.

$$R = \left(\frac{119.8 - 100}{100} \right) = 19.8\%$$

Example 7: Market neutral strategy

A client provided a hedge fund manager with capital of $100 at the beginning of the first month. The hedge fund manager deposited $100 with a prime broker and constructed positions of $100 long stocks and $100 short stocks. At the end of the first month market values of long stocks and short stocks are $109 and $107 respectively. The fund manager received interests of $0.30

(annual rate of 3.6%) from the prime broker. The value of the total portfolio changes from \$100 (= \$100 + \$100 - \$100) to \$102.30 (= \$100 + \$109 - \$107 + \$0.30).

$$R = \left(\frac{102.3 - 100}{100}\right) = 2.3\%$$

Overlay Strategies

Currency and asset overlay strategies are unique, but are treated similarly. In general, returns on overlay strategies are based on the gain or loss on the overlay assets (typically futures or forwards) divided by the assets of the underlying portfolio.

Example 8:

A client hires Manager A to implement a tactical asset allocation futures overlay on \$100 million. Manager A is given \$10 million to implement the overlay strategy.

Basis of the overlay strategy = \$100 million
Overlay gain/loss for the period = + \$500,000

$$R = \left(\frac{500{,}000}{100{,}000{,}000}\right) = 0.50\%$$

The firm should include the \$10 million in the composite assets and the \$100 million should also be reported as overlay assets.

APPENDIX B

Calculating Exposure

Exposure is one of the most important risk measures for leveraged portfolios because it defines the degree of leverage and is the basic of the judgment of "materiality. Exposure could be defined as the expected unit move in the portfolio divided by the unit move in the market. For example, if a portfolio is expected to increase in value by 1.5% for a 1% increase in the market, the exposure would be 150%. Although exposure could be defined differently, in this appendix we show examples of exposure calculations according to the definition above. Some of the examples, such as Example 5 and Example 6 might be disputable and the subcommittee hopes the concept of exposure and methodology of calculating exposures will be enhanced through fruitful discussions with the industry.

In order to calculate exposure, firms should identify the "markets" against which the exposure is calculated. It is expected that the markets used to calculate exposure will be consistent with the investment strategy and benchmark. In the case of simple single asset-class strategy, the market will be a broad index that represents the asset-class, such as the S&P 500, FTSE 100, TOPIX, etc. In the case of a market neutral strategy, the strategy is usually employed relative to a single asset market, such as the U.S. stock market. The exposure to U.S. stock market would be expected to be around zero for a market neutral strategy, so the exposure information provides a useful way to confirm the degree of market neutrality.

General Formula

Let I and V be the market level and portfolio value, respectively. The portfolio value changes ΔV if the market changes ΔI. In general, the following formula can be used to calculate exposure:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \frac{\sum_{i=1}^{n} \frac{\Delta V_i}{V}}{\frac{\Delta I}{I}} = \frac{\sum_{i=1}^{n} \frac{V_i}{V} \times \frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \sum_{i=1}^{n} \frac{V_i}{V} \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \sum_{i=1}^{n} w_i \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}}$$

where i is an instrument or strategy within the portfolio and w_i is the weight of the instrument or strategy in the portfolio (i.e., $w_i = \frac{V_i}{V}$).

Exposure of Stocks

In the case of a non-leveraged stock portfolio, the exposure of the stocks is calculated as follows:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \frac{\beta \times \frac{\Delta I}{I}}{\frac{\Delta I}{I}} = \beta$$

where β is the portfolio's sensitivity to changes in the stock market. Firms should use a β of 1, but may also present the exposure calculated using a different β, based on an estimate from a risk model (e.g. forecast beta) or historical β, if it determines that this is appropriate. The beta of the portfolio is calculated as an asset-weighted average of each stock's sensitivity to changes in the stock market. If the firm presents the exposure based on a β other than 1, the firm should disclose how the β is determined. Using a β of 1 improves comparability (otherwise two firms could estimate the β of the same portfolio differently, leading to two different exposure figures for the same portfolio).

