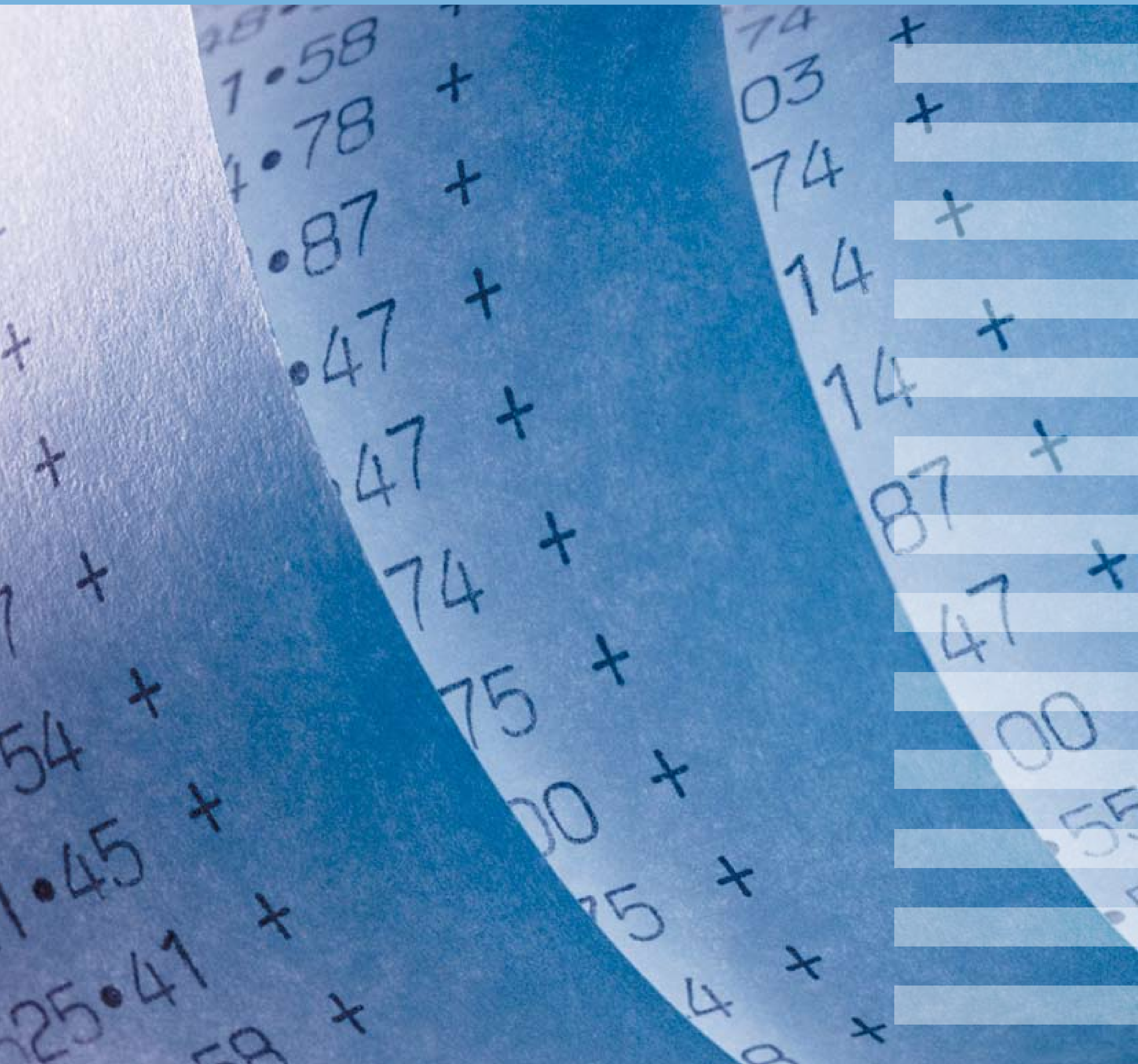
IBM Global Business Services

White Paper

Options for providing Best Execution in dealer markets

Financial Services



Research to determine how the FSA's proposed new general approach to implementation of MiFID's Best Execution obligations can be made operational in a variety of OTC markets in order to achieve the intended policy outcomes of investor protection and market efficiency.

Commissioned by the FSA from IBM Global Business Services

Contents

1 Executive summary

Based on an initial proposal by the FSA, IBM Global Business Services (IBM) has developed an approach to Best Execution in the over-the-counter (OTC) markets, as required by the Markets in Financial Instruments Directive (MiFID). The approach is based on a combination of a 'benchmark' or reference price, used where possible to compare prices of OTC trades with sources external to an investment firm, increased disclosure on the method and inputs used by the firm to arrive at a price for an instrument, and an obligation on the firm to value the instrument objectively. We call this approach a benchmark modelling approach.

In a competitive tender, IBM won an engagement to undertake an eight-week research project for the Financial Services Authority (FSA) to test the hypothesis that external benchmarks could be created as the basis for a firm's Best Execution policy in the OTC markets. The findings of this project are required to support a discussion paper on 'Best Execution' to be published by the FSA in the second quarter of 2006. While MiFID's requirements for Best Execution will apply to firms that execute client orders by dealing in the OTC markets, MiFID is unlikely to prescribe how this may be achieved. However, some EU market participants have signalled that they are uncertain about what they must do to deliver Best Execution in OTC markets. Therefore, national regulators will be considering whether there is a case for issuing guidance in this area.

Best Execution requirements serve two policy objectives: investor protection (to correct a market failure caused by information asymmetry or principle/agent problems), and market efficiency (where 'traders' are required to provide the best price for a trade, thus enhancing competition).

A variety of benchmarks (potential reference prices) were reviewed to identify those which were best suited to provide a form of price comparison for OTC trades. External prices from client-dealer electronic communication networks (ECNs) and inter-dealer brokers (IDBs) were concluded to be the most suitable. Where such prices are available, they can be used to set a limit within which the firm may agree to trade with a client, if providing Best Execution. Any variance between the price of a trade and the benchmark (reference price) may represent a number of valid factors, including the specifics of the firm's pricing model, the size of the trade and different appraisal of risk by the dealer compared to the market.

The benchmark can provide a first step to Best Execution and provides a method whereby compliance can be monitored and reported to clients. However, given the inherent conflict of interest where a firm is dealing on own account (seeking to maximise profits) but also is required to deliver the best possible result for the client, and the potential variance in pricing that the benchmark model would allow, further effort should be taken by investment firms in providing Best Execution. Such steps could include informing clients of the pricing models used and the key external inputs into those pricing models. They may also include undertaking that such inputs would be objective and non-discriminatory.

For many less liquid instruments, objective, externally verifiable benchmarks will not be available. There is therefore a question as to whether the steps described above, to provide information on how the firm arrives at its price, would satisfy MiFID requirements for Best Execution. This, and other key matters such as whether the price of a trade to be benchmarked should include the firm's dealing spread, are covered in this document.

An outline of the costs and benefits of implementing this approach was also developed. This suggested that the greatest net benefit could occur for assets such as corporate bonds, 'vanilla' commodity derivatives, and interest rate swaps and options where there may be no external benchmark, but Best Execution could include disclosing to clients a relatively simple pricing model and the key pricing inputs to that model. These markets will have 'uninformed' investors, with significant inequality of access to information, while the costs of implementing the required changes are less than for assets (such as customised derivatives) where the pricing of the instrument is based on a more complex model. While this document focuses on currently available benchmarks to provide Best Execution, these are not the only alternatives, and other industry solutions could be created. These could include external pricing services that are sometimes used by middle-office in investment firms to value positions, or the creation of an industry body to collect all historical transaction data for OTC trades, thereby increasing post-trade transparency.

Finally, as agreed with the FSA, our work on this project has been completed without direct input from the industry. As a result, the findings on the costs and benefits of the approach proposed are preliminary, and will no doubt be the subject of further debate.

2 Introduction

In 2004, the European Union adopted the Markets in Financial Instruments Directive (MiFID). Among other things, this legislation is intended to facilitate the creation of a single European market for financial services. To that end, MiFID seeks to provide a more consistent regulatory platform and 'level playing field' for investment firms operating in different EU Member States. Although the political process is not yet complete and timetables are subject to change, it is likely that MiFID will come into force in November 2007.

The Directive includes a pan-European 'Best Execution' rule. The Best Execution requirement, set out in Article 21 and the Level 2 implementing measures of MiFID, will require investment firms to take all reasonable steps to obtain the best possible result when executing orders on behalf of clients.

It is well understood how MiFID Best Execution requirements apply to client orders on a regulated market or multilateral trading facility (MTF). However, in OTC markets, it is not as clear what reasonable steps firms should take to demonstrate Best Execution, in particular when dealing on own account.[1]

The FSA has proposed, for discussion, that a firm could satisfy Best Execution requirements when it deals on own account, provided that it discloses (to clients) and executes transactions according to a formula that linked its price to an appropriate price benchmark.

Following a tendering process, in February 2006 the FSA appointed IBM to conduct an eight-week study considering how its proposed price benchmark approach to the implementation of MiFID's Best Execution requirements could be made operational across a variety of representative OTC markets. This report presents the findings, recommendations and key discussion points resulting from that study.

[1] *i.e. The firm acts as a counterparty to its client. In this type of transaction the firm typically executes the transaction at a 'net price' that bundles together the value of the instrument with any fee or remuneration the firm is charging for performing the service of execution.*

- *In the remainder of this introduction we:*
  - *Outline the approach adopted in analysing the OTC markets*
  - *Outline the OTC assets considered in this report*
  - *Provide a more detailed understanding of the Best Execution requirements and explore the alternatives for meeting these requirements*
  - *Discuss alternatives to a benchmark modelling approach*
- *In Section 3, we describe the components of the benchmark model*
- *In Section 4, we describe the key criteria used in assessing the effectiveness of a benchmark model*
- *In Section 6, we assess the benchmark models, based on a tight benchmark model outlined in Section 5, by considering three basic types of benchmarks used as part of an overall benchmark model*
- *In Section 7, we consider any outstanding issues.*

2.1 Approach to study

Our approach to this study is outlined in Figure 1 below:

