The Use and Abuse of Implementation Shortfall
Examining the Dominance of Implementation Shortfall as a Trading Benchmark
Abstract

This paper examines the evolution of how the implementation shortfall benchmark has been used in transaction cost analysis (TCA).

It is our contention that implementation shortfall has been extended to topics beyond its initial intent and purpose. Other questions concerning how to understand and improve trading performance have been reduced to the measurement of slippage.

The lack of granularity in the implementation shortfall measurement has resulted in criticisms that it does not provide useful or “actionable” information on how to improve trading performance. We identify in the existing literature an approach which is both consistent with implementation shortfall results, while at the same time, deepens it to provide a conceptual framework for managing trade cost performance.

Finally, some examples are provided to demonstrate how this approach can be used to practically enhance trading cost results.
Introduction

The notion of measuring trading costs by “implementation shortfall” benchmarks is now over 25 years old.

In that time, it has supplanted VWAP and a variety of other measures to become the primary benchmark by which trading costs and best execution are evaluated. It has been put forward by the industry and most vendors of Transaction Cost Analysis (TCA) as the “correct” way to measure and analyze trading costs.

Unfortunately, like most concepts that attain the status of a paradigm it has also become an intellectual dogma as “the way to measure trading performance”, which is largely unquestioned. In the meantime, market structure, technology and the regulatory environment have continued to evolve at an ever faster pace. One might ask, given all the changes in financial markets in the last quarter century – why not yet another new benchmark? This paper is admittedly a polemic intended to re-open discussion on the efficacy of trading benchmarks. The time is now right to examine (paraphrasing Nietzsche) the “use and abuse” of implementation shortfall as a tool for measuring trading performance.

Our thesis is that implementation shortfall, which was conceived as a measure for the overall cost of implementing investment ideas for a fund should be used for precisely just that. Certainly, when speaking to a plan sponsor or plan sponsor consultant, it is important to communicate trading performance in these terms. That is their primary question and concern regarding trading costs. Implementation shortfall as a benchmark, however, has been extended, and perhaps, abused, as the metric for answering many other diverse questions. Questions such as what is the measure and what is the standard for improving trader performance, evaluating broker skill, understanding the effectiveness of different strategies and, even assessing the quality of different trading venues have been reduced to the concept of slippage.

While all of these issues are components of overall implementation cost, our view is that slippage is a poor conceptual framework for achieving insight and useful information with respect to these questions. We put forward an alternative way of looking at implementation shortfall that, we believe, provides greater explanatory power and the ability to generate an actionable hypothesis for the different tools used and parts of the implementation process. At the same time, the benchmarking framework we propose has the virtue of reconciling the trading costs of different aspects of the implementation process back to the overall slippage cost to the fund.

What are the limits on implementation shortfall in providing actionable hypotheses and insights to improve trading? In speaking with the investment community, we increasingly hear veteran buy-side traders express dissatisfaction with implementation shortfall, both in terms of being misleading and incapable of providing meaningful improvements to trading performance. They point out, for example, that the large negative slippage costs associated with trades implemented in very adverse momentum trading environments is misleading. In fact, that there is significant skill required to control and minimize the high costs associated with trading in such difficult environments. Others point to the need to consider trading costs in the context of available liquidity. We agree that all of these factors such as adverse momentum and large demands for liquidity are important explanatory components of the overall slippage cost. However, implementation shortfall itself is too coarse a measurement tool to provide any type of decomposition that offers meaningful analysis. Not surprisingly then, the most prevalent comment from the investment community is that the benchmark cost number has very little information content nor actionable ideas for strategy improvement and can even be misleading with respect to trader performance.
Our goal is to contribute to the ongoing discussion on how to improve the conceptual framework and tools used to understand trading performance. We begin by examining how we got to the point where implementation shortfall is used as the benchmark for everything in trading from determining trader compensation to trading strategy selection.

