

Disclosing Transaction Costs – The need for a common framework



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“Better comparability might help investors make better-informed choices, and would enable operators to benchmark themselves more accurately against the market as a whole.”

–IOSCO, 2016

2018 has seen the introduction of new standards for disclosing the costs of investment portfolios, intended to enhance the visibility of transaction costs and empower investor decision making in the EU.¹ These disclosures reflect the introduction of the Markets in Financial Instruments Directive II (MiFID II) and the Packaged Retail Investment and Insurance-Based Products Regulation (PRIIPs) at EU-level in January 2018, as well as national initiatives such as the Financial Conduct Authority’s (FCA) upcoming requirements for UK pension funds.²

The practical application of these new standards has presented both market participants and investors with a number of challenges. **Crucially, there is no consensus on how to measure the transaction costs that portfolios incur.** Across the EU we are seeing different conventions and methodologies emerge depending on the product or service provided. This adds to the confusion, as disclosures are heavily influenced by the markets in which fund managers, distributors, and investors are situated. Within the same jurisdiction, reports can be hard to compare; but across EU markets with differing standards, it becomes nearly impossible.

In this context it is unsurprising that we have received consistent feedback from investors that they do not understand the data in the new disclosure standards.³ **The different approaches permitted under the various regulations create confusion among investors as to what they are paying for,** leading to increased distrust of the financial sector, rather than fostering greater trust and confidence.

We draw the conclusion that, however well-intentioned, the new regulatory standards have failed in their objective of empowering investors to make better and more informed investment decisions. This is principally due to the adoption of competing methodologies with markedly volatile and inconsistent outcomes, preventing effective comparability between providers in the market. The web of overlapping disclosures means that product manufacturers are increasingly under pressure to report the costs of a single product against a number of different standards. In two different markets the same product can be shown to have different transactions costs, with the result that **there is no single version of the truth for investors to rely upon.**

The planned review of the application of PRIIPs at EU level in 2019, the scheduled adoption of PRIIPs disclosure standards by Undertakings for Collective Investment in Transferable Securities (UCITS) funds from the start of 2020, and the FCA Call for Input on the impact of the PRIIPs Regulation in July 2018 underscore the importance of adopting a consistent and coordinated approach.⁴ **We believe that action is urgently needed to reach a common regulatory framework for transaction cost transparency which delivers for investors rather than further exacerbating the problem.**

The opinions expressed are as of August 2018 and may change as subsequent conditions vary.

“ I want to be clear that I am concerned about PRIIPS, and I know I am not alone. It carries a risk that it is leading to literally accurate disclosure which is not providing useful context.”

– Andrew Bailey, London Business School – Annual Asset Management Conference, April 2018⁵

To reach an agreement on the most suitable methodology we require clarity on the purpose to be served by transaction cost disclosures. Fundamentally, we see the objective of these disclosures as an instrument to empower end-investors to make better investment decisions. Ex-ante (pre-investment) disclosures help prospective investors understand the level of anticipated trading and transaction costs that a fund manager will engage in to achieve the fund’s stated outcome, informing

them in their product choice. Ex-post (post-investment and beyond) disclosures establish transparency around actual trading activity and the trading costs that a fund manager incurred. Investors should be encouraged to use transaction cost disclosures to understand how effective a fund manager is at generating the outcome set out in the portfolio’s objective. As a result, criteria such as stability and comparability of the disclosures are essential attributes of any methodologies used.

Key Recommendations

We make seven recommendations to provide investors with more relevant data for making informed and effective investment decisions, leading to smoother implementation of recent regulations:

1. **Purpose of disclosures:** Transaction cost disclosures should be judged according to their effectiveness in helping investors make better decisions about their investments. For both new and existing portfolios, the disclosures should serve as a tool for assessing how efficiently a fund manager achieves their stated objective. Additionally, **disclosures should explicitly state which costs are already included in performance figures to avoid misrepresenting their impact.** This approach highlights the importance of consistency and comparability in the metrics used.
2. **Optimal methodology: There is no one simple formula that can adequately represent the costs of trading across multiple strategies and asset classes.** Instead we recommend fund managers use a Modified Spread methodology as the concept most suited for providing transaction cost disclosure to investors; when well executed it delivers the highest degree of consistency and comparability. Existing Spread methodologies should be enhanced by incorporating relevant factors that influence trading costs.
3. To ensure full accountability and transparency to investors, fund managers should have appropriate governance and oversight controls in place overseeing fund transaction cost reports. Investor disclosures should include information of the material factors and assumptions used when reporting on transaction costs. **We recommend fund managers adopt a governance and supporting disclosure framework based on the recently enhanced MiFID II best execution rules.**
4. **Supplementary information:** End-investors would benefit from clearer attribution of costs which identifies the recipients of any charges and costs they pay (for example, fund managers, brokers, distributors, other intermediaries such as platforms, and tax authorities). Transaction cost disclosures could also be improved by providing separate information on the frequency of trading and cost of trading separately.
5. **Transaction Cost Analysis:** Slippage metrics are not suited to transaction cost disclosures, given their technical nature, exposure to market volatility, and sensitivity to underlying data, which leads to repeated instances of negative transaction costs even when averaged over the three year period required under PRIIPs. However, they are an important tool for portfolio managers and traders to improve investment performance.
6. **Harmonization of regulation:** We encourage policy makers to take action to harmonize the competing disclosure rules present in the market, to minimize investor confusion. Whatever methodology is finally agreed upon, all instruments and all transaction types should be included without exemptions. The designated methodology should treat all instruments as consistently as possible to ensure that costs arising from different instrument choices such as swaps, ETFs, or futures are comparable. Harmonization will improve transparency and help investors make unbiased investment decisions.
7. **Extend the UCITS exemption from PRIIPs:** We support the overall policy objective of ensuring that all retail investment products are subject to standardised cost disclosure standards. Until the issues we have identified with the PRIIPs disclosure requirements have been resolved we believe that it is premature to replace the current investor information requirements in the UCITS KIID. **We call on EU policy makers to extend the current exemption of UCITS from PRIIPs disclosure standards beyond the current expiry date of December 2019** until concerns about the underlying methodologies have been resolved. This will have the key benefit of minimising the number of changes investors have to assimilate.

Exhibit 1: Comparing Spread and Slippage Methodologies

Spread Methodologies	Slippage methodologies ⁶	Expected Cost Models
<ul style="list-style-type: none"> • Spread methodologies aim to measure a fund's transaction costs by quantifying the <i>typical difference</i> (or 'Spread') between the price required to buy and sell a security. • Each instrument category is assigned a representative 'Spread cost' so it is helpful to think of the methodology as capturing 'estimated costs' rather than 'actual costs'. • Spread costs at fund level are stable through time and comparable across funds. 	<ul style="list-style-type: none"> • Slippage methodologies are an attempt to capture the realized difference in value when one asset (cash) is exchanged for another asset (a security). • Each trade is assigned a cost that is made up of observable fees, commissions or levies as well as the actual price change between benchmark price and execution price. • Slippage costs at fund level are very volatile due to data and measurement challenges. 	<ul style="list-style-type: none"> • Expected Cost Models are statistical models that estimate the cost of trading a security by taking into account parameters such as the size of the order, bid-ask spreads, volatility and liquidity. • Models are typically calibrated against actual trading activity to ensure that predictions more accurately reflect realized costs.

In this *ViewPoint*, we:

1. Consider the regulatory landscape which drives the provision of conflicting standards for cost disclosure
2. Set out how costs and charges are incurred in investment portfolios
3. Compare the advantages and drawbacks of the cost disclosure methodologies used in European markets, most notably the Spread and Slippage methodologies
4. Provide a qualitative perspective on the impact of using these methodologies supported by the empirical analysis we have conducted on a number of representative portfolios
5. Seek to inform a common disclosure standard which is best suited to realize the objective of supporting investors and their advisors in their investment decision-making process while meeting regulatory demand for meaningful cost transparency by making recommendations on how to develop a Modified Spread methodology.