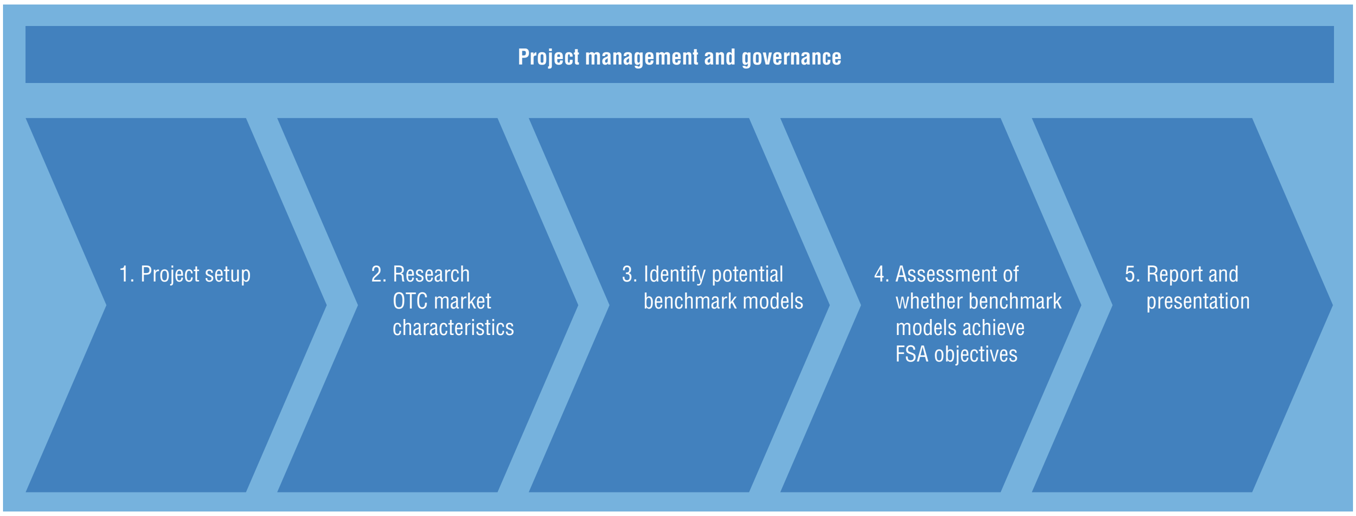


Figure 1: Eight-week project approach

During steps 2, 3 and 4 of the project, we ran six workshops jointly with the FSA and the IBM team.[2] These workshops were used to understand behaviours and current practice, and to test hypotheses regarding the applicability of various benchmark model approaches. At the heart of many of these discussions was a detailed systems

[2] *The IBM team included an expert on regulation and compliance; economists and business analysts; and former OTC market traders.*

thinking (cause and effect) map, which was developed during the course of the study. It helped highlight the interrelationships among:

- *Market efficiency*
- *Number of dealers a client approaches for a quote*
- *Competitiveness of a dealer's bid/offer*
- *Number of clients*
- *Number of dealers*
- *Equality of access to market information and its interpretation.*

A copy of this systems thinking map is included in Appendix B. The analysis and insight provided through these workshops have been incorporated into this report.

2.2 Assets covered by OTC Best Execution

In this paper, we use the term 'OTC' to refer to execution venues other than regulated markets and MTFs (which would include some ECNs). The character of OTC markets means that there is limited pre-trade information available, unlike on regulated markets. The assets traded on the OTC markets that are within the scope of this discussion can be split into the following broad categories shown in Figure 2.

OTC market	Principal outstanding in $USbn
Fixed income (bonds)	59,000
Derivatives	
Interest rate	204,000
Foreign exchange	31,000
Equity-linked	5,000
Commodity	2,000
Credit[4]	n/a
Other	28,000

Figure 2: OTC market sizes[3]

[3] *BIS Quarterly Review March 2006. Fixed income data represents outstanding international and domestic debt securities at Dec 2005 – includes OTC and exchange traded derivatives. Data represents notional amounts outstanding of OTC derivatives at June 2005.*

[4] *Not separated in BIS, but due to its increasing importance in the UK it has been separated out in this table.*

2.3 Best Execution requirements

MiFID's Best Execution requirements are defined in Article 21 of the Directive. This states that firms must "…take all reasonable steps to obtain… best possible results for clients taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other considerations relevant to execution…".

For the 'buy-side' of an OTC transaction, the FSA proposes that there may be three possible ways of completing a trade under MiFID:

1. *On an* ***eligible counterparty*** *basis:*[5] *the dealer does not offer Best Execution, but some part of the buy-side may be required to comply with the Best Execution requirements in relation to orders for their clients.*
2. *On a* ***Best Execution*** *basis: the dealer is required to take "all reasonable steps" to obtain "best possible results for the client"; this means that clients can approach a single dealer and be more confident that they are receiving the best result from that dealer.*
3. *By using an* ***intermediary****: typically, a broker who will give Best Execution by finding the best result from the market.*

This paper is concerned with the second of these options. For dealers, offering Best Execution is a choice. They could choose not to offer MiFID Best Execution, and accept that as a consequence they would only be able to trade on an eligible counterparty basis.

[5] *Eligible counterparties include investment firms, credit institutions, insurance companies, UCITS and their management companies, pension funds and their management companies, other financial institutions authorised or regulated under Community legislation or the national law of a Member State, and other undertakings meeting pre-determined proportionate requirements, including quantitative thresholds (i.e. 'large' firms) – see Article 24 of the MiFID Level 1 Directive. The main exclusion is retail clients, but as discussed below, they would normally use a broker in these markets.*

Recital 59 of the European Commission's proposed MiFID implementing measures would make it clear that investment firms, though subject to Best Execution requirements, are not expected to meet these in the same way for every type of instrument. For example, for a customised instrument traded OTC, the Commission has suggested[6] that the lack of a precise or wholly reliable benchmark comparison does not relieve an investment firm of its duty to act in the best interest of the client and hence its Best Execution obligations. This would mean that the pricing of an instrument should take reasonably into account the market values of the variables that enter into the pricing process or, where possible, uses available comparisons and a realistic assessment of risk.

Costs of execution

The proposed implementing Directive distinguishes between the external and internal costs of execution for retail client orders:

- External costs include (where relevant) commissions, fees, taxes, exchange fees, clearing and settlement costs, or any other costs passed on to the client by intermediaries participating in the transaction. External costs will largely be known in advance of a trade and are subject to Best Execution requirements.
- Internal costs represent a dealer's or broker's own commission for completing the transaction. These internal commissions have been excluded from the Best Execution requirement, meaning that a firm need not reduce its commission to the lowest level in the market. Indeed, the Background Note states that it would be "disproportionate and unreasonable to expect an investment firm to know about the commissions charged by competing firms".

In an OTC market where dealers largely make their profits through the difference in price between a bid and offer (spread), these spreads could be treated as internal commissions. As such, a dealer would not be required by Best Execution to offer a spread as good as another dealer. However, where a spread or spread limit is not agreed in advance of a quote being given, it is difficult to see how this can be considered a legitimate internal commission and not be subject to Best Execution requirements.

[6] *Background Note, Draft Commission Directive, implementing the MiFID 2004/39/EC (February 2006). This Background Note represents the Commission's recent thinking, but does not have any legal standing.*

2.4 Meeting Best Execution requirements

As well as requiring firms to take "all reasonable steps" to secure Best Execution, MiFID also requires firms "to be able to demonstrate to their clients, at their request, that they have executed their orders in accordance with the firm's execution policy" (Article 21, paragraph 4).

One of the difficulties of demonstrating Best Execution at present is that dealers normally execute OTC trades at a net price that bundles together the value of the instrument with any fee, remuneration or commission that the firm is charging for the execution service.

So in order to demonstrate compliance with Best Execution, dealers could choose to unbundle the net price into a Best Execution price for the instrument, and then add their own internal costs (probably in the form of a dealer's spread). Another option would be to offer Best Execution on the net price. If they chose the former,[7] their own costs will need to be disclosed and agreed prior to completion of the trade, as discussed in the box on page 9.

[7] *In practice, we expect most dealers to opt for unbundling where they are trading on a Best Execution basis. This is discussed further below.*

However, even if dealers chose to unbundle the net price, they will still need to justify why the price, net of the dealer spread, represents the "best possible results" they could have obtained. Their options here include:

- ***Increased disclosure as to how a price is derived:*** *If dealers rely on this option, they may need to ensure their pricing models are capable of external verification and are disclosed to their clients. The use of internal models is discussed further in the remainder of this paper.*
- ***Comparable quotes:*** *Dealers may compare (where available) quotes from:*
  - *ECNs – in particular ECNs allowing clients to trade with multiple dealers (but excluding single dealer ECNs as these are not visible to competitors)*
  - *IDBs*
  - *Regulated markets – for the product categories listed in Section 2.2, regulated markets will rarely be relevant since even where instruments are listed, trading will often take place off-exchange*
  - *Data vendors (e.g. Reuters, Bloomberg) – the quotes available through these sources are normally indicative.*[8] *They may be out of date or, if used as a market benchmark, may be 'gamed' by some market participants. As such, we did not consider them to be sufficiently robust to be used within a benchmarking model*
  - *Dealer flow information – dealers may receive requests for OTC trades. These will not be published but may give the dealer additional insight into the current state of the market and what constitutes a market price.*
- ***Non-quote comparisons:*** *Some possibilities include:*
  - *External independent valuation services (e.g. MarkIT), which may provide independent valuations of instruments*
  - *Historical prices of trades, which may be used by dealers to price new trades (not recommended as these trades have passed and therefore do not reflect the current state of the market); or may be used to monitor that dealers have given Best Execution historically.*

[8] *Unless, of course, the data vendor is operating an ECN, in which case the paragraph above applies, data vendors may also have an important role in the evolution of the Best Execution process. This is discussed further in Section 7.*

Each of these options is shown in Figure 3 below.

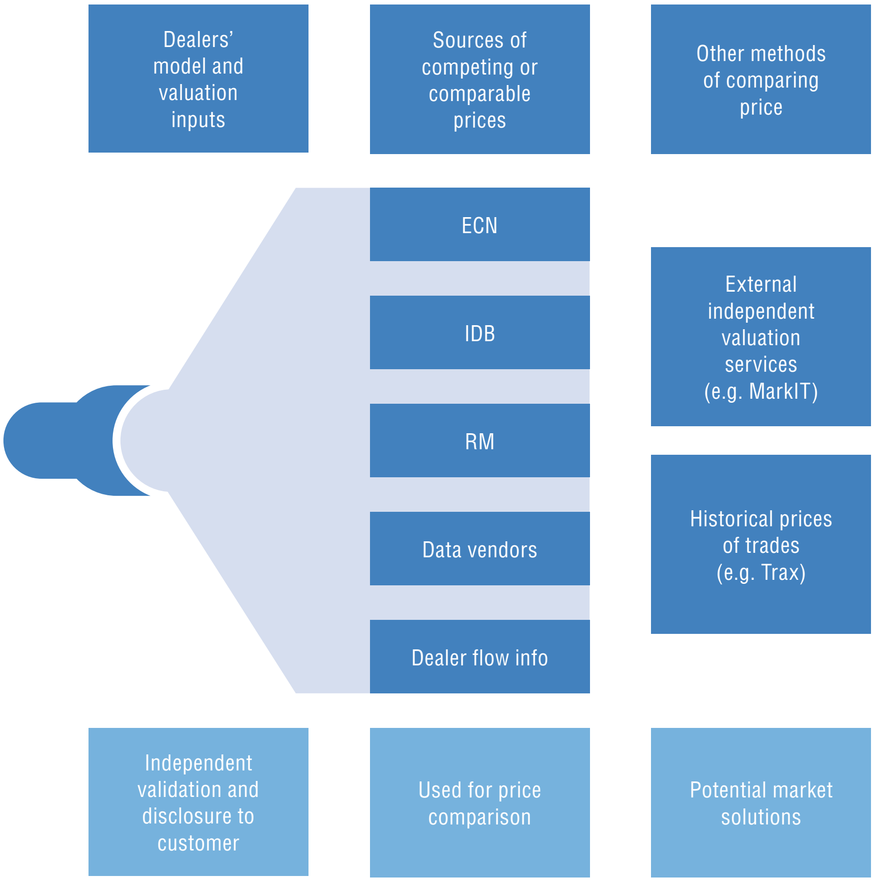


Figure 3: In a market characterised by a lack of transparency, dealers can provide Best Execution through validation, comparison and disclosure.

