

## What Active Return Expectations Should I Have?

Investors in Aperio strategies often ask about the potential distribution of portfolio returns relative to benchmark returns. For example: How much might their accounts deviate from their benchmarks? What is the chance of “large” underperformance? Are underperformance and outperformance equally likely?

While we cannot predict the actual future return for any account, we do have a portfolio measure that can help us understand how wide or narrow the potential return distribution around the benchmark may be. This measure is **Forecast Tracking Error** (also known as active risk), which is produced by a risk model and can serve as a useful tool to address these questions and guide **Active Return** expectations.

Before addressing questions about potential future returns, we look at both a theoretical and an actual historical distribution of **Active Returns**. If **Active Returns** were to follow a theoretical normal distribution, then 68.26% of **Active Returns** would be expected to be in a range of +/- 1 times **Forecast Tracking Error**, and 95.44% of **Active Returns** would be expected to be in a range of +/- 2 times **Forecast Tracking Error**. So, if a portfolio had a **Forecast Tracking Error** of 1%, its **Active Return** would be expected to be in the range of -2% to +2% for 95.44% of the time.

To determine the distribution of **Active Returns** that our clients have experienced over the years, we analyzed our historical database of **Active Return** and **Forecast Tracking Error** information.\* We found similar (but different) statistics:

- Roughly half (50.39%) of all Aperio accounts over time have outperformed their benchmarks, while the other half (49.61%) have underperformed. While we aim to generate pre-tax pre-fee returns in line with the benchmarks' returns, there is always a little wiggle on the upside or downside.
- The distribution of **Active Returns** is roughly symmetric and bell-shaped, but it does have fatter tails than a normal distribution. Fatter tails mean more outliers.
- Roughly **3 in 5** (61.27%) accounts have had **Active Returns** within +/- 1 times their **TE**.
- Roughly **9 in 10** (89.87%) accounts have had **Active Returns** within +/- 2 times their **TE**.
- For the accounts **in the distribution tails**:
  - Roughly **1 in 20** (5.10%) accounts have **underperformed** their benchmarks by more than 2 times their **TE**, while roughly 1 in 20 accounts have **outperformed** by more than 2 times their **TE**.
  - Roughly **1 in 90** (1.16%) accounts have **underperformed** their benchmarks by more than 3 times their **TE**, while roughly 1 in 90 accounts have **outperformed** by more than 3 times their **TE**.

### Terminology

#### Active Return

Portfolio return minus benchmark return.

#### Forecast Tracking Error (TE)

A holdings-based, equity-risk-model measure of the degree of differences between portfolio and benchmark exposures to factor and stock-specific risks; this measure is a forecast of the variability of Active Returns going forward.

#### Standardized Active Return (StAR)

Active Return divided by Forecast Tracking Error; this measure shows the amount of Active Return per unit of risk.