This *ViewPoint* focuses on EU developments given the recent legislative activity, but the core messages are equally applicable to other jurisdictions planning to update or establish transaction cost disclosure standards in light of the recent IOSCO Best Practices Report.⁷

The EU's regulatory landscape

In recent years the disclosure of transaction costs for investment portfolios has become a significant area of focus for regulators and market participants, particularly in Europe. In the Netherlands, the Federation of the Dutch Pension Funds led the way in establishing transaction cost disclosures.⁸ In January 2018, PRIIPs and MiFID II became effective and extended the scope of cost transparency across the EU.⁹ At a national level, further regulation such as the FCA's PS 17/20 rules for workplace pensions was finalised, requiring specific additional disclosures for UK-based firms.¹⁰

The timeline and resulting state-of-play for these regulations are shown in Exhibits 2 and 3.

Exhibit 2: Regulatory Timeline





Up to 2015	2016	2017	2018	2019 +
<p>UK – Better Workplace Pensions: Putting savers' interests first (2014)</p> <p>Providers of contract-based UK pension schemes required to operate Independent Governance Committees (IGCs) to assess the value for money delivered by schemes (2015)</p> <p>Trustees of trust-based UK pension schemes required to consider and report against the quality standards. New measures put in place to strengthen the governance in master trusts (2015)</p>	<p>Asset managers expected to report to UK trustees and ICGs on the costs incurred in managing schemes including underlying transaction costs,</p> <p>UK Financial Conduct Authority (FCA) Consultation Paper 16/30 on transaction cost disclosure</p> <p>Revision of Federation of the Dutch Pension Funds Recommendations on Administrative Costs</p>	<p>UK budget: Publication of UK Local Government Pension Schemes Code of Transparency</p> <p>ESMA publishes Q&A on disclosure of costs and charges under Markets in Financial Instruments Directive 2 (MiFID II)</p> <p>Joint ESAs publish Q&A on the Packaged Retail and Insurance-based Investment Products (PRIIPs) KID including disclosure of costs and charges</p>	<p>PRIIPs Regulation came into force (January 2018)</p> <p>MiFID II came into force commencing with ex-ante cost disclosures (January 2018)</p> <p>UK's Institutional Disclosure Working Group made final recommendations to FCA (June 2018)</p>	<p>MiFID II ex-post disclosures to be fully effective</p> <p>UK PS17/20 disclosure requirements on asset managers to provide cost information to trustees and IGCs requirements to be fully effective</p> <p>UCITS exemption from disclosing costs using PRIIPs KID standards expires on 31 December unless extended</p>
 Regulation	 Trust-based	 Contract-based	 Asset managers	

Exhibit 3: Summary of key European transaction cost disclosures

	Timing	Application	Methodology	Notes	
EU	PRIIPs	In effect since 1 January 2018. Planned review in 2019.	All retail products in the EU, excluding UCITS funds.	The primary methodology used where the product has been operating or more than three years and invests in liquid instruments is the Slippage methodology. In this case market impact is included in cost measurement An estimated costs methodology is used where a PRIIPs invests in underlying assets other than liquid instruments. A new PRIIPs methodology where a product has been operating for less than three years. ¹¹	PRIIPs manufacturers may use a Spread methodology on a transitional basis.
	UCITS	Pre-existing UCITS regulation. Scheduled to adopt PRIIPs methodology from 1 January 2020.	All UCITS funds' Key Information Documents	UCITS 'Ongoing Charge Figure' (OCF) does not include performance fees or transaction costs: Performance fees are stated separately to the OCF, net of transaction costs.	Insurers and other product manufacturers wrapping UCITS in unit-linked life insurance policies or other wrapped products must obtain full transaction cost data (using Slippage or Spread) from the UCITS manufacturer.
	MiFID II	In effect since 3 January 2018.	All costs and charges incurred along the full distribution chain of a fund, before investment and on an ongoing basis. Also applies to client portfolios managed on a discretionary basis.	MiFID investment firms can comply with requirements using PRIIPs regulation, however it was later clarified in an ESMA Q&A that they could also use any other methodology that "meets MiFID objectives": permitting either Slippage, Spread, or another equivalent methodology. ¹²	-
National	Federation of Dutch Pension Funds	In effect since 2011, updated in 2016	All funds invested in by Dutch pension funds, including those domiciled outside of the Netherlands	Spread methodology: investment firms can set their own or apply industry averages.	Includes the requirements to look-through to any underlying sub-fund.
	FCA PS17/20	In effect since 3 January 2018. Firms begin to report in 2019.	All relevant FCA-supervised firms.	Slippage methodology.	Whilst the FCA previously stated that the MiFID II, PRIIPs, and the PS17/20 standards were intended to dovetail together, there are a number of differences in the treatment of securities lending, investment in child funds, and swing prices which require additional preparations over and above those for MiFID II and PRIIPs.

Exhibit 3 demonstrates the complexity of the current landscape. The flexibility granted by the ESMA Q&A regarding compliance with MIFID II cost transparency added to the confusion by widening the range of acceptable methodologies. Moreover, both the PRIIPs and the Dutch Pension Fund methodologies are compliant with MIFID II. So whilst some fund managers have based their reports on

PRIIPs, others have followed local market conventions or requirements to comply with MiFID II. For example, the Dutch Pension Fund methodology requires reporting of implicit costs in a way which do not satisfy the PRIIPs requirements. This leaves significant portions of the investment fund universe in Europe torn between competing cost disclosure models.

These disclosure standards have similar overall objectives but have come into effect with differing timelines and various transitional provisions. This creates a challenge for the investment industry and their clients, as most firms operate in multiple markets which makes them subject to the requirements of more than one jurisdiction or set of market conventions. As a result, fund managers need to juggle different concepts and deadlines, while all market participants from distributors to end-investors struggle to evaluate inconsistent disclosures and sensibly compare costs across products and jurisdictions. Without action by National Competent Authorities, working together with the relevant European Supervisory Authorities, it is likely that cost disclosures standards will continue to be driven by national market practices which could further distort reports for the end-investor.

Portfolio Charges and Costs

In this section, we look in detail at the advantages and disadvantages of measuring portfolio costs and charges. For transaction cost disclosures to be a useful decision-making tool, end-investors require clarity as to which costs and charges are included in the relevant reports and how these costs are attributed to relevant market participants. Generally, 'charges' are paid to the fund manager or a third-party distributor as compensation for managing or selling a fund. 'Costs' can be thought of as the payments necessary to run the fund and deliver an investment strategy. For example, a management charge is not essential for a fund manager to buy and sell stocks in the market but it compensates them for providing this service. On the other hand, a fund manager cannot buy or sell without incurring transaction costs; these are part of the process of running the fund.

For all costs and charges which arise from investing in a fund, investors should be clear on how they are being measured, which firm (fund manager, distributor, etc.) is the recipient and where costs may already be included in other fund disclosures, such as performance figures.

Charges and costs can largely be grouped into the following categories:

1. Management charges and performance fees paid to the fund manager
2. Sales charges paid to and retained by the distribution channel
3. Costs incurred for entering or exiting a fund¹³
4. Explicit and implicit transaction costs for buying and selling underlying securities, paid to brokers or trading venues¹⁴
5. Taxes, stamp duties, and similar levies on trading activity, paid to government tax authorities.

Within these categories only the last two items – transaction costs and taxes – are a direct function of the trading activity within the portfolio.

Transaction costs are not a separate charge to investors. They reflect the cost of investing in markets and have already been deducted from reported fund performance and are fully reflected in performance statements. For that reason, we encourage investors to consider transaction costs as a complementary indicator of how effective a portfolio's trading activity has been in achieving its stated outcome – rather than an additional or supplementary measure of performance.

