Benefits of Portfolio Evaluation for Fund Sponsors

Three Components of Portfolio Evaluation

Portfolio Return with External Cash Flows

Time- and Money-Weighted Rates of Return

1. **Performance measurement** calculates rates of return over specified times.
2. **Performance attribution** determines the source of the account's performance.
3. **Performance appraisal** draws conclusions about the overall issue affecting performance.

- Shows where policy and allocation is and isn't effective.
- Directs management to areas of value added and lost.
- Quantifies the results of active management.
- Shows whether other strategies can be applied successfully.
- Provides feedback on the consistent application of polices in the IPS.

- **Time-weighted rate of return** calculates a compounded rate of growth over a stated evaluation period. Subperiod returns are calculated at dates of external cash flows. These returns are then compounded together to get the TWRR.
- **Money-weighted rate of return** is an IRR of all funds invested during the evaluation period, including the beginning value. The MWRR is the value of R such that

$$\mathrm{MV}_1 = \mathrm{MV}_0(1+R)^m + \sum_{i=1}^{n} \mathrm{CF}_i(1+R)^{L_i}$$

where:

$$\begin{aligned}
\mathrm{MV}_1 &= \text{ending value of the portfolio} \\
\mathrm{MV}_0 &= \text{beginning value of the portfolio} \\
m &= \text{number of time units in the evaluation period} \\
\mathrm{CF}_i &= \text{cash flow } i \\
L_i &= \text{number of time units cash flow } i \text{ is in the portfolio}
\end{aligned}$$

If there is an external cash flow at the beginning of the period, the return is

$$r_t = \frac{\mathrm{MV}_1 - (\mathrm{MV}_0 + \mathrm{CF})}{\mathrm{MV}_0 + \mathrm{CF}}$$

If there is an external cash flow at the end of the period, it should be subtracted from the account value.

$$r_t = \frac{(\mathrm{MV}_1 - \mathrm{CF}) - \mathrm{MV}_0}{\mathrm{MV}_0}$$

Comparison Between Time- and Money- Weighted Rates of Return

Data Quality Issues in Return Calculations

Decomposition of Returns into Market, Style, and Active Management

Properties of a Valid Benchmark

- For illiquid assets, price estimates must be used.
- Matrix pricing may be used by using dealer-quoted prices on similar securities.
- Highly illiquid securities may be carried at cost, not reflecting the current price.
- Account valuations should include trade date accounting including accrued interest and dividends.

- Generally TWRR is used for evaluation and GIPS because it reflects return on assets and not decisions to add or subtract funds.
- If the manager controls the timing of the cash flows, MWRR can be used for GIPS reporting.
- TWRR shows what would have happened to the portfolio had no cash flows occurred.
- TWRR can be data intensive because it requires portfolio market values on dates of all external cash flows.
- MWRR requires only a beginning and ending market value.

1. **Specified in advance.** Known to both the investment manager and the fund sponsor at the start of the evaluation period.
2. **Appropriate.** Consistent with manager's approach and style.
3. **Measurable.** Value and return can determined on a regular basis.
4. **Unambiguous.** Clearly defined identities and weights of components.
5. **Reflecive of the manager's current investment opinions.** Manager has current knowledge and expertise of the components.
6. **Accountable.** Manager should accept the benchmark and agree to attribute differences to active management.
7. **Investable.** Possible to replicate the benchmark and forgo active management.

$$P = M + S + A$$

where:

P = investment manager's portfolio return

M = return on market index

$S = B - M$ = excess return to style, difference between benchmark and market

$A = P - B$ = active return

Seven Types of Benchmarks

Advantages of Different Benchmarks Types

Disadvantages of Different Benchmarks Types

Steps to Construct a Security-Based Benchmark

- **Absolute.**
  - Simple and straightforward benchmark.
- **Manager universes.**
  - It is measurable.
- **Broad market indices.**
  - Well recognized, easy to understand, and widely available.
  - Unambiguous, investable, and can be specified in advance.
  - Appropriate if it reflects the manager's approach.
- **Style indices.**
  - Widely available, understood, and accepted.
  - Appropriate if it reflects manager's style and is investable.
- **Factor-model based.**
  - Useful in performance evaluation.
  - Gives insight into manager's style by showing factor exposures affecting performance.
- **Returns-based.**
  - Easy to use and intuitive.
  - Meets the criteria of a valid benchmark.
  - Useful if the only information available is account returns.
- **Custom security-based.**
  - Meets the criteria of a valid benchmark.
  - Allows continual monitoring of investment processes.
  - Allows sponsors to allocate risk across management teams.

- **Absolute.** A return objective.
- **Manager universes.** Median manager or fund from a universe of such.
- **Broad market indices.** E.g., S&P 500, MSCI, or EAFE.
- **Style indices.** E.g., large- or small-cap growth or value indices.
- **Factor-model based.** Relate factor exposures to returns.

$$R_P = a_P + \sum_{i=1}^{K} b_i F_i + \varepsilon$$

$$\begin{aligned}
\text{where:} R_P &= \text{periodic return on an account} \\
a_P &= \text{value of } R_P \text{ if all factors were zero} \\
F_i &= \text{factors that have systematic effect on performance} \\
b_i &= \text{sensitivity of the returns to } F_i \\
\varepsilon &= \text{error term, return not explained by model}
\end{aligned}$$

- **Returns-based.** Constructed using the account's returns and returns on several style indices for the same periods. These are then combined to get an allocation which tracks the account's returns.
- **Custom security-based.** Designed to reflect the manager's security allocations and investment process.