The remainder of this report focuses on sources of comparative price information, which can be derived from benchmarks such as ECN and IDB quotes, and the use that can be made of dealers' internal pricing models. In the next section, we define a benchmark model and show how these pricing elements fit into this holistic view.

2.5 Alternatives to a benchmark modelling approach

We have given some consideration to whether there are viable alternatives to the benchmark modelling approach outlined here. Given the requirements to take "all reasonable steps to secure the best possible result", and to demonstrate to clients, if required, that this has been done, we do not believe there are. These two requirements effectively require a dealer to compare or benchmark the dealer's price against the market, and to reveal how this has been done.

3 Benchmark model definition and applicability

We suggest that a benchmark model should contain six elements. The following three elements relate to constructing the benchmark:

- How do we establish a reference price?
- Should the reference price be a mid-price or best bid/offer?
- Does the benchmark on the reference price limit the trade price or set the trade price?

The following three elements relate to applying the benchmark:

- What are the disclosure rules?
- How should compliance be monitored?
- What happens when a benchmark (or internal pricing model disclosed to the client) cannot be applied?

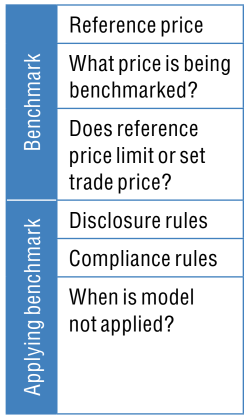


Figure 4

It will be apparent from this discussion that a wide range of benchmark models can be constructed. As we discuss below, some of the options are clearly preferable to others, and some, we believe, would not be acceptable to dealers and so would not be adopted. Even after allowing for these changes, however, we are left with a wide potential range of models. We therefore include, in Section 5, an examination of the differences between ‘tight’ and ‘loose’ benchmark models.

3.1 How do we establish a reference price?

A reference price is constructed from all available information about the price of the instrument being traded. This can be viewed as a process that starts with the dealer's internal model price (which dealers currently produce for every instrument they trade). The resulting price should then be compared to robust external prices given by an IDB or client-multidealer ECNs where these exist. The prices being compared should include any external transaction costs (e.g. costs of transacting on the ECN).

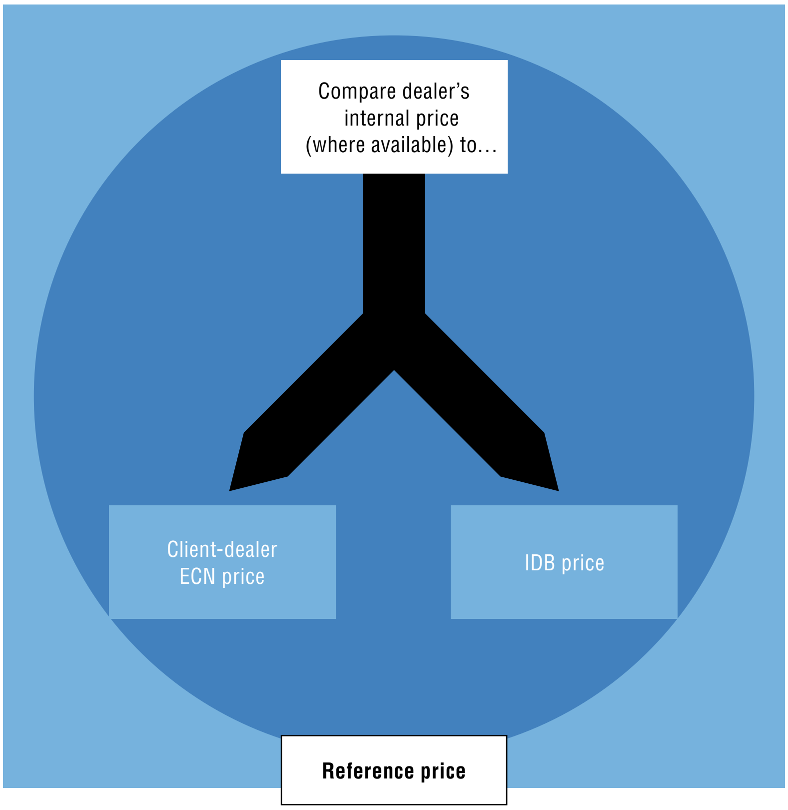


Figure 5: Best Execution benchmark is the best of the comparable prices

In this section we discuss:

- *The three sources for a reference price*
- *Where and when these different reference prices may be applied as benchmarks – in particular, we consider the applicability of these three price references to products of different liquidities.*

3.1.1 Sources of information to be used to provide Best Execution

We have identified three possible sources of price information:

1. Internal pricing models

- *All dealers use internal models to develop their view on the value of an instrument. If the inputs are unbiased, this view is the firm's view of the market value of the product. A spread will then be applied to this value to give bid and offer prices.*
- *Internal pricing models may range from the simple to the very complex, and from widely accepted, industry-standard models to proprietary models with embedded intellectual capital from the investment firm concerned.*[9]
  - *Simple models could include relating the price of an instrument to the price of a single reference instrument using a simple formula (such as a yield spread), or using a standard, widely publicised pricing model such as Black-Scholes.*
  - *Complex models could include proprietary models, such as models to price-structured products with exotic options embedded.*

[9] *We defer a fuller discussion of internal models to Section 6, as they raise major issues in terms of acceptability to the industry. One way around this may be for dealers to construct a Best Execution model for some instruments which is a simplified version of their own proprietary, internal pricing model – see Section 6.3.*

2. IDBs

- *The IDBs provide prices through three main methods. There are IDB ECNs such as MTS and BrokerTec, voice brokered IDBs that display the prices quoted on screens, and voice brokered IDBs that have no screen display*
- *IDBs operate in all product categories and a wide range of instrument liquidity*
- *The IDBs generally have firm, executable prices. The IDB ECNs deal in the most liquid instruments and dealers tend to quote two way prices with a constant bid-offer spread. On less liquid instruments IDBs are more likely to have a wide bid offer spread or perhaps just one side of the price. Generally the less liquid an instrument the more likely it is to be only voice brokered.*

3. Client-multidealer ECNs

- *The most liquid instruments are available on client-multidealer ECNs (i.e. an ECN where clients can obtain quotes from several dealers). The instruments available on a client-multidealer ECN will be a subset of the instruments available on IDBs. To provide quotes to an ECN, dealers generally commit to a given standard spread. While the prices are indicative, they are implicitly firm for a standard market size in that it is rare for firms to quote that they will not match or better them (and if they take such a policy, their client enquiries will quickly dry up).*

When considering the benchmark, firms will need to consider the price available on any ECN (either client to multi-dealer or IDB) and also any price available from a voice brokered IDB that can be seen on a screen. Prices available from a voice brokered IDB that cannot be seen on a screen should be excluded, as they are not sufficiently robust (as discussed in the box on page 17).

Other possible sources of price information include:

- *Publications by industry bodies – these are not currently widespread, but could develop over time, and are discussed further in Section 7*
- *Collation of historical data – generally, we think post-trade data in the OTC market would be difficult to use as a reference price, since the data refers to past trades, will only be available for more liquid instruments, and will not reflect the way the markets have moved*

- *Data vendors, such as Reuters – this data does not represent a firm quote, is likely to be out of date, and is likely to only be available for more liquid instruments where more accurate reference prices can be found on client-dealer ECNs or IDBs; so this source is not considered further.*

IDBs and ECNs

IDBs are brokers that transact business between investment bank dealers. It is a venue for dealers to re-balance their positions in line with their desired book position. They operate in the majority of product categories.

ECNs are dealing venues where price indications, price quotes and actual deals all take place electronically.

IDBs utilise both voice brokering and ECN methods. Voice brokering is used by a dealing venue where the clients (in this context the investment bank dealers) give price indications, price quotes and actual deals by telephone to the brokers. The prices and trades may be displayed on a screen that is visible to the clients (investment bank dealers), but this is not always the case, and depends on the instrument category and the particular broker. When prices are not displayed on screens, voice quotes are unlikely to act as suitable benchmarks since the quote may not be sufficiently robust (in that it is possible that another dealer could be offered a different price for the same trade) nor sufficiently firm (as the quote may disappear in the time the broker takes to go back to the other side of the trade).

ECNs have a range of formats:

- IDB ECNs where only the dealer community participate
- Multidealer to client ECNs where dealers are competing to win the client business on the single venue (also referred to as client-dealer ECNs in this report)
- Single dealer to client ECNs where a single dealer provides price indications and quotes to their own client base only.

The ECNs are a growing sector of the market and are increasing the products covered. The IDB and multidealer ECNs have expanded from the liquid government and supranational bond issues into the areas of interest rate and credit derivatives.

The single dealer platforms already cover a wider range of bond and money market products, but would not be appropriate for benchmarking as the prices are hidden from other dealers.

3.1.2 Applicability of different reference prices

Typically only the most liquid instruments are available on client-dealer ECNs. The availability of different reference prices for products with different liquidities is illustrated using the liquidity spectrum shown in Figure 6.