We suggest that its adoption as the benchmark of choice for a wide range of questions around trading performance, as opposed to the original more limited usage as a measurement of the cost of trading to a fund, results from a case of misguided reductionism. What has effectively happened is that a wide variety of questions relating to trading performance have been reduced to being measured and evaluated as the change in price from one point in time to another. The result is that we get explanations of execution quality that are misleading and incapable of providing information useful for forming an actionable hypotheses by which trading performance can improve.

Next, we review an alternative method, from the literature, which provides valuable insight into how implementation shortfall can be expanded to answer more meaningful questions about execution quality. However, when that method was originally proposed, the technology was not available yet to implement it in practice. We describe an alternative approach based on this framework that takes advantage of the increased granularity of execution level data to provide a more powerful tool framework for trading costs.

Finally, we provide illustrations of the use of this explanatory framework. Using the new approach we show how you can compare and evaluate the relative performance of two liquidity seeking strategies. That analysis is followed by an illustration of how optimizing market impact and market timing can reduce overall trading costs. We use the liquidity seeking strategy data from the prior section, but now take a deeper looking at cost distributions of market timing and market impact cost outcomes in different momentum conditions. We conclude by extending the previous example to illustrate how these same concepts can be used to help in selecting the preferred type of trading strategy in well-defined trading scenarios.
How Did Implementation Shortfall Become the Dominant Trading Cost Benchmark?

References to the concept of measuring trading costs go back to the 1960’s. Harold Demsetz¹ and Jack Treynor (writing under the pseudonym of Walter Bagehot – you Economist fans will get the reference), had already begun to discuss the importance of transaction costs in making investment decisions.

Transaction costs traditionally were categorized into “explicit” and “implicit” costs. “ Explicit” costs like commission fees or stamp taxes are clearly understood. They are on trade statements and are clearly defined and observable. “Implicit” costs, however, while generally much larger, are not directly measureable and their definition has been the subject of significant debate.

Over time, the different components of implicit costs were identified. Immediately acknowledged as part of implicit costs is the spread between the price where you can quickly buy an asset (the market’s ask price) and the price at which you can quickly sell the same asset at the same point in time (the market’s bid price). For a long time, traders defined implicit costs simply as the spread (as spreads are at least something that could be empirically measured). Although spreads can be measured empirically, spread costs are still implicit. While we can measure the spread, we do not observe the true price until after the trade is executed. Bid/ask spreads as a constituent of trade execution costs reflect the price concessions to liquidity suppliers that compensate them for the risk they incur in providing the liquidity necessary to complete transactions immediately.

Besides using the spread as the measure for implicit cost, traders acknowledged market impact as another aspect of trading costs which needed to be accounted for. Market impact can be understood as the change in price resulting from an aggressive trading strategy that pushes the price up when buying an asset and pushes it down when selling.

Finally, in a seminal paper, Jack Treynor² pointed out that a significant part of the cost to the overall return of a portfolio was the result of the market timing cost associated with a passive strategy of waiting to trade. These costs are invisible because as Treynor puts it “the trader won’t know what information made the bargain possible until it bags him.”³ A patient trader might lower the other components of trading cost. Or conversely, waiting can reduce profits both on trades that are made and trades that would have been profitable if they were made at the time but then became unprofitable as a result of waiting. This result is generally referred to as costs due to momentum. It is the sum of these different implicit cost components, in conjunction with the explicit costs of commissions and other fees that makes up the trading costs of an asset.