The exposure of the total portfolio is therefore the percentage of stocks times the β. For example, if the portfolio holds 95% stocks and 5% cash, the exposure would be 95% times β. Since it is recommended that firms use a β of 1, the exposure is simply the percentage of stocks in the portfolio.

Exposure of Bonds
In the case of a bond portfolio, the portfolio's modified duration is used instead of β. The price sensitivity of a bond and/or a bond portfolio versus a unit change in interest rates is expressed by modified duration as below:

$$D = -\frac{\Delta V}{\Delta y} \times \frac{1}{V}$$

where D is the modified duration, V is the price level of a bond, and Δy is the unit change in interest rates.

Portfolio duration (D_p) and benchmark index duration (D_I) are expressed as follows:

$$D_p = -\frac{\Delta V}{\Delta y} \times \frac{1}{V} \;,\quad D_I = -\frac{\Delta I}{\Delta y} \times \frac{1}{I}$$

Rearranging these formulas leads to the following:

$$\frac{\Delta V}{V} = -D_p \times \Delta y \;,\quad \frac{\Delta I}{I} = -D_I \times \Delta y$$

From these equations the exposure of the bond portion of the portfolio is calculated as follows:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \frac{-D_p \times \Delta y}{-D_I \times \Delta y} = \frac{D_p}{D_I}$$

If portfolio duration (D_p) is equal to the benchmark index duration (D_I), then the exposure is 100%. If D_p is larger than D_I, then the exposure exceeds 100%. As with the stock portfolio, the exposure of the total portfolio is equal to the percentage of bonds in the portfolio times the exposure of the bonds. For example, if the portfolio is 97% bonds and 3% cash and the exposure of the bonds is 105%, then the exposure of the total portfolio is 97% times 105%, or 101.85%.

While the use of the portfolio's effective duration is better to use in theory, the use of modified duration is simpler and does not depend on an underlying pricing model to estimate spot rates. Firms are allowed to use the effective duration instead of the modified duration, but should disclose the pricing model methodology used.

Exposure of Options
In the case of options, the delta-weighted exposure should be used. The option delta (δ), which is the first derivative of the option price relative to a change in the price of the underlying security, is used rather than β. The option premium changes ΔV if the stock market changes ΔI. In this case, exposure is calculated as

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \frac{\frac{I}{V}\times\frac{\Delta V}{I}}{\frac{\Delta I}{I}} = \frac{\frac{I}{V}\times\delta\times\frac{\Delta I}{I}}{\frac{\Delta I}{I}} = \frac{I}{V}\times\delta$$

If the option is an at-the-money call option, δ is approximately 0.5. The option premium V depends on stock market level (I), volatility of the stock market, execution price, time to maturity, and the risk-free interest rate. A typical example could be I=\$100, V=\$8 and δ=0.5. The exposure would be calculated as follows:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \frac{I}{V}\times\delta = \frac{100}{8}\times 0.5 = 6.25$$

Thus, the exposure is 625% for this at-the-money call option.

Multi-Asset Composites
In the case of multi-asset composites that use leverage, firms should indicate which segments within the multi-asset strategy use leverage. Firms may also present the total exposure, which could be calculated as the sum of the weight of each segment multiplied by its respective exposure. While this aggregation of exposures is not a precise technical measurement it is a useful approximation of the total exposure. It would be more precise to present each of the segment's exposure relative to the underlying market (e.g., the stock segment relative to the stock market), but this would require the presentation of a great number of data points, particularly for composites with several segments. Firms are encouraged to present the exposure of each of the individual segments as supplemental information.

Example 1: Stock portfolio with long futures
At the beginning of the period the portfolio consists of \$90 long stocks, \$10 margin deposited for futures, and a long futures position with \$60 notional value.