When looking at transaction costs it is important to bear in mind the portfolio's investment objective and its net-of-fees performance. A fund with lower transaction costs will not necessarily generate better performance. Transaction cost data should not be used as a method for comparing the performance of funds; incurring costs can in some instances help generate higher returns, manage risk and volatility and so improve performance.

A simple measure of reporting transaction costs uses the following formula.

$$\text{Transaction Cost} = \text{Investment amount} \times (\% \text{ Turnover of Fund} \times \text{Basis points cost per trade})$$

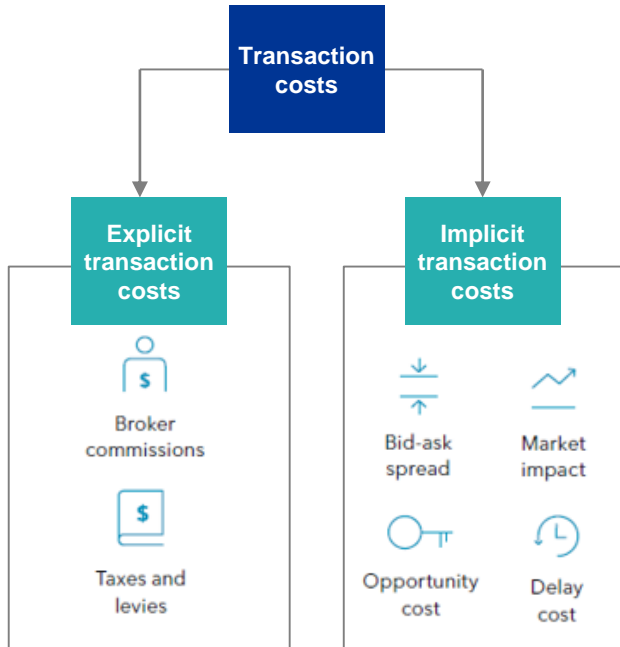
Numerically, the transaction costs that a fund manager reports are made up of the investment amount, the portfolio's trading activity and the transaction costs incurred in doing that trading. For example if a fund trades the equivalent amount of 80% of its AUM at an average per-trade cost of 0.5% (or 50 basis points) then the transaction cost is 40 bps of AUM. In reality, there are more data points which we will now explore.

Transaction Cost Measurement

As transaction costs are central to the disclosures required by regulators, it is important that investors know what transaction costs are composed of and how they are measured. Conceptually, transaction costs are made up of explicit costs – identifiable and easily quantifiable – and implicit costs which cannot be directly observed. This makes transaction cost measurement challenging. Any empirical measure of transaction costs is necessarily an approximation rather than an objective direct measurement.

Explicit costs are straightforward to measure. They typically include the commission that a broker charges, clearing costs, exchange fees, or any taxes or levies payable. They vary by instrument. For equities and futures, brokers collect a predetermined execution commission. For fixed income instruments, the commission is incorporated into the final trade price and cannot be easily split out from other cost

Exhibit 4: Transaction Cost Components



components. Even when commissions are charged explicitly it is important to be aware that, normally, the commission is only a small fraction of the overall transaction cost. Any metric that relies on explicit costs alone will be incomplete.

Implicit transaction costs arise from the bid-ask spread and from the market impact of trading in larger size. In most circumstances, the price for buying an instrument will be higher than the price for selling the same instrument to the broker. The difference between the lowest ask price and the

highest bid price is the bid-ask spread. Assuming prices don't move this means that a fund manager will incur a cost equal to the bid-ask spread for the roundtrip of buying a security and selling it later. However, the quantity available to buy at the lowest ask price or to sell at the highest bid price is limited. When a fund manager has an order that is larger in size, the order amount will most likely exceed the quantity available at the current best price. It can only be bought at a higher price or sold at a lower price. As a result, the roundtrip cost from buying the security and selling it again will be higher than the bid-ask spread. This additional cost component is called 'market impact' and reflects that large orders will be executed at less advantageous prices than the best bid or offer for the fund manager.

Exhibit 5 illustrates bid-ask spreads and market impact for a limit order book example. Before the trade, the bid-ask spread is $100.01 - 100.00 = 0.01$ with a midpoint of 100.005 . If a fund manager purchased 3000 shares this would be done at a price of 100.01 and, after the trade, the remaining best ask quantity would have reduced from 5000 to 2000 shares. The cost of purchasing 3000 shares, relative to the prevailing midpoint, is $100.01 - 100.005 = 0.005$. The roundtrip cost of buying and selling the stock is $100.01 - 100.00 = 0.01$ (the bid-ask spread). If the same fund manager were to purchase 13,000 shares instead, this would exceed the quantity available at the best ask price. The first 5,000 shares would be purchased at a price of 100.01 , the next 5,000 shares at a price of 100.02 and the final 3,000 share at a price of 100.03 , resulting in an average price of 100.0185 . The difference between this purchase price and the best ask price before the trade reflects the market impact of executing a larger transaction.

Exhibit 5: Bid-Ask Spread and Market Impact

	Before Trade		After Small Trade: 3000		After Large Trade: 13000	
ASKS ↑	100.05	8000	100.05	8000	100.05	8000
	100.04	5000	100.04	5000	100.04	1500
	100.03	3500	100.03	3500	100.03	500
	100.02	5000	100.02	5000		
	100.01	5000	100.01	2000		
	100.005 Midpoint		100.005 Midpoint		100.015 Midpoint	
BIDS ↓	100.00	8000	100.00	8000	100.00	8000
	99.99	5000	99.99	5000	99.99	5000
	99.98	3500	99.98	3500	99.98	3500
	99.97	5000	99.97	5000	99.97	5000
	99.96	5000	99.96	5000	99.96	5000

Portfolio cost disclosures summarize all charges and transaction costs at portfolio level. As part of that process, a decision must be made regarding what methodology to apply for measuring the underlying transaction costs that are incurred in the portfolio. The two competing methodologies are either a Slippage approach, seeking to measure the actual cost per trade, or a Spread approach, assigning representative costs to the trading activity instead. In the following section, we discuss Slippage in the context of transparency and decision-making for end-investors.

Slippage Methodology

The central concept in Slippage methodologies is the attempt to measure the realized cost of trading by comparing the execution price to a benchmark price. The benchmark price is generally the midpoint of the best bid and ask before the time of the trade. In Exhibit 6, the best bid in the order before the trade was 100.00, the best ask was 100.01 and

the midpoint before execution was 100.005. This would serve as a benchmark price to compare the execution price against and assess the Slippage cost.

$$\text{Slippage (Buys)} = \left(\frac{\text{Execution Price} - \text{Benchmark Price}}{\text{Benchmark Price}} \right)$$

When buying a security, an execution price above the benchmark price is considered a cost and, when selling, an execution price below the benchmark price is a cost. As a result, for selling the Slippage calculation becomes:

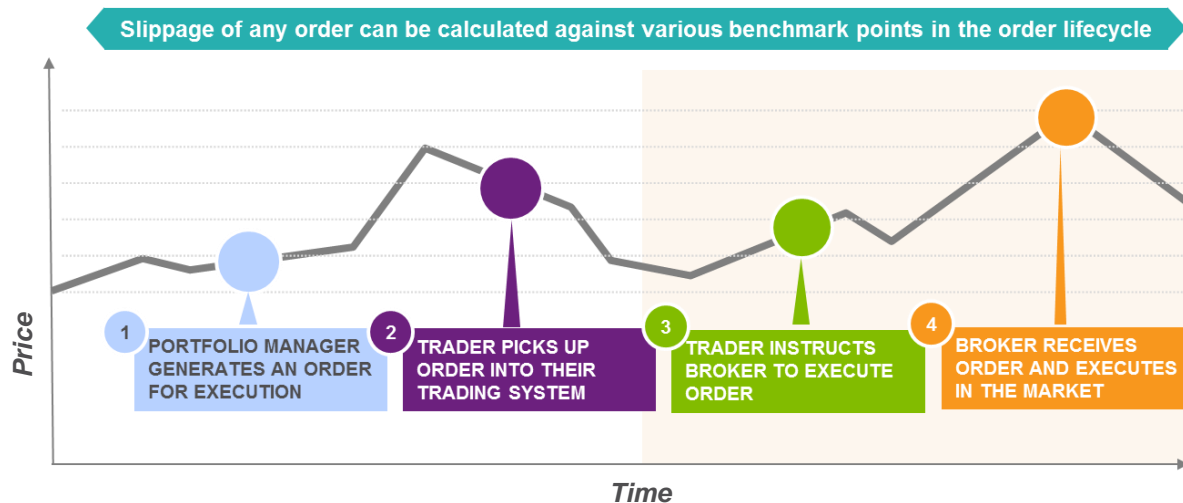
$$\text{Slippage (Sells)} = \left(\frac{\text{Benchmark Price} - \text{Execution Price}}{\text{Benchmark Price}} \right)$$

If we continue using the previous example, we obtain a Slippage cost of $(100.01 - 100.005) / 100.005 = 0.5$ bps for the smaller trade of 3,000 shares and $(100.0185 - 100.005) / 100.005 = 1.35$ bps for the larger trade of 13,000 shares.