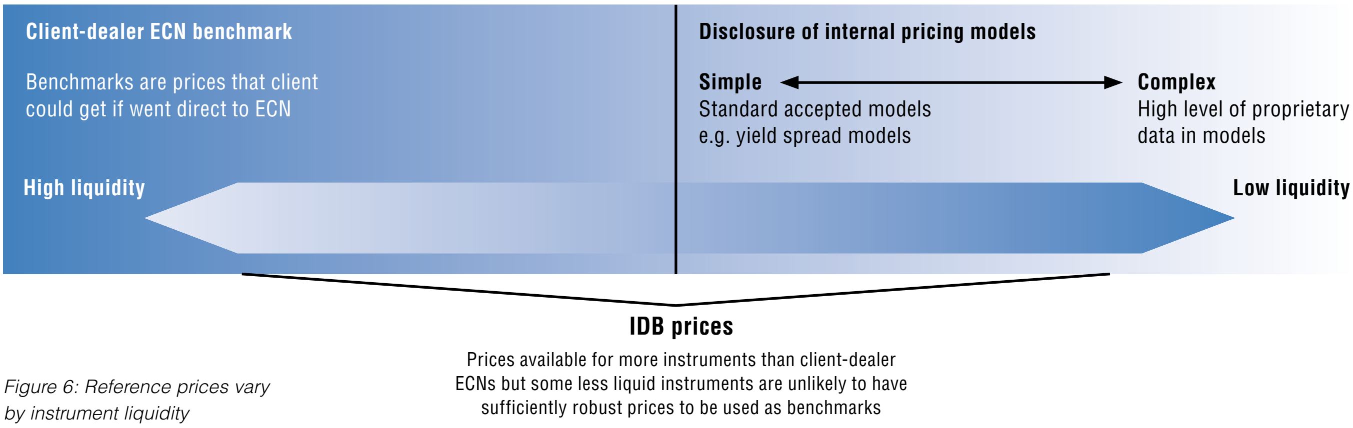


Figure 6: Reference prices vary by instrument liquidity

Some instruments will sit at different places on this scale at different times in the product lifecycle. For example, bonds are generally very liquid immediately after issue, and are likely to be available on a client-dealer ECN, but then become less liquid over time. In its recent paper on Bond Market Transparency, the FSA illustrated this same point with the bond below. [10]

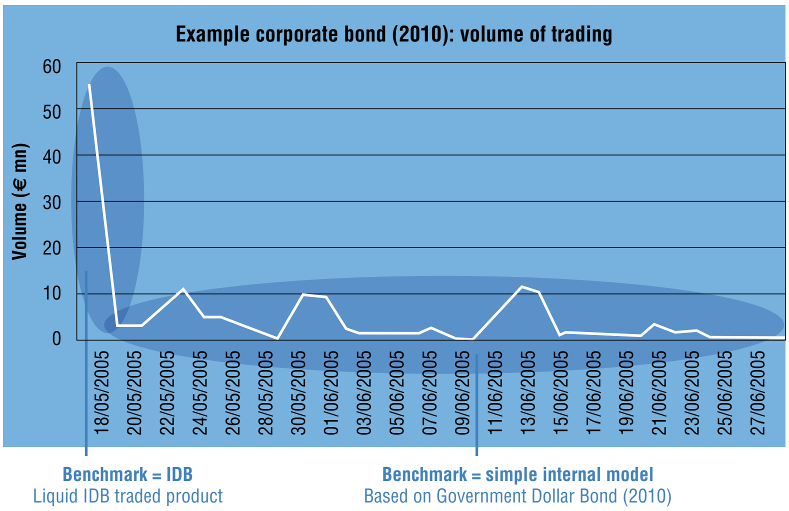


Figure 7: Example of bond trading volume over the product lifecycle

[10] *Based on data from the FSA discussion paper, 06/05, Trading transparency in the UK secondary bond market.*

Examples of products that sit at different points on the liquidity spectrum, and which will therefore use different benchmarks, are shown below:

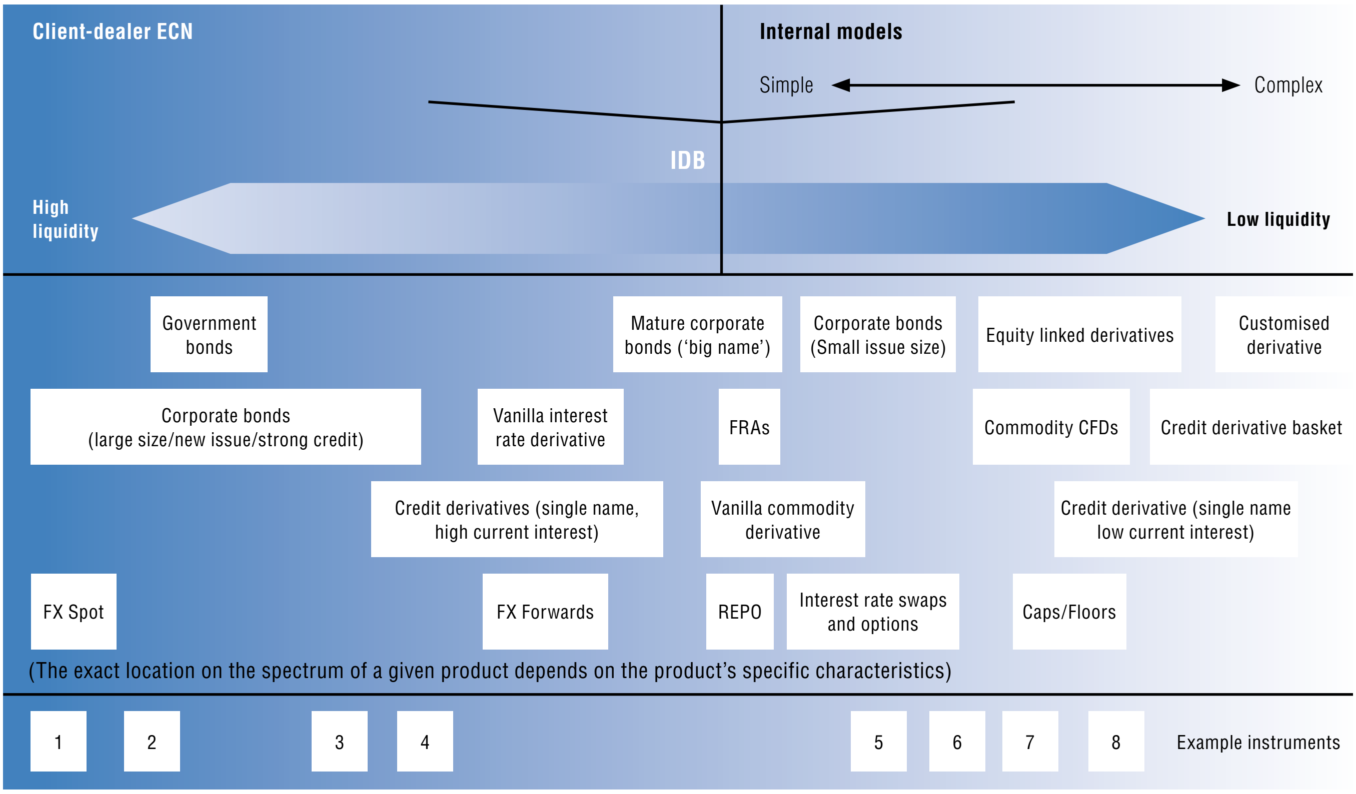


Figure 8: Examples of products on the liquidity spectrum

The following example products are referenced on the diagram above:[11]

1. Government Bond
   a. Issuer: UK, Coupon: 4.25%, Maturity Date: Mar 2011, Current Price: 99.35, Current Yield: 4.40%.
2. Investment Grade Bond
   a. Issuer: World Bank, Issue Size: $1bn, Coupon: 5%, Maturity Date: Apr 2013, Rating: AAA, Current Price: 99.852, Yield Spread to Govt Benchmark: UST+32.
3. Emerging Market Bond
   a. Issuer: Turkey, Currency $, Coupon: 7.25%, Maturity Date: Mar 2015, Rating: BB-, Current Price: 104.25, Current Yield: 6.61%, Yield Spread to Govt Benchmark: UST +191.
4. Credit Derivative
   a. Instrument: Credit Default Swap, Reference Entity: ITV plc, Maturity: 5-year, Premium: 95 basis points per annum.
5. Interest Rate Derivative
   a. Structured Swap "CMS Steepener": Maturity Date: December 2014
      i. Customer receives: 4% p.a. (annual payment, act/act ISMA)
      ii. Customer pays: start date to December 2006: 3.25% (annual payment, act/act) December 2006 to December 2014: 5.4% – 2*(CMS10-CMS2), min. 0% (annual payment, act/act).
6. FX Derivative
   a. Maturity: 2-year, Instrument: 100% principal protected note linked to the appreciation of a basket of Asian currencies.
7. Commodity Derivative
   a. Maturity: 3-year, Instrument: principal protected Oil Note – semi-annual coupons dependent on the Brent Oil price not falling below a defined price level during the defined time horizon.
8. Equity Linked Derivative
   a. Instrument: Nikkei 225 Quadruple Leverage Notes.

[11] *The data for these products was taken on 24 March 2006.*

Estimating likely applicability of each benchmark in the bond market

Typically, we might predict that client-dealer ECN prices would become standard as benchmarks for the most liquid instruments, IDB prices for slightly less liquid instruments (where ECN prices do not exist), and internal models for the remainder.

If we consider all outstanding bonds contained on the CUPID database (approximately 110,000 bonds), we estimate that up to 8% have prices quoted on IDBs or client-multidealer ECNs. This is illustrated in Figure 9 below.

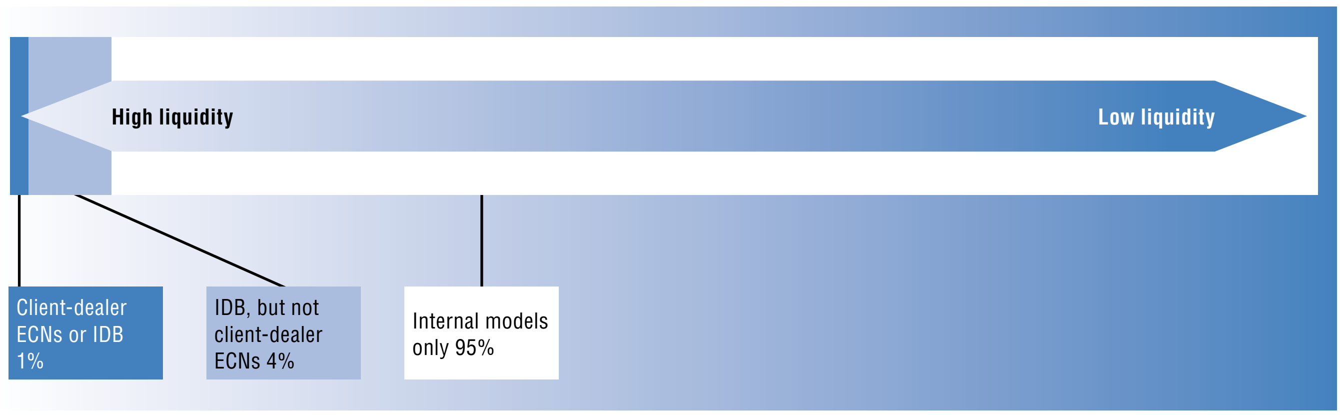


Figure 9: Proportion of outstanding bonds for which prices are available from each type of benchmark

However, Figure 9 shows that if we consider the approximately 25,000 daily bond trades registered on the TRAX database,[12] we estimate that up to 28% of these trades relate to bonds quoted on client-multidealer ECNs, while another 64% of these trades relate to bonds which may be available on IDBs. So while these benchmarks can only be used for a small proportion of outstanding bonds, as shown in Figure 9, they do in fact cover a much higher proportion of the number of daily trades (as illustrated in Figure 10). However, we have no data which tells us what proportion of these trades are dealer-to-dealer trades, which should be excluded from this analysis as they are unlikely to be conducted under Best Execution and will therefore not need a benchmark. More details of the assumptions underlying this data are explored in Appendix A.