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{2}\frac{V_i}{V}\times\frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \left(\frac{90}{100}\times\frac{\frac{\Delta V_1}{V_1}}{\frac{\Delta I}{I}}\right)+\left(\frac{10}{100}\times\frac{\frac{\Delta V_2}{V_2}}{\frac{\Delta I}{I}}\right) = \left(\frac{90}{100}\times\beta\right)+\left(\frac{10}{100}\times\frac{\frac{V_{2n}}{V_2}\times\frac{\Delta V_2}{V_{2n}}}{\frac{\Delta I}{I}}\right) = \left(\frac{90}{100}\times\beta\right)+\left(\frac{10}{100}\times\frac{\frac{\Delta V_2}{V_{2n}}}{\frac{\Delta I}{I}}\times\frac{V_{2n}}{V_2}\right)$$

Assume that V_2 is deposited margin for futures and is equal to \$10, V_{2n} is a notional value of futures position and is equal to \$60, β is 1, and $\frac{\frac{\Delta V_2}{V_{2n}}}{\frac{\Delta I}{I}} = 1$. Then the exposure is calculated as:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \left(\frac{90}{100}\times\beta\right)+\left(\frac{10}{100}\times\frac{\frac{\Delta V_2}{V_{2n}}}{\frac{\Delta I}{I}}\times\frac{V_{2n}}{V_2}\right) = \left(\frac{90}{100}\times\beta\right)+\left(\frac{10}{100}\times1\times\frac{V_{2n}}{V_2}\right) = \left(\frac{90}{100}\times1\right)+\left(\frac{10}{100}\times\frac{60}{10}\right) = 1.5$$

Thus an exposure against the stock market is 150%.

Example 2: U.S. equity market neutral strategy
At the beginning of the period \$100 is deposited margin to a primary broker and the portfolio consists of \$94 long stocks and \$96 short stocks. The market value of the total portfolio is \$98 (= \$100 + \$94 - \$96). Exposure against U.S. stock market is calculated as follows:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{3}\frac{V_i}{V}\times\frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \left(\frac{100}{98}\times0\right)+\left(\frac{94}{98}\times1\right)+\left(\frac{-96}{98}\times1\right) = -0.0204$$

The first term relates to the margin deposit and is assumed to have zero sensitivity to the stock market. The second term and third terms relate to the long and short positions respectively and are assumed to have a β of 1. The exposure of –2.04% is small but it is useful information because prospective clients would like to know the actual level of neutrality.

Example 3: Stock portfolio with index options
A portfolio consists of \$90 stocks and \$10 call options at the beginning of the period. Using a β of 1 and option exposure of 6.25 (from the example above), the exposure is calculated as:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{2} \frac{V_i}{V} \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \left(\frac{90}{100} \times \frac{\frac{\Delta V_1}{V_1}}{\frac{\Delta I}{I}} \right) + \left(\frac{10}{100} \times \frac{\frac{\Delta V_2}{V_2}}{\frac{\Delta I}{I}} \right) = \left(\frac{90}{100} \times \beta \right) + \left(\frac{10}{100} \times \frac{I_2}{V_2} \times \delta \right)$$

$$= (0.9 \times 1.0) + (0.1 \times 6.25) = 1.525$$

Thus the exposure relative to the stock market is 152.5%.

Example 4: Portfolio consisting of options of individual stocks

A portfolio consists of many options of individual stocks. For example, a call option of General Electric, a call option of IBM, and a put option of General Motors, etc.

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{n} w_i \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}} = \sum_{i=1}^{n} w_i \times \left(\frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta S_i}{S_i}} \times \frac{\frac{\Delta S_i}{S_i}}{\frac{\Delta I}{I}} \right) = \sum_{i=1}^{n} w_i \times \left(\frac{S_i}{V_i} \times \delta_i \times \beta_i \right)$$

where S_i is the price of stock *i*, V_i is premium of option *i*, δ_i is the delta of option *i*, and β_i is the beta of stock *i*.