The issues around measuring trading costs and by extension “implicit costs” became more important in the 1980’s because of large increases in equity trading volume. In the United States, the Revenue Act of 1978 included a provision where employees were not taxed on the portion of income they elected to receive as deferred compensation rather than as direct cash payments. This legislation was the foundation of 401K plans and the beginning of the shift in investments from Defined Benefit to Defined Contribution plans. This shift resulted in a substantial increase in assets for mutual and pension funds. Large buy-side institutions whose funds managed money for hundreds of pension plans found themselves buying and selling positions which could amount to 100% or more of the daily volume traded in a stock. Growth in equity trading along with advances in technology created a growing interest in the measurement and management of trading costs which precipitated the rise of transaction cost analysis as a separate discipline. However, as is often the case, the application of theory was limited by the practical limitations of what was technologically possible.
The first problem faced by those attempting to measure implicit costs was getting quality trading data with which to perform the measurements. Let us remember what technology was like in those days. There were no OMS/EMS-type trading systems. Electronic spreadsheets, like Lotus-123 and Excel were the state of the art and even those were simple by today’s standards. Computing power was a fraction of what it is today and significantly more expensive. Just recording trades for the books and records of the firm, let alone consistently applying trading characteristics like the time stamps of when trades took place for subsequent analysis, was an intensive undertaking that employed armies of trading clerks. By the second half of the 1980’s, these problems began to dissolve. In 1987, Seth Merrin created Merrin Financial Systems the first real OMS. This allowed trades to be electronically time stamped as to when they occurred.

A more fundamental problem than technology was developing a good conceptual framework for defining and understanding trading costs. Measuring trading costs required a standard or benchmark used to compare against the execution price to determine the “true” cost of the trade.

Among the early benchmarks utilized were an average of the High, Low, Open and Close prices or just measurement against the price at the previous night’s close, the Open or the trade date close of the stock. In 1988, Berkowitz, Louge and Noser published their paper advocating the explanatory power of a VWAP benchmark for evaluating trader performance. Supporters of these types of benchmarks claimed that these were indicative benchmarks of the average price the trader could hope to achieve. As such, the difference in actual trader results from these benchmarks was a measure of trader performance. Another virtue of these benchmarks, given the difficulty in getting high quality market data, was that the data needed to produce them was relatively easy to obtain and calculate. Objections, however, were raised from the start that these benchmarks did not actually measure trading costs, but at best, measured the trader’s ability to participate in the market at those times when liquidity was most prevalent. It was also a serious limitation, that these benchmarks could be “gamed” (i.e., were capable of being manipulated) by a smart trader.

Into this fray of benchmarks, Perold (1988) published his foundational paper defining implementation shortfall as a measure of the difference in price return between a theoretical and an implemented portfolio. When deciding to implement his/her investment idea, a portfolio manager measures a theoretical return during back-testing by using historical decision prices at meaningful price snapshots such as the open or close price. When the investment idea is implemented in practice the actual execution prices differ from the decision prices because of the implementation process. This difference results in returns that diverge from the portfolio manager’s expectations.

The industry was sensitive to the limitations in the previous generation of trading cost benchmarks and needed an alternative. It found Perold and his implementation shortfall. This new benchmark had several great advantages over previous benchmarks. First of all, it was much harder to “game” than schedule oriented benchmarks. The lack of “gameability” was a key selling point to the original asset owners and their fiduciary concerns, and probably was the critical factor in making implementation shortfall the dominant benchmark. Finally, with the advent of trade timestamps in new OMS technology, it was now technologically feasible to measure slippage. In an era where order management systems were becoming more widely used, there were time stamps available to measure the change in price (and hence the cost) from one time stamp to another.

Treynor had asked the question, “Why do paper portfolios consistently turn in spectacular performances, even after adjusting for the visible costs of trading and after adjusting for risk - while actual portfolios strain to beat the market averages?” Perold provided an answer. Implementation shortfall results from the costs of trading as well as the opportunity costs of not executing all of the positions in the paper portfolio. His insights into the challenges that equity managers faced in translating investment ideas into realized portfolio performance illustrated the difference in performance between a paper and an actual portfolio. It had the great benefit of getting people to start thinking about all the different parts of the order implementation workflow where inefficiencies could generate additional costs detracting from the overall performance of the fund.
Perold’s concept of implementation shortfall was designed to measure the total cost to the fund at the level of the portfolio. As such, it performs its job admirably. But is it as useful when adapted to measuring the quality of trader performance? Does implementation shortfall as a benchmark adequately measure the trader’s ability to efficiently manage liquidity? Could it even mask the effectiveness of trading performance?