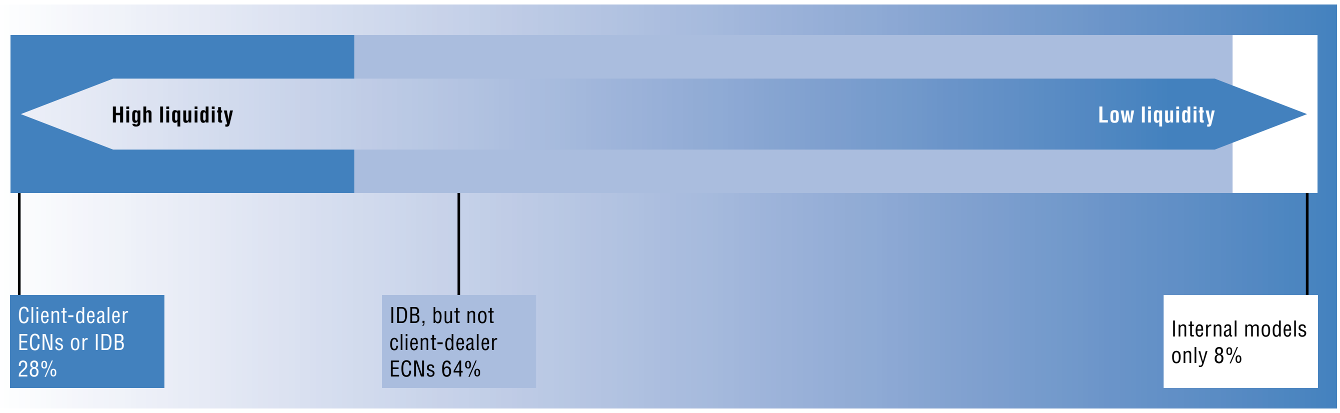


Figure 10: Proportion of daily bond trades for which prices are available from each type of benchmark

[12] *Based on data from the FSA discussion paper, 06/5, Trading transparency in the UK secondary bond market.*

3.2 Should the reference price be a mid-price or best bid/offer?

There are two price elements which could be used as the reference price:

- *The best bid or the best offer price in the market*
- *The mid-price of the best bid and offer prices in the market.*

These two elements are shown in Figure 11.

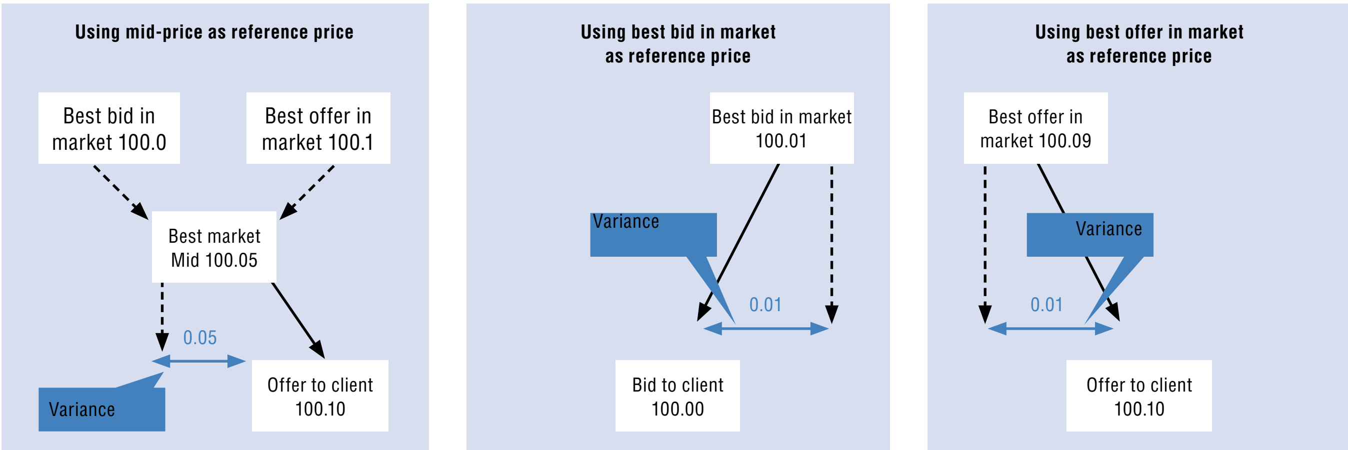


Figure 11: Examples of using the best mid- or the best bid/offer to calculate a price for a client

The two models are equivalent where the ECN spread is constant. However, if the ECN spread widens, then the variance around the reference price created from the mid will not widen, while the variance around the reference price created from the bid/offer will. In practice, we would only recommend using ECNs as a source of reference prices when ECN spreads are relatively constant.

An advantage of using the mid-price is that it more closely matches current practice where clients seek to understand (and minimise) dealer spreads. These spreads represent a client's direct cost of trading, since if a client trades an instrument whose mid-price has not changed, the client's losses are directly proportional to the spread. An advantage of pricing off the bid and offer is that the client can see the incremental variance that the dealer is adding over and above what the client would pay on an ECN (assuming the reference price is from an ECN).

3.3 How should the reference price be compared to the price of the trade?

The quoted price may be:

- *Limited to being no greater than a set number of basis points from a benchmark bid/offer*
  - *In this case, the actual quotes must be within these bounds*
- *At a fixed number of basis points from a mid-price or from a benchmark bid/offer*
  - *These models are unlikely to be favoured by the industry.*

In both the limited and fixed models, the number of basis points variation from the reference price would need to be disclosed and agreed pre-trade, as part of the client's Best Execution agreement with the dealer. However, under the limit model, the actual variance achieved would be revealed at the time of the quote on a trade-by-trade basis.

The assumption is that, when there is disclosure of the reference price, rivalry between dealers to attract buy-side Best Execution business will drive dealer spreads to competitive levels. We would also expect that, as a result of the competitive process, two clients with identical characteristics, and trading in the same instruments in the same volume at the same time, would be offered both the same reference price and the same dealer spread if the deals were executed on Best Execution terms.

This approach (of excluding pre-disclosed dealer spreads from Best Execution) is in line with the Commission's current thinking, and is likely to be the approach which most closely meets regulatory objectives and industry interests:

- *At least in non-retail markets, it is reasonable for the buy-side to test how competitive the spread being offered was; the difficulty for the buy-side at present is that, because a net, bundled, price is quoted, they cannot test either the competitiveness of the spreads or the tightness of the underlying pricing to a reference price; under a benchmarking approach to Best Execution, this constraint is removed.*
- *It does not seem reasonable to require investment firms to offer the best spread in the market; it would require them, for example, if their view on risk was less favourable than the market's, to include the market view in their spread.*

3.4 What are the disclosure requirements?

Firms will need to determine their disclosure policy (i.e. what is disclosed, when and to whom). Disclosure issues to be considered include:

- *How much information about the benchmark should be disclosed? Such information could include:*
  - *Where the reference price is being taken from*
  - *The allowed variance from the reference price*
  - *The reference price*
  - *The firm's compliance procedures*
- *What detail is being disclosed about internal pricing models?* *(see box on page 25)*
- *When is the information to be disclosed?*
  - *By agreement in advance*
  - *Trade by trade pre-trade*
  - *Trade by trade post-trade*
  - *Periodically following review*
- *Who is the information to be disclosed to?*
  - *Clients*
  - *Wider market.*

One specific issue is whether there should be a separate fee charged for providing a Best Execution service and whether this charge should be incorporated in the firm's spread, or should be unbundled from other views of risk and disclosed separately. One option, for example, would be for dealers to offer Best Execution including their spread, but to charge separately for providing a Best Execution service. Dealers would then need to disclose the reference price, their spread, and their Best Execution charge.

In our view, there is a risk that this could lead to complex and incomparable charges among firms, as in practice it would be difficult to know what element of the dealer's costs was included in the spread, and what element in the Best Execution charge.

3.5 How should compliance be monitored?

Firms will need to consider what they can reasonably do to keep their benchmark models current and valid as a means of providing the best possible results. An examination of which transactions were effected in accordance with a firm's policy could include:

- *What is being monitored? This could include:*
  - *Where the reference price is derived from*
  - *Value of the reference bid/offer and/or mid-price*
  - *For an internal model, the structure of the model, input values and sources for these input values*
- *How it is being monitored? Monitoring activities could include ensuring:*
  - *Prices are calculated in a consistent non-discriminatory manner (through checking the process or comparing the outputs, for example with the mid-office price)*
  - *Inputs into internal pricing models are, wherever possible, verifiable market values*
- *With what frequency is monitoring conducted? This will often depend on who is conducting the monitoring. External reviewers may be used to verify the models and processes on an annual basis, while internal compliance teams may check price consistency across trades and with mid-office internal book valuations more regularly.*

Validating internal pricing models

The following methods could be used to validate internal pricing models:

- Publicly available external inputs to internal pricing models could be disclosed to clients
- The internal pricing model could be shared with clients
- The model could be reviewed by external experts
- Valuations of instruments using pricing models could be compared to mid-office valuations of instruments, probably on a daily basis.

3.6 What happens when a benchmark or internal pricing model cannot be applied?

Firms will need to decide what their approach will be when a benchmark cannot be applied, for example during a period of unusual market conditions, or outside trading hours when there may have been developments which would have moved the last quoted price.

A suitable approach may be that a firm will decide that trades can still go ahead, but Best Execution will not be offered.

4 Criteria for assessing benchmark models

As proposed in the FSA's Invitation to Tender (ITT) for this work, four criteria have been adopted for assessing the benchmark models outlined in Section 2. These criteria are explained in this section before the benchmark models are assessed against them in Section 4. The criteria are that the benchmark model:

- *Provides 'Best Execution', i.e. is compatible with Article 21 of the MiFID*
- *Meets FSA objectives, i.e. advances the twin policy objectives of the Best Execution requirement: maintaining/improving market efficiency and investor protection*
- *Would not impose unreasonable costs to implement and maintain which make sense in relation to the scale of the market failures and potential benefits*
- *Is "acceptable" to the industry, i.e. is seen by the industry as a viable alternative to trading on an eligible counterparty basis in dealer markets.*

The three last factors are explained in more detail below. Whether benchmark models can provide Best Execution depends on how tightly they are specified, and this is discussed further in Section 5.

4.1 FSA objectives

In its ITT, the FSA defined a suitable benchmark model as one that: "can be shown, through appropriate mechanisms, incentives and controls, [to be] likely to contribute to the achievement of the intended regulatory outcomes of Best Execution policy, i.e. to further the investor protection and market efficiency objectives."

4.1.1 Market efficiency

What do we need for an efficient market?

Efficient markets are characterised by:

- *A large number of clients (or brokers)*
- *A large number of dealers*
- *Accessibility between clients and dealers*
- *Equality of access to market information and the requisite knowledge to interpret it (often referred to as "price transparency")*
- *Low costs to trade.*

Where these factors exist, markets should provide an efficient mechanism for trading financial instruments, and regulatory intervention could lead to a less efficient outcome by imposing costs and market distortions.

For markets in financial instruments, there is a further feature, namely that there should be sufficient liquidity or 'depth' in the relevant instruments to trade. It is a feature of many OTC markets in the UK that dealers provide this liquidity (by dealing on their own account), and naturally they expect to be remunerated in order to do so.