Assuming β_i is 1, the formula simplifies to the following:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{n} w_i \times \left(\frac{S_i}{V_i} \times \delta_i \right)$$

Example 5: Multi-Asset portfolio with tactical asset allocation strategy

A portfolio consists of stocks (*s*), bonds (*b*), and short term instruments including cash (*c*), and the benchmark consists of 60% stock index and 40% bond index. Let *I* be the stock market or bond market. The total exposure for the composite is calculated as the weight of the stock segment multiplied by the stock exposure, plus the weight of the bond segment multiplied by the bond exposure. The exposure of the cash segment is assumed to be zero.

Assume stock futures have a short position and bond futures have a long position. Let *sm* correspond to the margin for stock futures, *bm* correspond to the margin for bond futures, *sn* correspond to the notional value of stock futures, and *bn* correspond to the notional value of the bond futures.

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \left(\left(w_s \times \frac{\frac{\Delta V_s}{V_s}}{\frac{\Delta I}{I}} \right) + \left(w_{sm} \times \frac{\frac{\Delta V_{sm}}{V_{sm}}}{\frac{\Delta I}{I}} \right) \right) + \left(\left(w_b \times \frac{\frac{\Delta V_b}{V_b}}{\frac{\Delta I}{I}} \right) + \left(w_{bm} \times \frac{\frac{\Delta V_{bm}}{V_{bm}}}{\frac{\Delta I}{I}} \right) \right) + \left(w_c \times \frac{\frac{\Delta V_c}{V_c}}{\frac{\Delta I}{I}} \right) \quad \textbf{(5-1)}$$

Let I_s be the stock market and ΔI_s be a change of the stock market. The portion of the equation related to stocks is as follows:

$$\left(w_s \times \frac{\frac{\Delta V_s}{V_s}}{\frac{\Delta I_s}{I_s}} \right) + \left(w_{sm} \times \frac{\frac{\Delta V_{sm}}{V_{sm}}}{\frac{\Delta I_s}{I_s}} \right) = \left(w_s \times \frac{\frac{\Delta V_s}{V_s}}{\frac{\Delta I_s}{I_s}} \right) + \left(w_{sm} \times \frac{\frac{V_{sn}}{V_{sm}} \times \frac{\Delta V_{sm}}{V_{sn}}}{\frac{\Delta I_s}{I_s}} \right) = (w_s \times \beta_s) + \left(w_{sm} \times \frac{V_{sn}}{V_{sm}} \right) = (w_s \times \beta_s) + \frac{V_{sn}}{V} \quad \textbf{(5-2)}$$

The second term is the ratio of nominal value of stock futures to portfolio total value and because the futures are short, the numerator will have a negative sign in this case.

The bond segment is calculated as follows:

$$\left(w_b \times \frac{\frac{\Delta V_b}{V_b}}{\frac{\Delta I_s}{I_s}} \right) + \left(w_{bm} \times \frac{\frac{\Delta V_{bm}}{V_{bm}}}{\frac{\Delta I_s}{I_s}} \right) = \left(w_b \times \frac{\frac{D_p}{D_I} \times \frac{\Delta I_b}{I_b}}{\frac{\Delta I_s}{I_s}} \right) + \left(w_{bm} \times \frac{\frac{V_{bn}}{V_{bm}} \times \frac{\Delta V_{bm}}{V_{bn}}}{\frac{\Delta I_b}{I_b}} \times \frac{\frac{\Delta I_b}{I_b}}{\frac{\Delta I_s}{I_s}} \right) = \left(\left(w_b \times \frac{D_p}{D_I} \right) + \frac{V_{bn}}{V} \right) \times \frac{\frac{\Delta I_b}{I_b}}{\frac{\Delta I_s}{I_s}} \quad \textbf{(5-3)}$$

Since the sensitivity of bond market relative to the stock market is generally expressed as:

$$\frac{\frac{\Delta I_b}{I_b}}{\frac{\Delta I_s}{I_s}} = \frac{Cov(I_b, I_s)}{Var(I_s)} = \frac{\sigma_b \times \sigma_s \times \rho_{bs}}{\sigma_s^2} = \frac{\sigma_b}{\sigma_s} \rho_{bs} \quad \textbf{(5-4)}$$