## Standardized Active Return

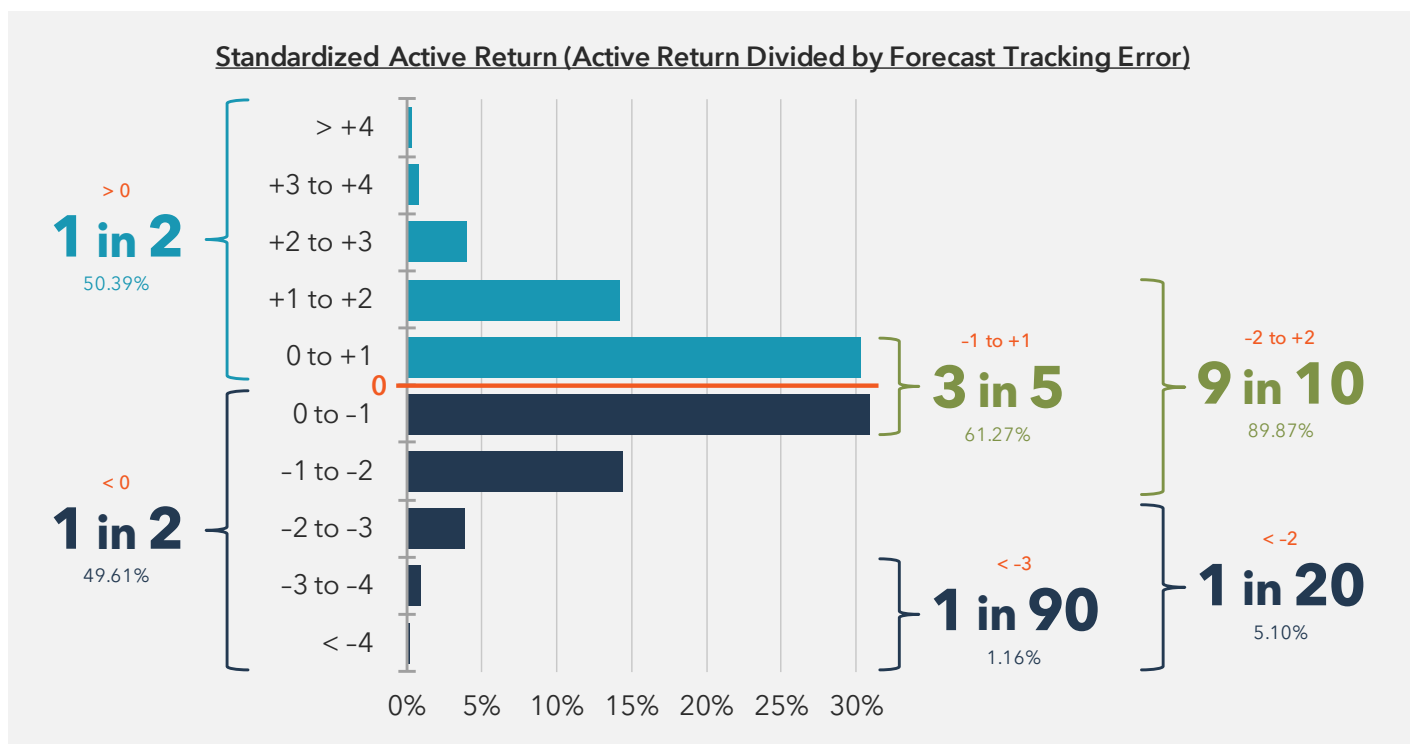
**Standardized Active Return** (which is **Active Return** divided by **Forecast Tracking Error**) is another useful tool as it shows the amount of **Active Return** experienced per unit of risk taken. Given your account's **TE**, how "good" or "bad" (actually, how likely or unlikely) was your **Active Return**?

Using the historical likelihoods from the prior section, we can make these statements about **StAR**:

- Roughly **3 in 5** accounts have had a **StAR** between -1 and +1.
- Roughly **9 in 10** accounts have had a **StAR** between -2 and +2.
- Roughly **1 in 20** accounts have had a **StAR** below 2.
- Roughly **1 in 90** accounts have had a **StAR** below 3.

A histogram of these **Standardized Active Returns** is shown in Figure 1. Note that the upside tail distributions have similar percentages to the downside distributions, but Figure 1 focuses more on the downside, where we believe clients have more concern.

**Figure 1: Distribution of Standardized Active Returns**



Source: Aperio Group. The above chart reflects 247,162 data points covering every Aperio account, filtered for Forecast Tracking Error between 0.10% and 10.00%, for every month between 9/30/2004 and 5/31/2019 from Aperio's historical database. Aperio calculated each account's one-month return (before fees and net of transaction costs) minus the benchmark's one-month return, then divided by the de-annualized Forecast Tracking Error at the beginning of each month. Note: "X in Y" designations are approximations of the exact percentage of data points shown below them.

Thus, having a **StAR** between -3 and +3 is not uncommon. We believe our actual historical distribution of **StAR** serves as useful tool for anticipating potential future distributions.