There is an inherent tension between the efficient markets requirement of price transparency and liquidity. As a recent Centre for European Policy Studies book points out:

"The exact nature of the relationship between price transparency and liquidity remains a contentious matter. Liquidity is initially found to improve as transparency increases, but too much transparency can damage liquidity. Too much transparency has the potential to damage the liquidity-making function by discouraging market-makers from risking their capital to supply it, which would reduce market efficiency."[13]

[13] *Europe's hidden capital markets – Evolution, architecture and regulation of the European bond market. Jean-Pierre Casey & Karol Lannoo. Centre for European Policy Studies (2005).*

Who are the market participants?

The key market participants in OTC trades are:

- *Clients (who may be intermediaries)*
- *Brokers*
- *Dealers.*

An efficient market has a large number of clients, although the relative sophistication of the clients also needs to be considered. More sophisticated clients will have a better understanding of the market value of an instrument, and are therefore more likely to achieve a price close to that value.

Market efficiency could also be affected by the equality of access to information across different client groups. Typically, the disparity in this access to information decreases as the liquidity of the products they trade increases.

Less sophisticated clients' access to information is low, particularly for less liquid investments. However, prices of some highly liquid products are reported through mass media, and some more sophisticated retail clients will have access to indicative price information through their broker's proprietary system.

More sophisticated clients typically have access to electronic quote vendors such as Bloomberg and Reuters, and to financial modelling tools. In some cases sophisticated clients may also have price information based on their own flows.

An efficient market may also have a large number of brokers through whom retail clients will deal. Retail clients will often use a single broker with whom they have an account or a strong relationship on an exclusive basis.

Market efficiency can be influenced by the accessibility between dealers and clients. In OTC markets, this accessibility is largely represented by the number of dealers approached for a given trade; in an efficient market a large number of dealers will offer trades in a particular instrument.

Dealers make their profits on the difference between bid and offer. A separate commission is not normally charged, and the implied dealer spread on the bid/offer represents the cost of the trade to the client. Since an efficient market has low costs to trade, the efficiency of the market will be affected by the level of competition between dealers to offer low spreads.

We discuss the impact of using a benchmark modelling approach to meet Best Execution requirements below, after considering the issues of investor protection and costs.

4.1.2 Investor protection

Investor protection has two elements: the first relates to advice: will acquiring or disposing of this asset improve my portfolio? The second relates to execution: can I acquire/dispose of this asset on favourable – Best Execution – terms? The MiFID requirements on Best Execution refer only to the second of these elements of investor protection.

The balance between these two elements will depend on the nature of the asset concerned, and the characteristics of the individual's portfolio. However, other things being equal, the importance of investor protection as far as Best Execution is concerned will be lower, the longer the asset is held, as any deviation from Best Execution terms is a one-off loss. This is particularly relevant for retail investors, who often follow a 'buy and hold' strategy.

4.2 Cost

When considering the costs of using a benchmarking model to provide Best Execution, the costs to the OTC market dealers and the costs to the buy-side both need to be considered.

For an OTC market dealer, the costs can be split into the following categories:

- *Implementation costs, such as changes to systems and processes. The scale of these costs could depend, in part, on the "reasonable" implementation timetable since shorter timescales could increase potential development and implementation costs*
- *Ongoing costs, such as using the model, periodic validation of the benchmark, compliance, or data storage costs.*

In general, implementation costs will be lower where there is a long lead time, to allow the required system changes to be incorporated as part of ongoing maintenance or upgrade work.

The nature and size of buy-side costs is not clear. Obtaining Best Execution from a dealer who is using a benchmark model may increase their compliance costs, as they will need to research the Best Execution policies of the potential dealers they may use, and will need to expend time and effort in selecting dealers with the keenest spreads (all other factors being equal). However, this form of trading may reduce their search costs on completing particular transactions.

4.3 What will the impact on market efficiency be of introducing a benchmark model as a means of providing Best Execution?

The major impact of introducing a benchmark model as a means of providing Best Execution will be to increase buy-side access to information. This should increase clients' understanding of what the market value for an instrument is, reduce the number of clients willing to pay a wide spread on that value, and improve price transparency, particularly for 'uninformed' investors. This should reduce the number of 'poor' trades uninformed investors might do, but also increase their confidence to trade (see Figure 12).

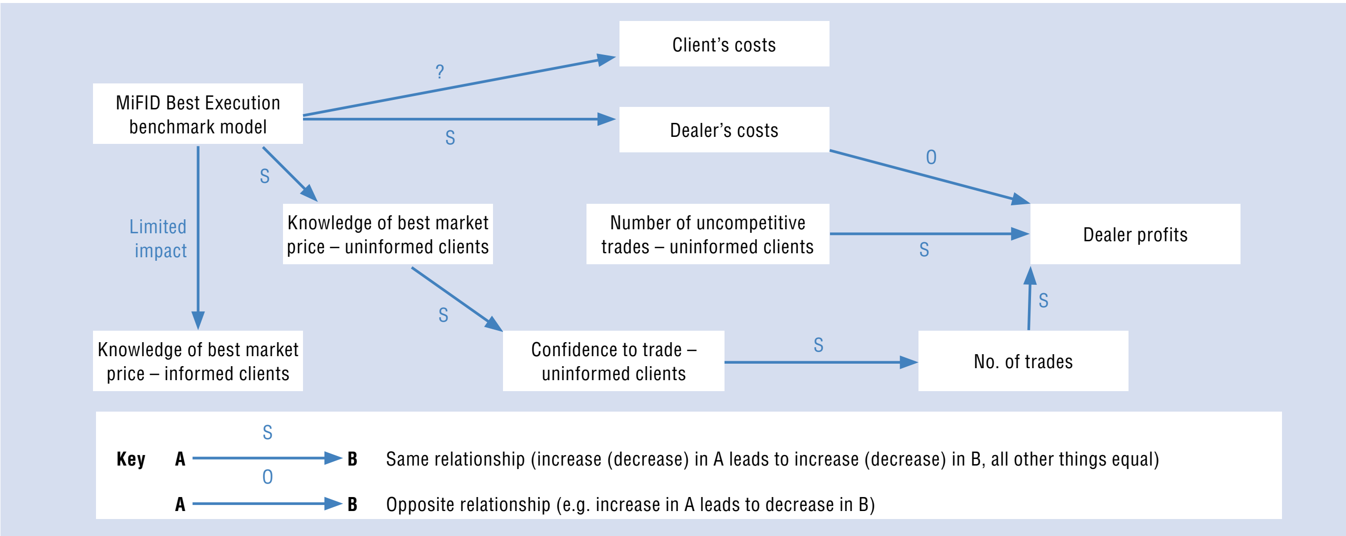


Figure 12: Cause and effect map showing some potential impacts of the Benchmarking Model approach to Best Execution under MiFID

As Figure 12 shows, increased confidence to trade may increase trading volumes (the number of trades in the diagram), which will tend to improve dealer profitability. However, as uninformed clients improve their knowledge of the best market price, the number of 'poor' or uncompetitive trades will decline, reducing dealer profits. The costs of implementing the benchmark model would reduce dealer profits (at least for those dealers who choose to offer Best Execution).

The overall impact on market efficiency will depend on the size of these different effects, but IBM has not undertaken to quantify them. While consultations with the industry during the FSA's discussion paper process may help quantification, the scale of the benefits from reducing 'poor' or uncompetitive trades is likely to remain difficult to establish.

4.4 Acceptability to industry

Assessing the acceptability to the industry of any Best Execution policy needs to consider two aspects:

- ***The costs and benefits*** *of trading on a Best Execution basis. As we have discussed above, dealers do not have to offer to trade on a Best Execution basis – they may decide to restrict themselves to trading with eligible counterparties. They will therefore need to decide whether the trades they can attract by implementing a Best Execution policy will justify the investment required.*
- ***Disclosure of proprietary information.*** *OTC market dealers invest significant amounts of money in developing proprietary models for pricing instruments, and the accuracy and speed of these models can be a significant source of competitive advantage for firms. For this reason, any policy which requires firms to disclose proprietary information to their clients, and potentially to the wider market and their competitors, may be of concern to the industry.*

5 Example benchmark model used for assessment

It is clear that some benchmark models chosen by dealers would be more likely to give clients Best Execution than others, depending on the options selected by dealers for each element of the benchmark model. So before we can assess benchmark models against these criteria, we need to specify one (or more) of these model(s) in more detail.

There seems little point in evaluating a 'loose' model, as it will have little impact on investor protection or market efficiency, but would increase regulatory costs. While this might be acceptable to the industry, it is difficult to regard it as a satisfactory outcome. A loose benchmark would be a model where:

- *A dealer may offer a 'wide' variation around the reference price on trades, and the reasons for changes in instrument prices between trades may not be clear*
- *A dealer may offer a wide spread limit, but actual trades may be bunched within a much narrower range*
- *A better benchmark may be available but not used, for example a 'yield spread' benchmark from a government bond may be used where a more directly comparable, recently-traded, liquid corporate bond is available*
- *The model could allow bias in internal model inputs (including risk assessments), or similarly, the model may not take market information fully into account.*

For the purposes of this exercise, we have therefore chosen to specify one relatively tight benchmark model (see below). The more tightly defined the benchmark model is, the more likely it is that the dealer is taking "all reasonable efforts" to ensure Best Execution.

This of course raises the issue of whether competitive forces and regulatory requirements will be effective in driving firms to implement tight policies. While the FSA will need to monitor this situation carefully, clients will also be reviewing different dealers' Best Execution policies; where they chose to deal on a Best Execution basis, we would expect them to move their business to dealers offering the best (i.e. the tightest) policies.

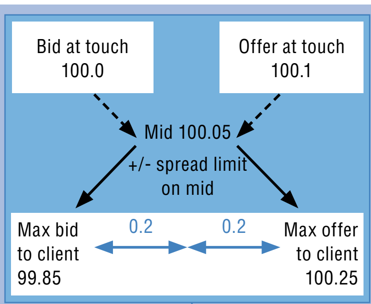
Benchmark	Reference price	**Compare: Internal model price IDB price (where available) Client-dealer ECN price (where available)**
	What price is being benchmarked?	 • Benchmark against reference mid-price where both sides of trade available, otherwise benchmark against best bid offer market • Price trade within tight price limits, limit varies by size of trade and client characteristics • Price of trade excluding spread used for comparison where spread and other fees agreed in advance
	Does reference price limit or set trade price?	
Applying benchmark	Disclosure rules	• Benchmark – method for applying agreed in advance or trade by trade • Variation/spread limit set by prior agreement • External benchmark price provided trade by trade, pre-trade, where available • Internal pricing model disclosed in advance and key inputs provided at time of trade
	Compliance monitoring	• Review variance limits periodically • Review choice of benchmark (e.g. benchmark ‘venues’) where external benchmark prices available • Validate internal model (Frequent: mid-office, infrequent: external experts/FSA)
	When is model not applied?	• Best Execution not offered

Figure 13: Example of a tightly defined benchmark model

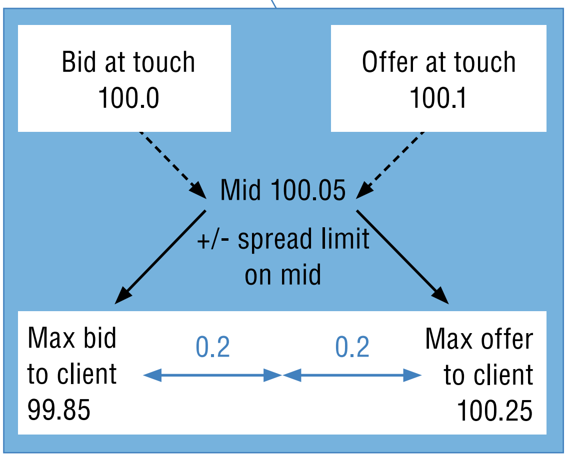


Figure 13 summarises an example of a tightly defined benchmark model. Within each element, investment firms will have a series of choices to make, depending in part on the instrument being traded: for example, as discussed above, comparable ECN prices will be available for some instruments but not for others – the reference price may relate to a mid-price, or against IDB best bids or offers. Each element is discussed in more detail below.