To appropriate implementation shortfall for the purposes of measuring trader performance required a subtle modification in its definition. It had initially been proposed by Perold as the slippage from the portfolio manager’s decision price to the completion time for implementing the investment idea. TCA vendors and other practitioners redefined and extended the concept to be the measurement of the difference between the execution price and the time stamped benchmark price between any two points in the implementation process. The benchmark price represented an alternative decision price of another participant in the investment lifecycle, for example the trader. This re-definition was needed in order to shift the focus of implementation shortfall from explaining the differences between paper and actual returns to using it as a benchmark for measuring trading performance.

In other words, what happened was a linguistic confusion equating fund performance (the change of price from one point in time to another) with quantifying the quality of performance in accomplishing the activity and tasks of trading. Once this piece of reductionism was accomplished, the effectiveness of a trader (or a broker or a strategy) was defined as and reduced to the ability to minimize a change in asset price.

The semantic shift was justified by the assumption that the paper portfolio is constructed by the portfolio manager and the actual portfolio contains positions implemented by the trading desk. The responsibility for the differences in the value between the paper and actual portfolios resulted from costs associated with decisions made by the trading desk. This justified allowing trading desk performance to be measured on this basis. However, what it does not reflect are the constraints placed on traders, brokers and strategies by the portfolio manager, regulations and the needs and risks of liquidity management in a fragmented trading environment.
What are the implications of this shift?

The adoption of implementation shortfall accelerated an era of benchmark-based trading analysis broadly categorized as TCA (Transaction Cost Analysis). Given the widespread popularity and adoption of VWAP as an implementable trading strategy, perhaps the most important immediate reason for this adoption of the implementation shortfall model was a best execution rationale: The claim that implementation shortfall couldn’t be “gamed.” Interestingly, VWAP continues to be used by traders as a practical matter because (on the assumption it is not being gamed), it provides explanatory power and a practical framework to traders that slippage as a benchmark does not⁸.

Users of slippage benchmarks however were frustrated because the numbers rarely provided concrete insights. While the benchmark gave them a target to shoot for, it provided no inherent feedback mechanism to understand why they hit or missed the mark. In an environment where traders had the bandwidth to handhold orders, they could use the benchmark as a confirmation of their perception on how the order had progressed. However, as workflow became more driven by technology, the number of orders increased while trading desks down-sized, the “feel” of an order became less apparent to traders and consequently, implementation shortfall’s merits were diminished.

As we touched on in the initial discussion of the components of implicit costs, when executing an order the trader has an explicit decision to make. The tradeoff is between the impacts of executing with immediacy versus the opportunity cost of waiting. It is in this “trader’s dilemma” that the lack of explanatory power in implementation shortfall is revealed. For example, a trader presented with an order that misses the decision price mark by 50 basis points is left unsure of “where” the slippage came from. Without a more detailed knowledge of the underlying narrative of how the order was worked, the trader cannot draw any substantial conclusions. For example, the trader might conclude that the execution allowed for some timing cost while minimizing impact when indeed it signaled the market and fell prey to the anticipatory hedging activities of competing order flow. As more traders question the insight provided by implementation shortfall, it has become apparent that this concept has been misappropriated to trading situations and is potentially misleading and dangerous as a benchmark for the purposes of evaluating trade performance. Ultimately, traders want to know how much impact they have versus the competing order flow and they are left empty handed when using implementation shortfall.
An alternative approach that answers traders’ questions

In discussing the implicit or variable costs of investing, Collins and Fabozzi point out, “The variable component consists of execution costs and opportunity costs. … Execution costs can be further decomposed into price, or market impact, and market timing costs.” It is this conceptual framework of the decomposition of execution costs that provides the explanatory power which more general implementation shortfall benchmark lacks. Ideally, a benchmark that conveyed insight into this attribution, while staying anchored to the decision price would benefit the trader immensely. In theory, a trader armed with this breakdown could take a look at his/her performance that misses the decision price by 50 basis points and know that, for example, 10 basis points was due to timing costs while 40 basis points was on account of market impact. With this context, a trader could, among other things, use the results as a confirmation that he/she traded in an aggressive or passive manner.