1. Identify the important elements of the manager's process.
2. Select securities that are consistent with that process.
3. Weight the securities—including cash—to reflect the manager's process.
4. Review and adjust as needed to replicate the manager's results.
5. Rebalance on a predetermined schedule.

- **Absolute.**
  - Not an investable alternative.
- **Manager universes.**
  - Universes are subject to survivorship bias.
  - Must trust that the universe is accurately compiled.
  - Cannot be specified in advance.
- **Broad market indices.**
  - Manager's style may deviate from the index's style.
- **Style indices.**
  - Style index may contain imprudent weightings.
  - Different definitions of style can produce different returns.
- **Factor-model based.**
  - Not intuitive to all managers or sponsors.
  - Data and modeling may not be available and may be expensive.
  - Different factor models can produce different output.
- **Returns-based.**
  - The style indices may not reflect what the manager owns.
  - A significant number of returns are needed to establish a pattern.
  - Will not work for managers who change style.
- **Custom security-based.**
  - Can be expensive to construct and maintain.
  - Lack of transparency can make it impossible to construct.

Disadvantages to Using Manager Universes as Benchmarks

Issues to Consider in Benchmark Evaluation

Issues Arising when Assigning Benchmarks to Hedge Funds

Three Components of Macro Performance Attribution

- **Systematic bias.** The historical beta of the account relative to the benchmark should be low. Alternatively, active management returns, A, should be uncorrelated with investment style, S.
- **Tracking error.** Standard deviation of A. Should be smaller than $\sigma(P - M)$.
- **Risk characteristics.** Account's exposure to systematic sources of risk should be similar to that of the benchmark over time.
- **Coverage.** Coverage ratio is the percentage of portfolio market value that consists of securities in the benchmark. Higher coverage ratio indicates better benchmark replication.
- **Turnover.** Proportion of benchmark's total market value that is bought or sold during a period. Passive portfolios should have benchmarks with low turnover.
- **Positive active positions.** Active position is difference in weights of a security between the portfolio and benchmark. Many negative active positions indicate the benchmark doesn't reflect the manager's process.

- Besides being measurable, it fails all the properties of valid benchmarks.
  - Can't identify the median manager in advance.
  - Because of this, it isn't unambiguous.
  - Not investable as the median manager will vary between periods.
  - Impossible to verify appropriateness due to not knowing the median manager.
- Must trust the compiler that universe accounts have been screened, data has been validated, and calculation methods approved.
- As fund sponsors get rid of underperforming managers, universes are subject to survivorship bias. This biases the median manager upwards.

- **Policy allocations.** The sponsor decides the asset categories and weights and allocates funds among managers. These are determined by risk tolerance, long-term expectations, and liabilities the fund must meet.
- **Benchmark portfolio returns.** A sponsor may use broad market indices for asset categories and narrower indices for managers' investment styles.
- **Fund returns, valuations, and external cash flows.** When using percentage terms, returns are calculated on the manager level, allowing the sponsor to compare managers directly. If using monetary terms, more data are needed.

- Difficult to compute return as many hedge funds hold long and short positions which sum to nearly zero.
- Can use a value-added return as the difference between portfolio and benchmark returns.
- Some hedge funds target an absolute return and argue benchmarks are irrelevant.
- Some funds have a definable style which can be used to compare funds to others of that style. Others do not have a definable style.
- Difficulty with benchmarks has lead to using Sharpe ratio, but using standard deviation with hedge funds is questionable.

Six Levels of Macro Attribution Analysis

Micro Performance Attribution Formula

$$R_V = \sum_{i=1}^{S}(w_{P,i} - w_{B,i})(R_{B,i} - R_B) + \sum_{i=1}^{S}(w_{P,i} - w_{B,i})(R_{P,i} - R_{B,i})$$

$$+ \sum_{i=1}^{S} w_{B,i}(R_{P,i} - R_{B,i})$$

where:

R_V = value added return

$w_{P,i}$ = portfolio weight of sector i

$w_{B,i}$ = benchmark weight of sector i

$R_{P,i}$ = portfolio return of sector i

$R_{B,i}$ = benchmark return of sector i

R_B = return on the portfolio's benchmark

S = number of sectors

1. **Net contributions** is the net sum of cash inflows or outflows.
2. **Risk-free investment** simulates value if only the risk-free return were earned.
3. **Asset categories** simulates passive allocation in index funds. Can be calculated as

$$R_{\text{AC}} = \sum_{i=1}^{A} w_i(R_i - R_F)$$

4. **Benchmark level** allows manager benchmarks different from the policy benchmark. Can be calculated as

$$R_{\text{B}} = \sum_{i=1}^{A}\sum_{j=1}^{M} w_i w_{i,j}(R_{B_{i,j}} - R_i)$$

5. **Active management** simulates returns actually produced by managers. Can be calculated as

$$R_{\text{IM}} = \sum_{i=1}^{A}\sum_{j=1}^{M} w_i w_{i,j}(R_{A_{i,j}} - R_{B_{i,j}})$$

6. **Allocation effects** is a plug to sum to the portfolio ending value.