Constructing the benchmark

In this model, the *reference price is*:[14]

- *A price available on a client-dealer ECN, where available*
- *A price available on an IDB, where available*
- *A price derived from an internal model.*

Best Execution can then be offered either:

- *By disclosing the internal model used to derive the price, plus its key pricing inputs, and then adding a pre-agreed dealing spread*[15] *to create a dealer trading range*

or

- *By using the ECN or IDB reference price and adding the pre-agreed dealing spread; in this case, the dealer would not be required to disclose his internal model.*

In situations where an internal model reference price could be bettered by an ECN or IDB reference price adjusted for spread/commission, the dealer should do so.

Pricing within agreed variations from an internal model reference price or externally validated IDB or ECN reference price could vary for factors such as:

- *Differing views of risk: the dealer may have a different view on the risk of price movements in the instrument to the market (the market view should be reflected in the reference price)*
- *Expected difficulties in unwinding the dealer's book position if they accept the trade*
- *Differences in the costs of trade (for example, size of trade, or objective characteristics of the client which influenced the dealer's cost).*[16]

This procedure effectively requires the dealer to incorporate all market information into his pricing when offering Best Execution, but to include information proprietary to the dealer in the spread.

[14] *These reference points would need to be for trades of equivalent size; if this is not the case, an adjustment will need to be made.*

[15] *This assumes the reference price is based on the mid-price. Section 3.2 discusses the approach where the best bid or offer is used.*

[16] *Alternatively, the dealer may offer different spreads to different categories of client, or for different sizes of trade. Again, these would need to be pre-agreed.*

In order to ensure that market information is properly reflected in the reference price, the internal model should be objective and unbiased. As discussed above, where the dealer has differing views to the market, these should be reflected in the spread, not the reference price.

Applying the benchmark

In the benchmark model, the dealer has to disclose the following information to the client:

- *The reference price: this should be disclosed on a trade-by-trade basis, pre-trade, whether the reference price is taken from an external source or an internal model*
- *The dealer spread limits on the reference price: these should be set by prior agreement*
- *The actual spread applied for a given trade: disclosed at the time of the quote.*

One of the features of OTC markets is that they are highly dynamic, with rapid product innovation and a continuing trend towards greater use of client-multidealer ECNs. So in order to ensure dealers continue to provide the best possible result, firms would need to take the following actions:

- *Periodically review the appropriateness of the spread limits for different size of trades and for clients with different characteristics (competitive forces are likely to provide an incentive for firms to do this)*
- *Periodically review whether this 'reference price' is likely to provide the best possible information about the current market price for particular instruments*
- *Validate the internal pricing models. Frequent internal validation should take place, for example using mid office process. External validation may also have a role to play, for example through securing an external audit of the internal models and parameter values used. However, this should not be mandatory, but rather a tool the investment firm can use if it deems appropriate (for example, as an aid in the winning of new business).*[17]

[17] *The relevant standard here is the same as for the bullet above – whether the internal model is likely to provide the best possible information about the current market price for particular instruments.*

Regression techniques may also have a role to play in demonstrating Best Execution, as described in the box below.

It is possible to envisage circumstances in which a benchmark model pre-agreed with the client cannot be applied and where the dealer would not be able to trade on a Best Execution basis. This might happen if there were particular market turbulence either in the instrument being traded or in the instrument from which the reference price was derived. For example, the relevant ECN might have been suspended, or the dealer might be in possession of proprietary information which made him reluctant to trade within his pre-agreed spreads.

Use of regression techniques to explain dealers' price variations

One of the benefits of using benchmark models is that the review process can use some of the quantitative information which they will generate. So, for example, a regression model could be built which would explain, financial instrument by financial instrument, the price of a trade by reference to a series of factors such as the reference price, the size of the trade, a series of client characteristics (such as size of annual business) and an error term:

P (trade)=f(reference price; size of trade; client characteristics)+ ε

The error term (ε) captures the effects of all influences omitted from the formal model, which would include:

- Information proprietary to the dealer which had influenced his quoted spread (market information would be reflected in the reference price)
- A dealer's desire to build or run down his book in a particular asset at a given time
- Differences between the dealer's and the market's view of risk (for a given asset at a given time).

Over a reasonable time period (say a quarter or longer), these omitted influences should tend to cancel each other out – on some occasions they would increase the quoted price, on others they should reduce it. This regression model could then be calculated using standard statistical techniques, the coefficients on the different variables computed, and an estimate made of the variance of the error term.

Publishing this information in some form (for example, sending a report on the exercise to clients the investment firm was dealing with on a Best Execution basis) would allow market participants to become better informed about how closely the firm was following its Best Execution policy. For example:

- The variance of the error term would show how closely the pricing policy was tracking the reference price
- Comparing the standard error of the error term (σ) with the spread limits would show how tight the latter were: as over 95% of trades should be within a 4σ range, spreads significantly larger than 4σ would require explanation
- Any evidence of serial correlation would show that the random factors had a degree of time persistence built in (for example, that building a position took several days)
- The coefficients on the client characteristics terms could provide useful information to clients; they might show, for example, that a particular dealer tended to charge a larger spread on clients with small annual turnovers with him, or for clients in particular sectors.

6 Assessment of benchmark models and their impact

In this section, we appraise each benchmark type within the 'tight' benchmark model discussed in the previous section against the evaluation criteria discussed in Section 4.

In order to do so, we need to make certain assumptions about the economic environment in which these Best Execution benchmark models are employed.

Effectively, we assume the continuance of current conditions: a macro-economic background of low inflation and stable growth, and a financial markets picture of healthy (and growing) trading volumes and satisfactory profitability. Impacts could be different in different environments: for example, in a 'bear' market with low trading volumes, dealers could be much more reluctant to make the investments required.

The impact of a tight benchmark model (as described in Section 5) will also differ according to the source of the reference price (internal model, IDB, client-multidealer ECN) which, as discussed in Section 3, is largely driven by the liquidity of the instrument.

The level of information asymmetry in the market is largely driven by client characteristics. As illustrated in Figure 14, there is a relationship between the asymmetry of information and product complexity, since the market players who suffer the greatest asymmetry of information (e.g. retail) tend to trade only the less complex product categories (e.g. bonds), and are not likely to trade more complex product categories (e.g. structured products). In addition, less complex product categories tend to be more liquid, meaning that asymmetry of information can be roughly related to product category liquidity.[18]

[18] *Note that when a bond is initially issued, the level of information is widely held, in that a prospectus is issued and the price is known. After a few weeks the asymmetry of information makes retail and traders less likely to trade the instrument with each other.*

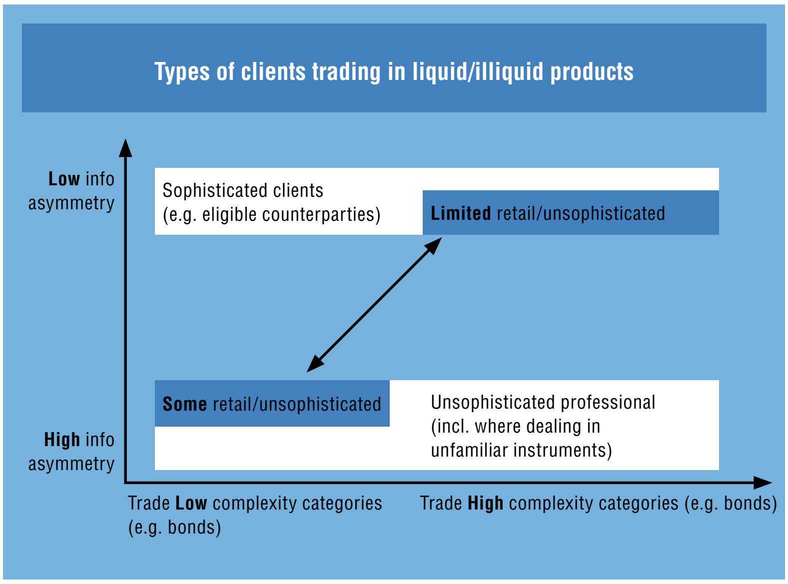


Figure 14: Unsophisticated clients experience highest asymmetry of information, but tend to trade only in the least complex product categories

In order to assess benchmark models and net impacts, we have made an initial qualitative assessment of the potential costs of implementing them. As we made clear in the executive summary, this is not based on any consultation with the industry, but on the views of internal IBM experts. This assessment is summarised in Section 6.4, and the main drivers behind costs are discussed in Sections 6.1 to 6.3 below.

This initial qualitative impact compares the cost of implementing a benchmark model with a 'do nothing' scenario. In practice, investment firms will need to decide whether to offer Best Execution, or to use other models (for example, eligible counterparty and interposed agency models).

6.1 Client-dealer ECN benchmarks

As discussed in detail in Section 2, a client-dealer ECN contains prices for the most liquid instruments. Some of these liquid instruments may be traded by retail clients and unsophisticated professionals (e.g. small fund managers), as well being widely traded by sophisticated eligible counterparties.

Best Execution

A client-dealer ECN benchmark will offer a more transparent reference price than other benchmarks, but it will not necessarily lead to better prices for all market participants.[19] It is more transparent than other benchmarks because the reference prices will be actual discernable prices available to the client (if they wished to trade using the ECN). The quotes therefore require less interpretation than using other forms of benchmarks.

Large, more sophisticated clients are unlikely to benefit significantly from the use of this benchmark as they already operate in a relatively efficient market.

