



THE RISK-ADJUSTED SHORTFALL

Finding out the true costs of trading for institutional investors.

What is the real cost of trading? Perold (1998) suggests that the real cost of trading is the implementation shortfall, or the difference between investment performance on paper and realized performance. To calculate implementation shortfall, a benchmark price must be established. This price is set when the decision to trade is made. The assumption is that the transaction could take place immediately, without any friction or cost. Although simple to explain, implementation shortfall is extremely difficult to measure empirically. Reliable data on benchmark prices are usually not available.

In a forthcoming article co-authored with Mark Kritzman and Simon Myrgren, we use proprietary data from a large transition manager to measure the real cost of trading. Transition management involves transferring assets from one investment manager to another on behalf of institutional investors such as pension plans. Most transition managers use implementation shortfall in their post-trade reporting and therefore keep track of benchmark prices. These are typically set at the closing price of the day before trading begins. We build a unique and comprehensive database from a large sample of post-trade analyses. This database covers over 200,000 transactions. For each of these transactions, we compile both the benchmark and execution prices.

Investors rarely give traders the mandate to buy or sell one single security. Transition managers transact in multiple securities simultaneously in order to move clients from their legacy portfolio to their target portfolio at the lowest cost possible. In these cases, opportunity cost is a direct function of the tracking error between the legacy and the target portfolios. The transition manager must manage risk at the portfolio level. Correlations between securities must be considered, as well as the marginal contribution of each security on overall tracking error.

Although we can forecast implementation shortfall with a reasonable level of accuracy, it does not account for the difficulty of a trade. For example, the shortfall of an emerging market reallocation cannot be compared

with the shortfall of a U.S. large capitalization reallocation. Intuitively, an emerging market reallocation should be more expensive and, most importantly, it should be more “difficult.”

To measure the performance of investment managers, we use risk-adjusted measures such as the Sharpe ratio, Jensen’s alpha, and the information ratio. But how can we assess the skill of a transition manager? How can we compare multiple providers? To do so, we introduce the risk-adjusted shortfall. We summarize the difficulty of a trade by two factors: liquidity and tracking error between the legacy and target portfolios (*TE*). We measure the risk-adjusted shortfall as follows:

$$\text{Risk-Adjusted Shortfall} = \frac{\text{Shortfall}}{f(\text{TE}, \text{Liquidity})}$$

Any transition receiving a score greater than 1.0 will be considered expensive. Transitions for which risk-adjusted shortfall will be below 1.0 will be considered cheap. It can also be expected that some transition managers will never obtain scores below 1.0. To determine the parameters of $f(\text{TE}, \text{Liquidity})$, we regress realized shortfall numbers for our proprietary sample of transitions on these two factors:

$$\text{Shortfall} = \alpha + \beta_1 \text{TE} + \beta_2 \text{Li} + e$$

Where *Li* is the weighted average percentage of daily volume traded for the buy and sell lists. To obtain a widely applicable risk adjustment, we opt for simplicity. We do not include factors such as the percentage of internal crossing or the use of futures to reduce tracking error. Hence, we do not expect a perfect fit for this regression.

The real cost of trading is measured by the implementation shortfall. To compare shortfall numbers across markets and multiple providers, implementation shortfall can be adjusted for risk. This adjustment is based on liquidity and tracking error at the portfolio (buys vs. sells) level. ■

1. Perold, Andre F., “Implementation Shortfall: Paper vs. Reality,” *Journal of Portfolio Management* 14, no. 3 (Spring 1998), 4-9.