Following this thought process of attributing decision price slippage; the implementation shortfall of executed orders can be separated into two components. The first part is the market impact, or ‘footprint’, that results from the series of individual trades required to complete an order. This part captures both the spread and market impact components of implicit cost. The second part is the effect of the competing trades that are responsible for the price drift over the execution period and captures the remaining market timing or momentum aspect of implicit costs. Attributing costs into these components allows traders and portfolio managers to confidently isolate key trading costs, and then consider those costs in the context of the factors driving the trading decision.

This approach provides a framework that allows a trader to propose an actionable hypothesis surrounding the decisions made during the course of trading. In practice, traders have a much higher degree of control on market impact than momentum, which is primarily influenced by other market participants. Controlling transaction costs, in our view, is essentially an optimization problem. Traders can control the level of aggression in incurring market impact to optimize performance associated with momentum (both favorable and adverse). They can achieve this by trading more aggressively and increasing market impact to reduce the effect of adverse momentum or capture short term alpha. Alternatively, traders can slow down and trade more passively to take advantage of positive market movements where the price is coming in to them. As a result, the trader can proactively make decisions about when to impact a stock given the momentum conditions faced on each trade. Consequently, post-trade results can be studied and analyzed to optimally tune the liquidity access decisions and understand performance in the context of the trader’s dilemma.
Using the new approach

To illustrate the explanatory power of this framework, we examine how one might evaluate the performance of two popular liquidity seeking strategies used by buy-side institutional traders. A trader wants to use a liquidity seeking strategy but the trading environment called for one with low market impact. How would a trader evaluate the different tools available to them? The goal of a liquidity seeking strategy is to execute an order at the most favorable price by using all available liquidity both from lit as well as dark (non-displayed) venues. In practice, brokers differentiate their offering by using proprietary smart order routers and anti-gaming logic in an effort to achieve outperformance.

Liquidity seeking strategies attempt to utilize non-displayed or dark liquidity to get an order filled. They are a popular choice for traders who wish to remain anonymous while executing in a quick and aggressive manner. For this analysis, we examine 26,285 broker placements from Markit TCA's peer universe for two popular liquidity seeking strategies from 1/1/2014 to 9/1/2014 comprising over $7.8 billion notional traded. We examine orders that were between 0.5% and 1% of day's volume in order to control for order difficulty while focusing the analysis on a subset of orders with a typical broker placement size. For each order we calculate the percentage of day's volume, participation rate, trade duration (in minutes), the number of fills per order and the average trade size relative to the market to provide more context.

<table>
<thead>
<tr>
<th>Order Characteristics</th>
<th>Liquidity Seeking Strategy - Alpha</th>
<th>Liquidity Seeking Strategy - Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Day's Volume</td>
<td>0.72%</td>
<td>0.71%</td>
</tr>
<tr>
<td>Participation Rate</td>
<td>59%</td>
<td>45%</td>
</tr>
<tr>
<td>Trade Duration (min.)</td>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>Average Fills per order</td>
<td>39</td>
<td>33</td>
</tr>
<tr>
<td>% Trade Size</td>
<td>109%</td>
<td>120%</td>
</tr>
<tr>
<td>% Spread Paid</td>
<td>58%</td>
<td>74%</td>
</tr>
</tbody>
</table>

Basic market statistics do not clearly identify a preferred strategy. As we can see from the above table of order context metrics the two strategies are executing orders with similar percentages of day's volume because of our explicit order filter. Alpha has higher participation rates and shorter order durations, with more fills per order at a smaller average trade size than Beta. However, Beta pays more of the spread on average (as indicated by the % spread paid value). Using conventional wisdom as a guide, we'd expect Alpha to incur more market impact than Beta because of its higher participation rates and shorter durations.