Benchmark Choices

The exhibit below illustrates potential times at which benchmarks could be chosen to calculate Slippage. In our example, the benchmark chosen was the midpoint in the limit order book when the broker executed the order. This information will not always be available to fund managers, especially in the case of less liquid or OTC instruments, so it may become necessary to take the midpoint when their trader instructs the broker to execute an order. For internal purposes, fund managers might also wish to track Slippage cost from either the point in time when the portfolio manager generated the order or from the point in time when the trader received the order in their system for execution. In the context of fund cost disclosures, it is not always straightforward to determine the most appropriate benchmark due to differences in the availability of pricing data and the conventions used across asset classes.

Exhibit 6: Potential benchmarks used to calculate Slippage



Slippage is a very important concept for the fund management process, because it measures the full cost of implementing an investment idea from inception to execution. If a fund manager is slow at raising orders and passing them onto their trading desk, they are possibly incurring additional Slippage and eroding the benefit of their ideas through more costly implementation. The measurement of Slippage – and ideally even the forecast of Slippage using Expected Cost Models – can be used to gauge the cost of implementing an investment. All things being equal, a portfolio manager should only raise an order if their anticipated return is higher than their expected transaction cost. Slippage helps portfolio managers consider this financial trade-off, particularly as part of their ongoing duty to deliver Best Execution.

While Slippage is useful as a tool for fund managers, in practice there are some challenges in implementing cost disclosures based on a Slippage approach. Most importantly, Slippage costs are sensitive to data quality and availability, benchmark choices, and the way in which different instruments trade.

Disclosures of transaction costs that are based on Slippage are highly volatile and strongly influenced by many factors:

Benchmarks

The choice of benchmark has a large impact on the magnitude and variability of transaction costs. To establish comparability of fund disclosures, benchmark selection must be consistent and transparent across fund managers. Without standardization of benchmark points we should expect inconsistent cost reports. This is hard to achieve as different benchmarks work better in different scenarios. There is no one optimal benchmark that works equally well and fairly for all funds. See 'Benchmark Choices' above.

Trading strategies

Slippage calculations are influenced by the trading strategy that a fund manager employs. For example, it is possible for a fund manager to submit a limit order at the market open for execution once the stock reaches a specific price later in the day. Alternatively, the fund manager can wait until the stock price has moved to the desired level before submitting a market order for immediate execution. In both cases, the execution price may be identical **but in Slippage terms the orders will look very different as the Slippage cost measurement of the first strategy will include far more market movement – despite the same economic outcome.**

Data availability

The quality of any disclosure depends on the calibre of the market data which is used to measure costs. Intraday data is not available in many derivative or fixed income instruments. Where securities are not traded on centralized exchanges, price data may often be indicative rather than firm. Further, not all participants will have the same access to intraday data. High data costs are an additional challenge. As a result, **discrepancies between Slippage cost measures may be driven by disparities in data availability and access, rather than actual differences in costs.**

Defaults and fall-backs

Where market data is not available, or where benchmarks fall outside of regular market hours fund managers will need to use defaults and approximations such as the official close of the previous day. This introduces a significant time lapse

between the benchmark price and the execution price. As a result, the stated transaction cost will reflect market movements over a longer time horizon, substantially eroding its accuracy as an approximation of transaction cost.

Market structure

Instruments such as equities, futures, or currencies, are primarily executed algorithmically on exchanges and orders are worked over an extended period of time. It is not uncommon for an equity order to be traded in small quantities over multiple hours. As a result, Slippage calculations for these instruments will be materially impacted by market movement over the trading horizon – not due to data availability but due to the way in which these markets function. This is not a temporary phenomenon and will not change with better data quality. See 'Impact of timing and market structure on Slippage costs' below.

Sample size

For big statistical samples, for example funds with high trading activity, some limitations and noise in the data will cancel each other out. For funds with fewer trades the variation and the impact of market movement on Slippage costs will be particularly pronounced. This is challenging given the aim of establishing comparability across the fund universe.

Harmonization

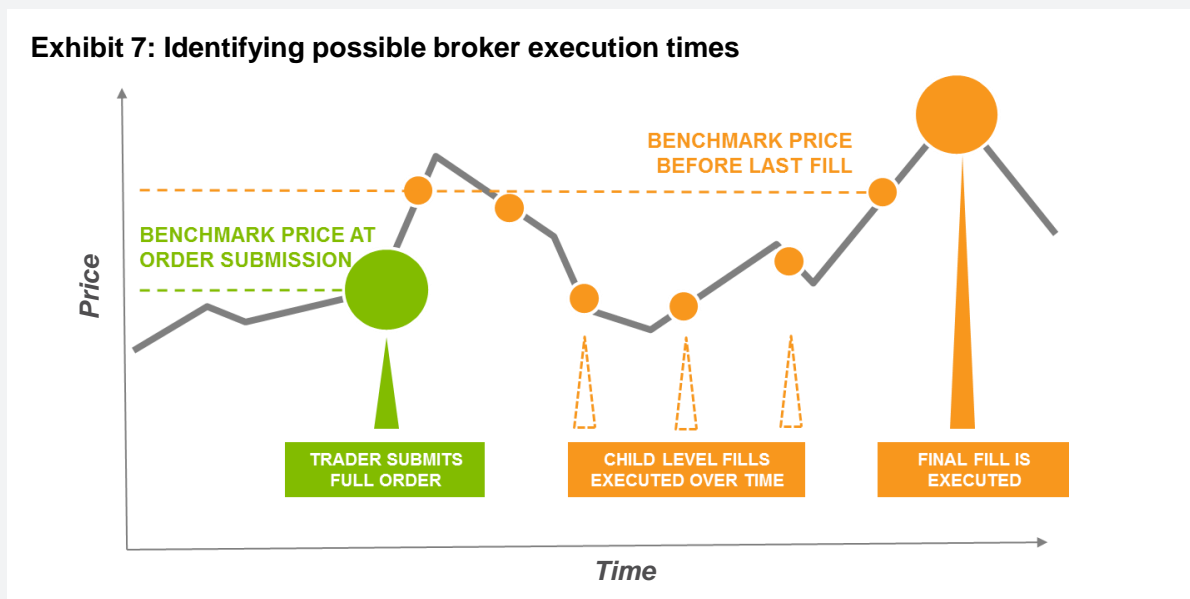
An important by-product of some of these factors is that the Slippage methodology does not treat all instruments consistently. The lack of data and the need for defaults is particularly pronounced for fixed income transactions and OTC markets in general. Funds that trade such instruments will therefore represent costs differently compared to funds that do not engage in such trades. This is an unintended asymmetry which introduces the risk that costs become less comparable. Furthermore, this may incentivize fund managers to use certain instruments to artificially lower costs despite having the same economic exposure (e.g. using total return swaps vs. physical equities).