## Active Return Downside and Scenario Choice

When a client receives a Tax Transition or SRI Analysis from Aperio, we typically include three scenarios, and each scenario has a **Forecast Tracking Error** (e.g., 1.50%, 1.00%, and 0.50%). The client's choice of scenario involves making a trade-off between **Forecast Tracking Error** (and the future distribution of **Active Returns**) and either taxes or values intensity (i.e., ESG score). Taxes are obviously painful today, but future underperformance can also be painful.

When selecting a scenario, we encourage clients to think about extreme negative 3xTE events, which we call **Active Return Downside -3xTE**. (This is a negative 3-StAR event.) To get a sense of how a -3xTE event may feel, consider the three scenarios above by multiplying the TE by -3. The results would be underperformance of 4.50%, 3.00%, and 1.50%. We believe there is a 1.16% probability (1 in 90 chance) of a return at these levels or worse. Clients should be aware and comfortable in tolerating the possibility of such potential returns when making a selection.

## Limitations on Using Forecast Tracking Error

While we believe **Forecast Tracking Error** is the best tool for guiding return expectations, it is far from perfect, and we believe clients should be mindful of its limitations.

Some key points to consider on the limitations of using **Forecast Tracking Error**:

- Although a portfolio's **Forecast Tracking Error** is tuned to market conditions, a portfolio's realized tracking error going forward may be meaningfully different, especially if market conditions change.
- For taxable accounts, **Forecast Tracking Error** should be anticipated to rise over time due to active tax management (e.g., tax-loss harvesting).
- The sources of **Forecast Tracking Error** may impact its accuracy. In particular, the presence of concentrated positions or exogenous alpha/risk factors may increase the model error.
- **Forecast Tracking Error** cannot provide a guaranteed lowest bound. Thus, while a -3xTE event can be considered an outlier, it is not a worse-case event.
- **Forecast Tracking Error** cannot reflect unforecastable risk and returns.

## Summary

- **Forecast Tracking Error** conveys a distribution of potential **Active Return** outcomes.
- Clients should expect a greater frequency of tail events than they would expect to see with a normal distribution of Active Returns due to fatter tails. A -3xTE event is not uncommon, and investors should be aware and comfortable in tolerating such a return (or worse).
- There are trade-offs among taxes owed today, values intensity, and the potential underperformance coming from an **Active Return** tail event in the future.

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With respect to the description of any investment strategies, simulations, or investment recommendations, we cannot provide any assurances that they will perform as expected and as described in our materials. Past performance is not indicative of future results. Every investment program has the potential for loss as well as gain.

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The optimization process used in tax-loss harvesting by Aperio relies upon an optimization model built and designed by MSCI Barra. The model utilizes a mathematical objective function which seeks to minimize the combination of active risk (i.e., forecast tracking error), and the tax liability on realized gains, all while also meeting the conditions presented by a series of simultaneous equations, the values of which are, in part, populated by data based upon the securities being analyzed. With respect to measuring potential equity risk in the process of tax-loss harvesting and portfolio analysis, Aperio also uses and relies upon MSCI Barra risk models. You should note that such use and reliance of the MSCI Barra models in the optimization and equity risk analysis presents model risk, which is defined as the potential for adverse consequences from decisions based on incorrect or misused model outputs and reports. Model risk can lead to financial loss. The model may have fundamental errors and may produce inaccurate outputs when viewed against the design objective and intended business uses. The mathematical calculation and quantification exercise underlying any model generally involves application of theory, choice of sample design and numerical routines, selection of inputs and estimation, and implementation in information systems. Errors can occur at any point from design through implementation. In addition, shortcuts, simplifications, or approximations used to manage complicated problems could compromise the integrity and reliability of outputs from those calculations. Finally, the quality of model outputs depends on the quality of input data and assumptions, and errors in inputs or incorrect assumptions will lead to inaccurate outputs. The model may be used incorrectly or inappropriately. Even a fundamentally sound model producing accurate outputs consistent with the design objective of the model may exhibit high model risk if it is misapplied or misused. Models by their nature are simplifications of reality, and real-world events may prove those simplifications inappropriate.