On the other hand, if we use the percentage of spread paid as a proxy for impact, we would expect to see Beta with more market impact. Ultimately, even with detailed metrics available we are unsure as to which strategy experiences more market impact. To take a deeper look, we can examine the trading costs for these orders using the outlined approach. Throughout the rest of the paper any positive performance value indicates a savings from the respective benchmark while a negative value indicates a cost.
Using the traditional implementation shortfall benchmark (with the broker receipt time as the arrival price timestamp) we can see that Alpha has about one basis point more implementation shortfall slippage from arrival than Beta. With just this information, one would be left to choose Beta as the superior strategy. However, by decomposing the shortfall into its constituent parts, we can see that Alpha actually has less market impact than its counterpart Beta.

The reduction in overall slippage for Beta, in fact, is achieved as the result of favorable market momentum. Armed with this information, a trader seeking to achieve the lowest trading cost might choose to use Alpha in more adverse market momentum to reduce market impact and complete the trade before the price moved too far away from him/her. While, on the other hand, a trader may choose to use Beta, which is a slower liquidity seeking strategy but captures larger fills to take short term alpha when the price is moving in his/her favor.
Optimizing Market Impact versus Market Timing

The process of optimizing trading strategies can be further tuned by examining performance under different execution scenarios. In this next section we look at the statistical distribution of trading cost outcomes to paint a more complete picture of execution quality in different trading momentum conditions. Looking at Figure 1 below, each vertical group of bubbles shows the frequency distribution of market timing costs for a bucket of trades that have different market impact results.

The vertical axis shows the market timing or momentum costs in basis points. The size of the bubble indicates the frequency for that bucket, where a larger bubble equals a more frequent observation. Looking from right to left, we see two interesting outcomes that result from more trade aggression (i.e. larger market impact). First, as market impact increases, the cost outcomes associated with market timing become more widely dispersed. Secondly, increased trade aggression is correlated with a larger frequency of orders which are slightly positive in terms of market timing costs.

Figure 1 - These results allow us to gain a better intuition for the interplay between the market timing and market impact components. This figure shows the relationship between market impact and market timing costs. As market impact increases, trading costs from adverse momentum are reduced.

This trend becomes even clearer when we zoom in on one particular set of trades. In Figure 2 we focus on trades where the level of trade aggressiveness generates between -5 to -10 basis points of market impact. Here in more detail we see that slightly positive market timing performance bucket (2 to 6 bps) has the highest frequency of orders (about 30%). The opposite market timing performance bucket, -6 to -2 basis points, has only 10% of the orders.
Figure 2 – This figure focuses only on orders that had between -5 and -10 basis points of market impact to examine the distribution of market timing costs.

When we isolate and examine adverse and favorable momentum trades independently\(^5\), this phenomenon becomes clearer. Looking at orders with favorable momentum (Figure 3), we see that most orders have favorable timing costs, as expected. What is interesting and important is that as market impact costs increase (i.e., become more negative) so does the frequency of orders with higher positive market timing performance. In this scenario, traders move aggressively and are willing to incur market impact in order to access liquidity at favorable prices.

Figure 3 - This figure suggests that traders can aggressively execute crossing the spread and are willing to trade off market impact in order to access favorably priced liquidity.

Examining where market impact is between -5 to -10 basis points (Figure 4), shows a clear skew toward favorable market timing performance. There is, for example, greater than a 60% probability of achieving positive market timing performance greater than 30 basis points.
Figure 4 – In this figure we show the timing cost distribution for orders with -5 to -10 basis points of market impact is skewed toward the positive timing cost outcomes.

Similarly, (Figure 5) although market timing performance is largely negative in adverse momentum trading conditions, there is nonetheless an increased skew towards more positive market timing results as market impact increases.

Figure 5 – This figure examines the interplay of market timing and market impact costs for orders executed in adverse momentum.