These difficulties can be overcome when a trading desk is assessing its own performance with full knowledge of all measurement assumptions and relevant factors. However, end-investors will not have correspondingly exhaustive insights into the determinants which are influencing Slippage calculations in fund disclosures.

Impact of timing and market structure on Slippage costs

A remedy sometimes put forward for the shortcomings of the Slippage methodology is to improve the accuracy of cost estimates by utilizing the actual time at which the broker executes the trade in the market as the benchmark. A key problem here, however, is that knowledge of this time is often not available to fund managers. Further, in electronic markets, it may not even be obvious what time should be used, as orders will typically be broken up by algorithms into smaller trades, so-called child-level executions. The broker execution time could be interpreted as treating each child-level execution as if it were an independent transaction or, alternatively, as taking the time of the last child-level execution as the reference point.

Exhibit 7 below illustrates the difficulty of identifying broker execution time for orders filled as multiple child-level executions. The time of the last child-level execution does not work well for Slippage calculations: all executions prior to the last child fill would then be measured against a benchmark in the future which may potentially make the calculations vulnerable to manipulation. Additionally, it is likely that repeatedly accessing the market via multiple successive executions will incrementally and adversely move the price of the security. As a result, Slippage measured against the midpoint at time of the last child-level execution will understate the true transaction cost. Some regulations explicitly rule out the treatment of child-level executions as independent trades.¹⁵



Spread Methodology

Like Slippage, Spread methodologies aim to provide an accurate measurement of fund transaction costs. Rather than approximating trading costs based on realized execution prices, **Spread methodologies estimate the typical cost of a transaction instead.** This removes many of the statistical hurdles surrounding Slippage calculations, but introduces other challenges.

Each trade or instrument type is assigned a representative Spread cost that it typically incurs. In that sense the methodology captures estimated costs rather than actual costs. At this point we return to the question of terminology. **A Spread cost should be thought of as referring to the total cost for a particular transaction,** which is not

necessarily limited to the bid-ask spread component: put differently, the Spread cost should include both implicit and explicit costs and consider any factors which are relevant for determining the transaction cost. Indeed, factors such as the market, time-to-maturity, or order amount can influence the level of cost and this should be taken into account when formulating Spread estimates.

By convention, Slippage is calculated against a midpoint to make it equally suitable for buys and sells. Spread costs are typically also expressed as the cost of an individual trade rather than a roundtrip transaction:

$$\text{Spread Cost} = \frac{(\text{Ask Price} - \text{Bid Price})}{2}$$

Spread methodologies remove many of the statistical impediments that Slippage exhibits, and they have the advantage that they are more suitable for ex-ante cost disclosures that provide information about prospective investments. Particularly for newly launched funds, a fund manager will not have a trade history, and Slippage methodologies would need to rely on data from similar funds to proxy the anticipated transaction costs. Spread costs, however, can be estimated for new funds based on their target holdings and expected transactions in the same way that they are estimated for existing funds. This makes ex-ante cost disclosures more reflective of anticipated trading activity and introduces consistency between ex-ante and ex-post transaction costs.¹⁶

But while Spread methodologies have these beneficial properties, they come with a different set of concerns around their timeliness, accuracy, and the potential moral hazard of purposefully misrepresenting Spread costs:

Objectivity

Spread costs are set by the fund manager. Ideally, this is done by calibrating the spread cost to the typical cost of trading such an instrument, based on a fund manager's historical experience. This process enables fund managers to come up with spread costs that are unaffected by market movement and other confounding factors, however it removes a degree of objectivity from the cost estimation process and introduces moral hazard; some fund managers could feel incentivized to produce low estimates.

Granularity

Spread estimates that are used in the cost disclosures may not be as detailed as the Slippage methodology, which performs trade-by-trade cost calculations. For some instruments, empirical data is available such as broker quotes or actual bid-ask spreads from market data feeds. However, for many securities such data does not exist and fund managers may need to rely on coarser estimates at the asset class or sector level. The level of granularity applied in the process will likely vary across fund managers.

Market Impact

Unless Spreads are estimated or adjusted for different order amounts they may only reflect the cost of executing smaller transactions. This could be an unrealistic representation of the actual trading activity that the fund manager generates in the process of running their fund. Therefore, Spread costs must incorporate a size element that reflects the average transaction size in a portfolio. Fund managers could employ Expected Cost Models to predict market impact and transaction costs at an individual security level.

Timeliness

Spread costs reflect the market conditions that prevailed at time of their estimation. As market dynamics shift – for example from a low-volatility to a high-volatility environment – Spread estimates may become outdated. Expected Cost Models may leverage time-varying parameters which reduce the risk of their resulting cost estimates becoming stale, however regime shifts may still require models to be re-calibrated. Accordingly, Spread cost or model calibrations should be periodically reassessed to ensure they are current and adequately reflect average market conditions.

Precision

Given the concerns noted around granularity and timeliness of Spread costs it can be challenging to ensure their precision in measuring actual historical transaction costs. Spread costs that are sufficiently granular and well calibrated can be very precise; if they are stale or lack granularity there is the risk that they result in inaccurate transaction costs for some funds. This is a challenge for ex-post disclosures whose purpose is to help investors evaluate the cost of actual trading activity in the portfolio.

Data availability

As with the Slippage methodology, the availability of empirical data may impact the quality of Spread costs. Actual market data with intraday granularity is only partially available, and particularly difficult to acquire in fixed income markets. Some data feeds are based on quotes that are not firm and immediately executable, and intraday or market volume data often is not available. This means calibration of Spread costs or Expected Cost Models will be based on incomplete data, which has implications for accuracy.

Modifying the standard Spread methodology

Some challenges of the Spread methodology can be overcome through modifications of the concept. A simple modification of the Spread methodology would allow fund managers to calculate the cost of trading instruments in a specific asset class using a grid or matrix of relevant factors rather than on the basis of one single figure. This would enable fund managers to assign different estimates according to the order attributes which are most relevant to determining transaction costs.

For example, a simplistic model might identify a representative Spread cost for investment grade bonds and another cost for high yield bonds. For broad comparisons between corporate bond funds and equity funds, this level of granularity may provide adequate contrast in transaction costs. But it would not be suitable for conducting an

evaluation between different types of bond funds. Many other factors drive the cost of bond trades such as the currency of the bond, the size of the trade and even the investment style. Fund managers should determine and disclose the additional relevant factors which affect the cost of trading specific asset classes.

Relevant example factors when determining the costs of trading specific instruments:

Currency

For investment grade securities, US Dollar bonds and Euro bonds, for example, are likely to trade with tighter spreads than their counterparts in other currencies. Emerging Markets bonds will trade with very different spreads depending on whether they are denominated in local or foreign currency.

Trade size

For example, an equity fund with very concentrated holdings might typically generate orders which are larger than 25% of daily trading volume in a stock, while a second fund with broadly diversified holdings may only trade in sizes below 5%. In such instances, it is appropriate for fund managers to adapt their Spread costs to reflect trade size as this provides a more accurate reflection of transaction costs.

Investment style

A further modification of the Spread methodology could be to take the investment style of a fund into account. The way that a fund manager trades will depend on the outcome that they are seeking to deliver to their clients. The more active a fund is, the higher its trading activity or its risk appetite typically is. This has an impact on per-trade transaction costs – irrespective of how much a fund trades – and could be taken into account in Spread costs. Exhibit 8 illustrates the impact of different investment styles on transaction costs. The investment style is an important factor in deciding how much a fund trades.

Momentum strategies are trend-following and trade in the same direction as recent market movements. They might invest in a sector or specific instrument that has been doing well in the anticipation of further future returns. Momentum strategies result in higher Slippage and transaction costs. This implies that a higher per-trade spread cost could be assigned in such cases.