$\sigma_b \sigma_s \rho_{bs}$ are the bond market volatility, the stock market volatility, and the correlation between bond and stock market respectively. The last term of equation (5-1) should be zero because it is assumed that ΔV_c is not correlated with ΔI_s. From these considerations equation (5-1) becomes as follows:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I_s}{I_s}} = \left((w_s \times \beta_s) + \frac{V_{sn}}{V} \right) + \left(\left(\left(w_b \times \frac{D_p}{D_I} \right) + \frac{V_{bn}}{V} \right) \times \frac{\sigma_b}{\sigma_s} \rho_{bs} \right) \quad \textbf{(5-5)}$$

To facilitate comparability among firms, the β_s is recommended to be equal to 1 and the correlation is zero. However, firms may use a different β, based on an estimate from a risk model (e.g. forecast beta) or historical β, if it determines that this is appropriate. This results in the following equation:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I_s}{I_s}} = w_s + \frac{V_{sn}}{V} \qquad \textbf{(5-6)}$$

Therefore, the exposure of the multi-asset portfolio versus the stock market is simply the sum of the ratio of the stocks in the portfolio plus the ratio of nominal value of stock futures in the portfolio. As stated earlier, because the futures are a short position, the numerator of the second term will be negative. Note that the assumption of a zero correlation leads to an underestimation of the exposure. As the correlation increases, the exposure increases.

The calculation of the exposure against the bond market is calculated similarly as the stock exposure and the next equation corresponds to equation (5-5).

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I_b}{I_b}} = \left(\left((w_s \times \beta_s) + \frac{V_{sn}}{V} \right) \times \frac{\sigma_s}{\sigma_b} \rho_{bs} \right) + \left(\left(w_b \times \frac{D_p}{D_I} \right) + \frac{V_{bn}}{V} \right) \qquad \textbf{(5-7)}$$

As stated above, assuming a zero correlation between stock and bond markets, the following equation results:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I_b}{I_b}} = \left(w_b \times \frac{D_p}{D_I} \right) + \frac{V_{bn}}{V} \qquad \textbf{(5-8)}$$

The exposure of the total portfolio should be calculated as the sum of equation (5-6) and (5-8). In addition, the firm should indicate which segments use leverage.

Example 6: Global Equity portfolio with tactical country allocation

Let us consider the case of multiple underlying equity indexes. In this example the benchmark is constructed as, for example, 40% S&P 500, 40% MSCI Europe, and 20% MSCI Japan and a manager is permitted to use stock futures to change country allocation for the purpose of generating active returns. The actual portfolio consists of U.S. stocks, European stocks, Japanese stocks, stocks of other regions/countries, and cash. The portfolio has positions of long or short stock futures. The suffix *m* corresponds to the margin for futures position. Portfolio sensitivity relative to the "market" (*I*) is expressed as follows.

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{4}\left(\left(w_i \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}}\right) + \left(w_{im} \times \frac{\frac{\Delta V_{im}}{V_{im}}}{\frac{\Delta I}{I}}\right)\right) + \left(w_c \times \frac{\frac{\Delta V_c}{V_c}}{\frac{\Delta I}{I}}\right) \quad \textbf{(6-1)}$$

Please note that $\sum_{i=1}^{4}$ corresponds to the various markets (U.S., Europe, Japan, and others). The last term should be zero because it is cash. The second term of the parenthesis corresponds to stock futures. The first and second terms would be converted in the same way as equation (5-2).