Similar to the favorable momentum case, when we examine orders that generate between -5 to -10 basis points of market impact in an adverse momentum trading environment (see Figure 6), the overall slope is towards lower market timing costs suggesting that more aggressive trading can help reduce overall costs by expediting the completion of orders in difficult markets.
Figure 6 – In this figure we show the market timing cost distribution for orders that executed in adverse momentum with -5 to -10 basis points of market impact.
Improving Strategy Selection

Examining trading costs in a framework of optimizing the interaction of market impact and market timing can be for more than to support tactical decisions about the level of trading urgency. It can also be used to help make strategic decisions regarding the preferred trading strategy for a particular trading environment. The following chart illustrates how one can gain actionable insights into the type of trading strategy most effective in minimizing market timing costs. Here the data is constrained to only orders traded in an adverse momentum environment. The trader has already decided on a low level of aggressiveness to complete the trade (defined as between -1 to -3 basis points of market impact) within a given time frame.

Figure 7 shows both the distribution (the left axis) and the probability (the right axis) of market timing outcomes for orders executed with either a liquidity seeking or a participation strategy. The chart indicates that the liquidity seeking strategy is clearly preferable in these circumstances. There is a 42% probability of incurring unfavorable market timing performance worse than -20 basis points using the liquidity seeking strategy, while there is a significantly higher probability (54%) of getting a result worse than -20 basis points with the participation strategy. These results demonstrate one set of outcomes for two strategies and can easily be extended to other strategies using additional categorizations, such as market volatility or percentage of average daily volume.

Figure 7 - This figure shows the distribution and cumulative distribution for liquidity seeking strategy orders versus participation strategy orders in adverse momentum.
Conclusion

The goal of this paper is to re-engage a discussion on the efficacy of trading cost benchmarks. It is our contention that implementation shortfall as a benchmark has been over-extended and used for a number of questions beyond its original intent. Its limitations as a tool for answering these questions is evidenced by the criticism that these metrics provide no “actionable information.”

The conceptual framework advocated here attempts to address the need for actionable insights by managing trading costs as an optimization problem. Realized trading costs (leaving aside for the moment the question of opportunity costs) are comprised of two components, market impact and market timing. The ability to use the amount of trade urgency or aggression as a lever (and thus, the level of market impact costs) allows the trader to control and manage the generally much larger costs associated with market timing relative to the macro trading environment. The ability to decompose slippage into market impact and market timing components allows traders to create empirically testable hypotheses leading to the creation of genuinely “actionable ideas.”

Using statistical distributions and probabilities, we can test hypotheses and provide empirical confirmation of cost effective changes to trading strategies. In this paper, we have focused on the effect of market momentum in impacting trading cost performance, however, further research can extend this model to look at the impact of volatility, demand for liquidity and other trading factors and how they can be incorporated into this type of model. While the ability to decompose slippage into market impact and market timing provides a framework that offers greater explanatory power, at the same time, this approach provides for reconciliation to a high level implementation shortfall measure which allows for consistent high level reporting to plan sponsors and other interested parties needing to understand the impact of trading costs at the fund level.
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Citations

2. Ibid.
5. Our colleague Tim Sargent tells a story of a time in the early 1990’s when he and some of his associates at Merrill Lynch went up to Cambridge to discuss the use of his concepts in measuring trading costs with Professor Perold. He was aghast that the concept might be applied to trading analysis and stressed that the concept was relevant specifically at the portfolio level.
7. This definition limits the discussion to implicit costs. Total Trading costs would then be IS costs + explicit costs.
8. It is interesting in this context to think about participation benchmarks which became popular in the last decade and like VWAP is based on a scheduled approach to trading. Participation benchmarks continue to gain in popularity perhaps largely because they offer explanatory power while apparently avoiding the charge of gameability.
10. We are using the following as definitions of favorable and adverse momentum. Favorable momentum is defined as orders where the price changes more than one third of a percent in the direction of the decision price from the first execution to the last execution in the order. Adverse momentum is defined as orders where the price changes more than negative one third of a percent away from the direction of the decision price from the first to the last execution in the order. There are over 26,000 orders in the sample set from a period covering 1/2014 to 10/2014.

More information

For more information about Markit TCA please visit markit.com or email sales@markit.com

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