Value strategies aim to identify investments that are undervalued and, as a result, they often trade against the general market movement, in the anticipation that such securities or sectors will deliver future returns based on their current attractive price. Value strategies result in lower Slippage and transaction costs as there is less competition for buying and selling such instruments. This implies a lower per-trade spread cost.

Tracking strategies aim to reduce tracking error against a risk benchmark. Fund managers normally seek to trade close to common reference prices, such as the closing price – which is typically determined by the closing auction. Many other investors use the same reference prices and, as a result, these periods of the trading day are very liquid. Per-trade transaction costs for tracking strategies are usually significantly lower than for many other strategies.

The examples set out above highlight that a modified Spread approach defines Spread cost as a grid or matrix that is able to incorporate relevant factors which drive transaction costs. It is not necessary to consider every factor for every fund or instrument type, however we recommend sufficient granularity where it helps improve the accuracy of the transaction cost estimate. Ideally, fund managers can also use empirical data and their historical trading experience to refine their choice of granularity.

To provide high levels of transparency and accountability to investors, fund managers should disclose information regarding the process or framework which is used to establish the representative Spread estimates. Disclosures

Exhibit 8: Fund costs across various investment strategies used by funds

<i>lower</i> ← Transaction Costs → <i>higher</i>		
Tracking Strategies	Value Strategies	Momentum Strategies
No target alpha and limited risk	Target alpha and active risk	Target alpha and active risk
Minimal trading activity	Significant trading activity	Significant trading activity
Lower per-trade spread cost	Lower per-trade spread cost	Higher per-trade spread cost
Low fund transaction costs	Medium fund transaction costs	High fund transaction costs

should also include insight into the judgement and assumptions which fund managers employ in determining the factors in internal transaction cost grids. Fund managers should also put in place an appropriate governance and oversight framework to ensure that the choice of factors remains relevant and that artificially low numbers are not being used to report costs.

Similar to the approach required of fund managers under the MiFID II rules for best execution we favour an approach for fund transaction costs that discloses material factors underlying the methodology as well as ensuring appropriate internal governance and oversight. This would provide investors with greater confidence in the objectivity of the estimates and allay potential concerns regarding the granularity of the underlying matrix used. As transaction cost analysis already informs the process of delivering best execution under MiFID II it would be beneficial both to fund managers and investors to adopt a consistent process. To supplement the figures disclosed to the investors under recent regulatory standards investors would also receive a regular statement setting out the processes and the material factors used by fund managers in producing fund transaction costs.

This approach also avoids the complexity of delivering an industry-wide grid across all EU markets covering the costs of transacting on a sufficiently wider range of asset classes, strategies volumes and trading which is sufficient to cover the markets. Such a standard would need constant updating and would run the risk of becoming rigid and inflexible and therefore unrepresentative of the costs investors bear.

Empirical Evidence

The previous sections discussed the main competing methodologies for transaction cost measurement: the Slippage approach and the Spread approach. Here we provide some initial empirical evidence to illustrate the effects which were discussed. We focus on the impact of data quality on Slippage, the resulting variability of the transaction cost reports released to date and the empirical properties of a Modified Spread methodology.

A key concern with the Slippage methodology is its variability and the fact that it can produce negative transaction costs, which are counterintuitive for end-investors. An argument in support of the Slippage calculation is that with better quality benchmarks, the transaction cost reports will become more stable and negative costs will disappear, especially over the required three year assessment period. We used a large sample of BlackRock's equity trades in 2018 to assess this argument empirically.¹⁷ We purposefully chose equities as an example as it allows us to conduct the analysis on the richest possible data. Tick-by-tick market data is readily available in equities and the transaction records have timestamps which are detailed and

accurate. This provides a best-case scenario for asset classes where intraday market data is still a challenge.

We then measured every trade's Slippage against the market midpoint when our traders instructed the broker to trade the order. Additionally, we computed further Slippage costs using different benchmark times, such as the moment when the order was generated or even the previous day's market close. This allowed us to assess how much improvement to expect as measurement accuracy and data quality increase. The table in Exhibit 9 summarizes the key findings:

Exhibit 9: Slippage Cost of Equity Trades – Summary Statistics

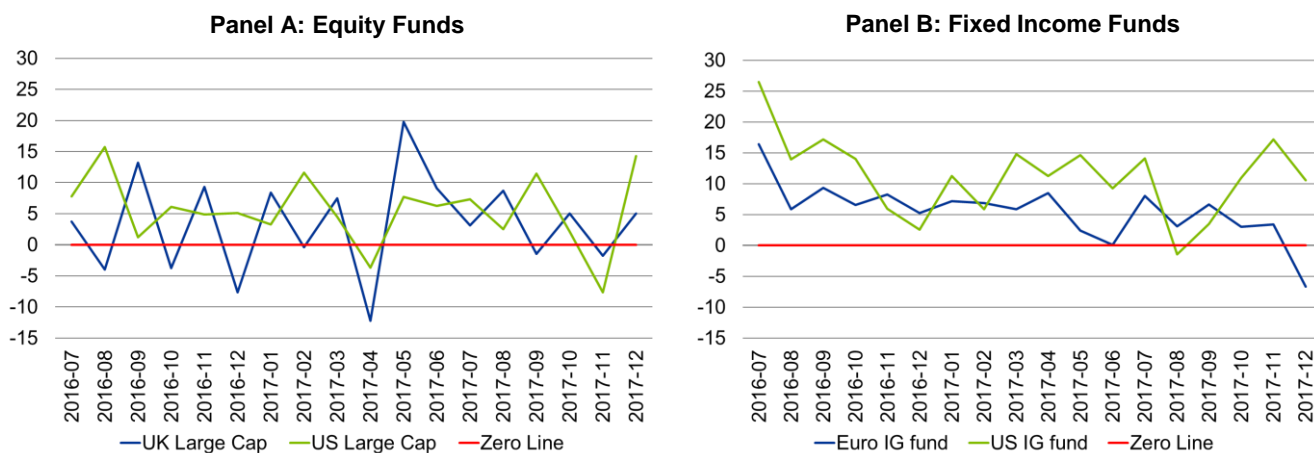
Benchmark timing	Median Slippage (bps)	Standard Deviation	Incidence of trades with negative Slippage costs (%)
Previous Close prices	7.7	141	47
Midpoint price when order was generated	6.1	97	41
Midpoint price when trader instructed broker	3.4	94	44

Source: BlackRock proprietary data

1. The median cost is likely to improve with better data quality and availability. In our sample, the median reduces from 7.7 bps to 3.4 bps, if we identify the exact execution timestamp and measure Slippage against the market price at that point in time. This analysis was done by equal-weighting all trades but the results are qualitatively unchanged if we value-weight the transactions
2. The variation of the Slippage cost, measured by its standard deviation, reduces by about one third but it remains very high even over the full three year calculation period required for PRIIPs. This is most clearly seen in the proportion of negative Slippage costs. With a previous close benchmark for Slippage measurement, we observe about 47% of negative Slippage costs. This reduces to 44% when we move to intraday data at time of broker instruction. **Accordingly, better data does very little to eliminate negative transaction costs.**

The key reason why we still observe a high incidence of negative transaction costs – despite better quality intraday data – is due to the structure of equity markets. Electronic trading in equities has flourished due to changes in regulation and advances in technology, resulting in low

Exhibit 10: Monthly Fund Cost Disclosure Data



Source: BlackRock proprietary data

transaction costs for investors. Most orders are managed algorithmically, split into smaller sizes and traded over time in order to more seamlessly or subtly interact with liquidity displayed in the order book. The duration of these trades introduces market movement into the Slippage calculation that cannot be stripped out even with more accurate benchmark data. This produces high variability and negative Slippage outcomes.