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{4}\left(\left(w_i \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I}{I}}\right) + \left(w_{im} \times \frac{\frac{\Delta V_{im}}{V_{im}}}{\frac{\Delta I}{I}}\right)\right) = \sum_{i=1}^{4}\left(\left(w_i \times \frac{\frac{\Delta V_i}{V_i}}{\frac{\Delta I_i}{I_i}}\right) + \left(w_{im} \times \frac{\frac{\Delta V_{im}}{V_{im}}}{\frac{\Delta I_i}{I_i}}\right)\right) \times \frac{\frac{\Delta I_i}{I_i}}{\frac{\Delta I}{I}} = \sum_{i=1}^{4}\left(\left(w_i \times \beta_i\right) + \frac{V_{in}}{V}\right) \times \frac{\frac{\Delta I_i}{I_i}}{\frac{\Delta I}{I}} \quad \textbf{(6-2)}$$

The sign of V_{in} is plus if the futures position is long and is minus if the futures position is short. If I is assumed to be the "global stock market" (i.e., including exposure to markets outside of the benchmark), it might be assumed that $\frac{\frac{\Delta I_i}{I_i}}{\frac{\Delta I}{I}} = 1$ for each i. Theoretically these assumptions are not necessary correct and more accurate estimations are possible. Those estimations, however, would reduce the comparability among firms. The exposure is calculated as:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I}{I}} = \sum_{i=1}^{4}\left(\left(w_i \times \beta_i\right) + \frac{V_{in}}{V}\right) \quad \textbf{(6-3)}$$

Firms are reminded that Standard 4.A.10 requires firms to disclose the percentage of the composite invested in countries or regions outside of the benchmark.

Again, assuming the β within each market is equal to 1 for simplicity and comparability among firms, inserting 1 into equation 6-3 leads to the final exposure figure. Firms should report the result of equation (6-3). Firms are also encouraged to report as supplemental information the exposure against particular stock markets, for example U.S. stock market, if it characterizes the investment strategy and has a prominent effect to the portfolio returns. Exposure against the U.S. stock market is calculated from equation (6-2) by defining I as U.S. stock market, $\frac{\frac{\Delta I_1}{I_1}}{\frac{\Delta I}{I}} = 1$, and $\dfrac{\frac{\Delta I_i}{I_i}}{\frac{\Delta I}{I}} = 0$ for $\sum_{i=2}^{4}$. Assuming the β of the U.S. stock portfolio is 1 leads to the following equation:

$$\frac{\frac{\Delta V}{V}}{\frac{\Delta I_{US}}{I_{US}}} = \left(w_{US} \times \beta_{US}\right) + \frac{V_{USn}}{V} = w_{US} + \frac{V_{USn}}{V} \quad \textbf{(6-4)}$$

APPENDIX C

Calculation of Composite Value at Risk
The Value at Risk (VaR) ratio is the ratio of the value of possible loss to total assets. The composite VaR ratio is the asset-weighted average of individual portfolio VaR ratios.

The composite VaR ratio should be calculated on a monthly basis. The firm should present the minimum, average, and maximum of the 12 monthly composite VaR ratios for each annual period reported. If the strategy assumes frequent change of leveraged positions, these calculation should be performed based on daily data.

Example 1
Composite C has three portfolios, X, Y, and Z. Assume that asset values and VaRs for January are as follows:

	Asset Value	VaR	VaR Ratio
Portfolio X	$100	$8.5	8.5%
Portfolio Y	$200	$18	9%
Portfolio Z	$40	$3	7.5%
Composite	$340		8.68%

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The composite VaR ratio of 8.68% is the asset-weighted average of the individual portfolio VaR ratios. Assume the same calculations are performed each month with the following results:

	Composite VaR Ratio (%)
January	8.68
February	8.98
March	8.33
April	8.09
May	8.16
June	7.84
July	8.11
August	7.78
September	7.72
October	7.51
November	7.88
December	8.03

The firm would present 7.51%, 8.09%, and 8.98% as the minimum, average, and maximum composite VaR ratios for the year. From these three figures, a prospective client should anticipate that their average value at risk is the value of their portfolio times 8.09% and they should expect that their value at risk ranges from 7.51% to 8.98% times their portfolio value.