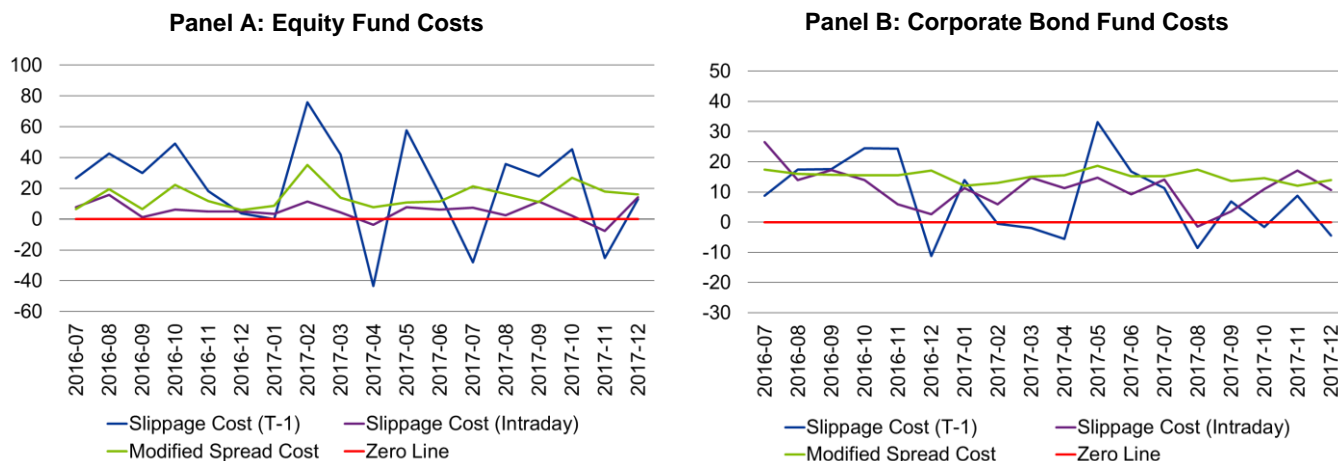
Based on our findings we expect fund cost disclosures, as they stand, to continue exhibiting highly variable transaction costs that confuse investors. To understand how the variation of Slippage translates into the transaction cost numbers shown in the disclosures, we examine some sample BlackRock strategies. For equities, we choose two actively managed strategies investing in large liquid markets with high quality underlying data – i.e. the UK FTSE 100 Large Cap index and the US S&P 500 Equities index. This means we were able to use intraday market data and accurate timestamps for more than 99% of the observations.¹⁸

The previous analysis illustrated that we observed about 40% negative transaction cost on a trade-by-trade level while, Exhibit 10 shows transaction costs aggregated monthly at fund level. Slippage is expressed as basis points of traded amount rather than fund AUM to make the costs comparable across the two funds (despite their different AUM and trading activity). Panel A shows that for both equity funds we see a significant number of months in which the monthly average of transaction costs is negative. In addition, the monthly average varies substantially over time. In other words, the noise does not average out when costs are aggregated to fund level. For some funds the opposite is true; individual funds might have low trading activity which leads to small samples that amplify the statistical challenges; even highly liquid equity funds have volatile Slippage costs.

Panel B reproduces the same statistics for two fixed income funds which trade European and US investment grade corporate bonds. For fixed income, data availability is more challenging; the analysis is based entirely on observations for which we were able to source intraday quotes. As in Panel A we see substantial variation and some negative transaction costs despite the Slippage calculation being based on intraday market data. The more subdued level of variation for the corporate bond funds in Panel B (relative to the equities panel) could be due to the fact that, once instructed, a broker will typically provide an immediate execution rather than spread trades out over time (as is common for algorithmic equity trades). As a result, Slippage cost for bonds is less strongly affected by market movement. However, increased price transparency could allow trading platforms and electronic solutions to gain a stronger foothold in the fixed income market in future. This in turn may impact how bonds are traded and could increase the variability of Slippage costs, similar to equities, rather than decreasing it.

Finally, we simulated the expected impact of a switch to Modified Spreads on fund cost disclosures. We used a representative fund from the same sample that we used previously.¹⁹ The equity Spread cost is based on BlackRock's proprietary Expected Cost Model. The corporate bond Spread cost is based on a granular Spread matrix that accounts for average trade size, currency, rating, and further factors. Exhibit 11 illustrates how Spread costs based on Modified Spreads are more stable than Slippage costs. The Spread cost adjusts to market liquidity, the types of instruments traded or the size of the trades, however it moves in a tighter range. There are no instances of negative Spread costs and, overall, this seems a more accurate reflection of the transaction costs that a fund manager incurs.

Exhibit 11: Monthly Fund Cost Disclosures Based on Modified Spread Cost



Source: BlackRock proprietary data

Recommendations on the way forward

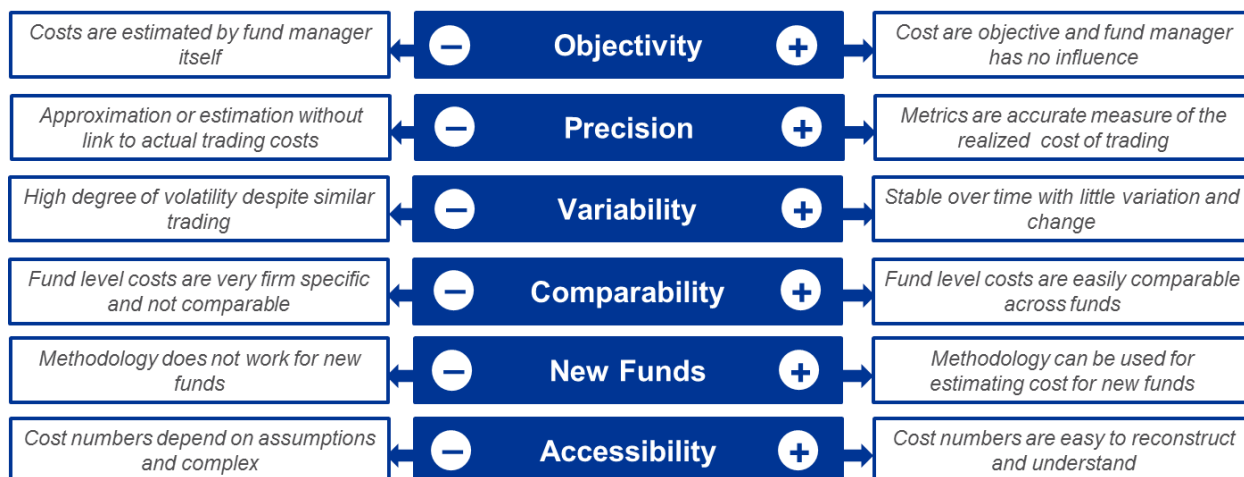
The fund cost disclosures standards in Europe have adopted competing methodologies and, as a result, investors struggle to understand their content. To make recommendations to resolve this, it is important to recall that the key objective of disclosures should be to provide end-investors with useful information that allows them to assess the effectiveness of how a fund manager achieves the fund's stated objective. Such transparency improves investors' understanding of what they are paying for, helps them make more informed choices and strengthens their trust in financial markets. Initial empirical evidence suggests that Slippage methodologies in particular produce a high degree of variability in their outcomes which impedes the objective of disclosures.

Reviewing the empirical evidence, supplemented by qualitative factors, we recommend extending existing methodologies so that they enhance transparency rather than create confusion. The key consideration is balancing the objectivity and precision of calculating transaction costs against the variability and comparability of outcomes. It is

also important to consider the performance of any methodology in an ex-ante and ex-post context as well as its accessibility for end end-investors (see discussion of criteria in Exhibit 12).

Slippage is an objective methodology as a fund manager has limited influence over how to represent Slippage costs. However, in some cases, it is possible to impact the Slippage cost reported in transaction cost disclosures by adopting specific trading strategies as discussed in previous section. Even if fund managers had no influence over Slippage costs, this strength of the Slippage methodology has its limitations. In many asset classes, the required intraday market data is not available for calculating Slippage costs accurately (e.g. for OTC and derivative instruments) and fund managers fall back to less objective defaults that they set themselves. As a result, the appearance of objectivity is actually undeserved as Slippage methodologies still harbour an element of moral hazard arising from the handling of OTC and derivative instrument costs. In practice, this often means the objectivity of Slippage is not improved relative to a Spread methodology.

Exhibit 12: Criteria for Assessing Fund Cost Disclosure Methodologies















A Modified Spread methodology can be more precise than Slippage in terms of providing accurate measures of realized transaction costs. To achieve this, it is critical that fund managers use a sufficiently granular internal grid for their Spread costs so that they reflect actual transaction costs across factors such as instrument, currency, and trade size. Unlike Slippage, Spread costs are not influenced by market movements and will not produce negative costs, which removes a major obstacle for comparing funds through time or across providers. This makes transaction cost disclosures more accessible to end-investors due to the more intuitive outcomes.




Finally, a Modified Spread approach can be applied to new funds using the fund manager’s anticipated holdings and trading activity; basing ex-ante cost disclosures and ex-post transaction cost statements on the same methodological approach establishes greater consistency. By construction,

Slippage methodologies do not work without historical transaction data, meaning new funds have to rely on proxy funds with similar properties, which often may not exist.

In conclusion, the Modified Spread methodology’s ability to remove noise and establish simple, consistent and intuitive transaction costs make it strongly preferable to Slippage-based methodologies. We summarize these findings in Exhibit 13. While Slippage costs may seem objective, fund cost disclosures based on these metrics are not suitable for helping investors make better and more informed investment decisions. We recommend the adoption of a Modified Spread methodology consistently across regulations backed up by the disclosure, control and governance framework put in place under MiFID II for best execution to provide end-investors with a useful framework for understanding transaction costs and to eliminate competing methodologies which are creating confusion for end-investors.

Exhibit 13: Comparison of Slippage and Modified Spread Methodologies

	Objectivity	Precision	Variability	Comparability	New Funds	Accessibility
Slippage						
Modified Spread						

 **Strong**
  **Medium**
  **Weak**

Related Content

- BlackRock response to [Joint ESAs Discussion Paper on Key Information Documents for Packaged Retail and Insurance-based Investment Products \(PRIIPs\)](#) (February 2015)
 - The Investment Association – [Meaningful Disclosure of Costs and Charges](#) (February 2015)
 - BlackRock response to [Joint DWP and FCA consultation on Transaction Costs Disclosure: Improving Transparency in Workplace Pensions: Call for Evidence](#) (May 2015)
 - BlackRock response to [IOSCO consultation on International Regulatory Standards on Fees and Expenses of Investment Funds](#) (August 2015)
 - BlackRock response to [Joint ESAs Technical Discussion Paper on Risk, Performance Scenarios, and Cost Disclosures in Key Information Documents for Packaged Retail and Insurance-based Investment Products \(PRIIPs\)](#) (August 2015)
 - Federation of the Dutch Pension Funds – [Recommendations on Administrative Costs](#) (February 2016)
 - BlackRock response to [FCA consultation on Transaction Cost Disclosure in Workplace Pensions](#) (January 2017)
 - BlackRock – [Guide to value for money: A primer for trustees and IGCs of Defined Contribution Schemes](#) (October 2017)
 - European Fund as Asset Management Association – [EFAMA’s Evidence on the PRIIP KID’s Shortcomings](#) (February 2018)
 - BlackRock – [ViewPoint – Regulatory Developments in Europe: 2018 Outlook](#) (March 2018)
- For access to our full collection of public policy commentaries, including the *ViewPoint* series and comment letters to regulators, please visit www.blackrock.com/corporate/en-us/insights/public-policy.

Endnotes

1. We use the term portfolio in a broad sense to cover both collective investment schemes as well as individual mandates from clients. The Regulatory Landscape section on pages 3-5 discusses in more detail the precise scope of specific regulatory initiatives.
2. FCA (2017) FCA Policy Statement PS17/20: Transaction cost disclosure in workplace pensions, available at: <https://www.fca.org.uk/publication/policy/ps17-20.pdf>
3. We note that industry bodies in the fund management ecosystem are making analogous observations and calling for adjustments to disclosure rules. The Investment Association (IA) has a position paper on meaningful disclosure of cost and charges (The Investment Association (2015) Meaningful disclosure of costs and charges, available at: <https://www.theinvestmentassociation.org/assets/files/consultations/2015/20150210-iacostsandchargesreport.pdf>). The European Fund and Asset Management Association (EFAMA) has recently published evidence on the shortcomings of PRIIPs Key Information Documents (EFAMA (2018) EFAMA's Evidence on the PRIIP KID's Shortcomings, available at: <https://www.efama.org/Publications/Public/PRIIPs/EFAMAPRIIPsEvidencePaper.pdf>)
4. FCA (2018) Call for Input: PRIIPs Regulation – initial experiences with the new requirements, available at: <https://www.fca.org.uk/publication/call-for-input/priips-regulation-initial-experiences-with-the-new-requirements.pdf>
5. FCA (2018) Asset management: A regulatory perspective, delivered at the London Business School Annual Asset Management Conference, available at: <https://www.fca.org.uk/news/speeches/asset-management-regulatory-perspective>
6. Slippage is often also referred to as 'Implementation Shortfall' – we use the former hereafter.
7. IOSCO (2016) Report on Good Practises for Fees and Expenses of Collective Investment Schemes, available at: <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD543.pdf>
8. Federation of the Dutch Pension Funds (2016) Recommendations on Administrative Costs, available at: <https://www.pensioenfederatie.nl/stream/recommendations-on-administrative-costs.pdf>
9. See Regulation EU No 1286/2014: Key information documents for packaged retail and insurance-based investment products (PRIIPs), available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R1286&from=EN>; and Directive 2014/65/EU Markets in financial instruments amending Directive (MiFID II), available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0065&from=EN>
10. FCA (2017) PS17/20: Transaction cost disclosure in workplace pensions, available at: <https://www.fca.org.uk/publication/policy/ps17-20.pdf>
11. See PRIIPs Regulatory Standards of 8 March 2017 at Annex VI Points 12-23, available at: http://ec.europa.eu/finance/docs/level-2-measures/priips-delegated-regulation-2017-1473_en.pdf
12. ESMA (2017) ESMA Updates MiFID II / MiFIR Investor Protection Q&A, available at: <https://www.esma.europa.eu/press-news/esma-news/esma-updates-mifid-ii-mifir-investor-protection-qa>
13. These can be incurred in a number of ways either as a charge levied by the manager or other intermediary in the distribution chain or as indirect costs paid to the fund to minimise the effect of subscription and redemption activity on existing investors.
14. For the purposes of this paper, we take trading costs and transaction costs to be synonymous.
15. FCA PS17/20 (at note 10) addresses child level order challenges and regulates accordingly to prevent cost computation on the basis of child level orders. It requires that all related trades on the same day are compared to the earliest arrival price.
16. PRIIPs mandates the use of half-spreads for new funds, which de facto establishes methodological inconsistency between the ex-ante and ex-post estimation of transaction costs – for further details see note 11.
17. The data was taken from TAR, BlackRock's proprietary Transaction Costs Analysis application. The data covers order raised between 1st and 30th April 2018 globally. The sample excludes observations where any of the benchmark prices (Previous Close, PM Order Time, Trader First Placement) are missing which excludes 1.01% of all observations. Additionally, we remove observations with Slippage >5% or lower than -5% to make the sample as clean as possible. This removes another 0.27% of observations. The analysis is indicative and for illustrative purposes only.
18. For this analysis, we exclude the few observations with missing intraday market data or incorrect time stamps to ensure that any conclusions drawn about slippage are based entirely on instances of high-quality data.
19. All fund data is taken from BlackRock's proprietary Transaction Cost Analysis application TAR. The corporate bond fund invests in US corporate bonds for which TRACE prices are available. The equity fund has the S&P 500 as its investment universe.

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