Prices should improve for retail clients, for some unsophisticated clients (e.g. some small fund managers). These improvements would occur because:

- *There will be a pre-agreed limit on the dealer spreads, meaning unsophisticated clients are less likely to experience an 'poor' or uncompetitive trade*
- *The greater price transparency makes it easier for clients to compare dealers and therefore to select a more competitive dealer. Competitive forces may then lead to pressure on dealers to tighten their spreads. For this to occur, clients would have to accept responsibility to shop around for the best spreads, relying on Best Execution commitments to ensure the best price*
- *The above two points will increase some less sophisticated clients' confidence to trade, leading to more trades in retail sizes, an increase in liquidity for these instruments in these sizes, and a decrease in the risk of holding stock for dealers. Competition should see some of the profits from this decreased risk passed onto clients in the form of reduced spreads for smaller trade sizes.*

[19] *Best Execution should be seen as a process. While it contains additional checks and safeguards, it does not guarantee a particular outcome in all circumstances.*

Meets FSA objectives

Market efficiency

Using client-dealer ECN prices as a benchmark and disclosing these prices and spreads should increase the equality of access to information for retail clients and some less well-informed professionals. This increased disclosure and the limits placed on spreads should also improve these investors' confidence, leading to an increase in clients wishing to trade, and therefore further improvements in market efficiency.[20]

Large, sophisticated clients may also benefit from the unbundling of the 'net price' into a reference price and an agreed spread. This may increase their willingness to trade on a Best Execution basis, and reduce their costs of trade.

Dealer profits are likely to be squeezed since trading on this basis is likely to reduce the number of 'poor' or uncompetitive trades. This will increase competitive pressures on any inefficient dealers, and could lead some to withdrawal from the markets for these particular instruments, as discussed above. However, threshold effects mean that this is unlikely to significantly reduce market efficiency unless there are only two or three dealers left in a particular market.

Greater use of ECN prices may also encourage the migration of some trades to this platform, which would raise market efficiency.

Investor protection

The market for instruments that are available on client-dealer ECNs is already quite efficient, particularly for sophisticated clients. The use of a benchmark model to provide Best Execution should lead to a decrease in 'poor' or uncompetitive trades, while the use of benchmarks and disclosure of spreads should lead to an increase in investor understanding of the pricing process.

The Best Execution policy will mean that more information is being provided, but that the client has more responsibility to "read, mark, learn and inwardly digest" that information. This may impose additional costs on the buy-side, as we discuss below.

[20] *Although investor confidence is likely to be influenced by many factors which have a far greater impact than Best Execution policy (e.g. understanding of the product, suitability of product etc).*

Costs and benefits

'Sell-side' set-up costs, and ongoing costs of implementing client-dealer ECN benchmarks are likely to be reasonable, while the buy-side costs to trade should improve because of lower search costs. However, the time cost of additional calculation steps in front-office pricing systems could prove to be significant.

The sell-side set-up costs of implementing client-dealer ECN benchmarks will partly depend on whether or not firms are required under MiFID to store information on quotes as well as trades. If they are required to store information on quotes, then the set-up costs would involve a major rewrite of or upgrade to existing systems. Otherwise the set-up costs would be more minor. Note, however, that while storing quotes may allow more rigorous compliance testing to be conducted, the most serious compliance breaches occur when trades actually take place and the proposals shown here on the use of benchmark models do not require dealer trade quotes to be stored.

Back-office reporting systems are likely to require simple changes, which means they will require low set-up costs. Similarly, the need to set up spread limits for every bond will be quite low.

Sell-side system implementation costs will be dependent of the complexity of the pricing models in use. Adding additional information to existing systems is likely to be relatively easy. However, it is important to consider implementation and testing costs as well as development costs, since these costs are likely to be incurred to a certain extent even if development costs are low.

There is a possibility that implementation costs may hurt smaller sell-side players, since it will more difficult for them to absorb the costs. However, the benchmark model should also help smaller dealers, since it will be clearer to clients what constitutes a good price, and the clients may rely less on the brand name of the larger players.

Ongoing costs relating to a client-dealer ECN benchmark system should mainly relate to monitoring, data storage, and reviews. Monitoring costs are likely to be relatively low because the ECN benchmark model is not significantly different from current practice, and will take less time to monitor. Data storage costs will depend on whether or not firms store information on quotes as well as trades, although this is not a requirement of benchmark models. Review costs will depend of how often the Best Execution policy requires reviews to take place.[21]

Ongoing client costs to trade are likely to improve, since the offer of Best Execution should lead to lower search costs, although the buy-side will incur set-up costs in understanding dealers' Best Execution policies. For example, they may need to recruit additional quantitatively-trained staff to assess the internal models used by dealers. The scale of this effect will depend upon the sophistication of the instrument. For a simple bond, the maths is relatively straightforward, whereas for a convertible SFr denominated bond on a Japanese stock with re-settable strikes and a soft call feature the maths is more complex. The time cost of additional calculation steps in the front-office pricing system could prove to be significant. Dealers will generally use only one pricing engine, so any additional calculations could affect the time taken to calculate prices for posting externally (for example, on ECNs). For some instruments, speed of execution is a powerful advantage, so even a small increase in calculation times could disadvantage dealers offering Best Execution.

Acceptability to industry

A client-dealer ECN benchmark model should prove acceptable to the industry, since the efficiency of the existing market means that such a model will require the industry to make only minimal changes. So trading on a Best Execution basis using this model should prove attractive compared to the alternatives of interposed broker or eligible counterparty models.

There should be little risk that a significant group of firms withdraw products from client-dealer ECNs, with the aim of reducing price transparency in those instruments, and allowing them to use internal model price benchmarks to achieve Best Execution. Firms generally wish to deal with big clients, and big clients wish to deal on client-dealer ECNs where possible because they are cheaper. Additionally, many client-dealer ECNs have joining rules that require firms to offer a certain range of products on the ECN.

[21] *MiFID's Level 2 Implementing Directive requires reviews to take place at least annually.*

Other considerations

There will be some variation in the benefit this model will provide for different classes of product.

The largest benefit is likely to be felt in the bond market, since more 'unsophisticated' investors are currently attracted to this market. As these investors suffer the greatest asymmetry of information, they are likely to experience the greatest benefit from receiving Best Execution.

Fewer benefits will be felt in other markets such as foreign exchange derivatives, since for many clients the suitability of such products is a bigger investor protection issue than whether or not they are receiving Best Execution. This means they may be more likely to want to use a broker to seek a suitable product.

Indeed, trade in some instruments (e.g. simple interest rate derivatives) may receive few benefits from such a model, yet are likely to incur the costs associated with implementing the model. This could mean that fewer dealers will offer to provide Best Execution for these products, as their margins will be depressed. Conversely, receiving Best Execution may increase confidence to trade and improve access for some clients to these assets.

6.2 IDB price benchmarks

IDB prices are available for a wider range of products than client-dealer ECN prices, covering some of the newer and less liquid products. The IDB prices are, by definition, not available to clients.

In many respects, the IDB price could be represented as a 'risk-free' trading price for dealers since when they take a position with a client, they can immediately off-load this position through trading on the IDB. In practice, however, the trade may not be risk free since the client may be trading with a dealer in a smaller size than the dealer can trade on an IDB, or the price may rapidly move against the dealer.

Best Execution

An IDB reference price is less transparent as a benchmark than an ECN price, as the price is not actually available to the client (it is a dealer-only price), and so the buy-side has no reliable means of verifying it.

In addition, it would be far less common for a dealer to match the IDB price for a comparable trade size than for that dealer to match a client-dealer ECN price for a comparable trade size.

The ability to trade with a dealer and get Best Execution may have some influence in giving less sophisticated clients more confidence to trade in more illiquid, complex markets. However, Best Execution concerns are likely to be only a minor factor influencing their confidence, with instrument knowledge and suitability having much greater impact.

Meets FSA objectives

Market efficiency and investor protection

Market efficiency and investor protection considerations for an IDB benchmark model are likely to be very similar to the considerations for a client-dealer ECN model. However, a much wider range of products are quoted on IDBs compared to ECNs, and they therefore cover not only liquid instruments but also less liquid and more complex instruments. This will benefit retail and less informed clients as well as covering more sophisticated clients (where due to the lower asymmetry of information there will be less impact from the proposals).

Since IDB quotes are more hidden than client-dealer ECN quotes, however, revealing these IDB quotes could have a greater impact on narrowing information asymmetry for non-dealer professionals, some of whom may be able to exploit this information to reduce trading costs, avoid 'poor' or uncompetitive trades and improve market efficiency.

Costs and benefits

The costs and benefits of an IDB benchmark model are likely to be very similar to the costs and benefits of a client-dealer ECN model.

Acceptability to industry

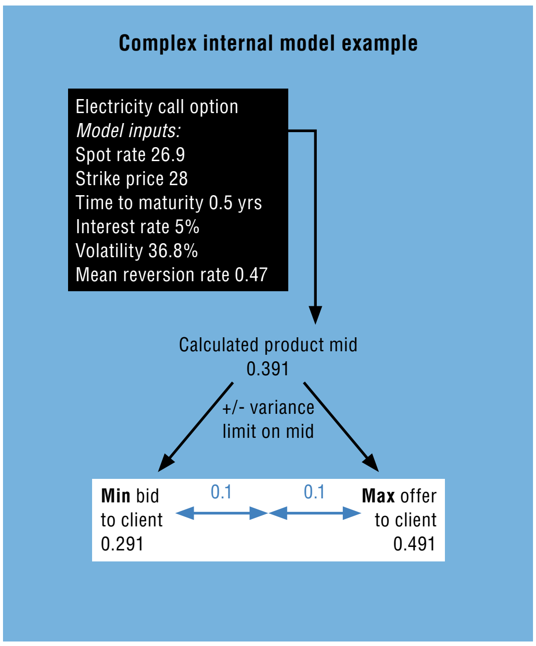
An IDB benchmark model is likely to be as acceptable to the industry as a client-dealer ECN benchmark model, except for one consideration. Firms may be reluctant to disclose IDB benchmark information as it is considered to be proprietary information, and represents a price that is only available to other dealers. Indeed, dealers may be prevented from disclosing IDB price information by IDB rules (and similarly, IDBs may be prevented from disclosing prices by their dealer community).

So the issue for the industry will be whether buy-side requirements for Best Execution in these markets will mean it is attractive enough for dealers to renegotiate IDB rules and share proprietary IDB information with clients, given the dealer spreads they will be able to earn. This may also be an area where external data vendors would be able to offer a service.

6.3 Internal model prices

The major benefit of an internal model benchmark price is that a reference price is available for any product. Firms have to establish an internal price in order to value their books, and as the reference point for pricing a trade. They could therefore offer Best Execution for products not quoted on IDBs (e.g. customised, structured, illiquid products) through disclosing to clients the structure and parameters of their internal price model. Indeed, an internal model price will always be taken into account by a dealer as one of the reference prices, irrespective of availability of other external price data.

This internal reference price could be created from a relatively simple model (e.g. for a bond, firms may be able to apply a yield spread to a comparable Government Bond) or complex model (e.g. a structured product containing a number of different instruments; a product whose price is calculated using a synthetic yield curve rather than a real product as a reference point etc.). Again, some of the parameters used in the model may be easily observable by market participants (e.g. the market yield for an investment-grade corporate bond over an equivalent maturity government gilt). Other parameters (e.g. market variability parameters used in some options pricing models) may be unobservable – they are the result of the firm's own calculations.



Potential disclosure at time of quote			
1	The electricity spot rate from an observable spot market (exchange)	26.9	Changing realtime
2	Strike price	28	Fixed
3	Time to maturity	0.5 years	Fixed
4	Interest rate	5%	Infrequently changing
5	Volatility	36.8%	Changing occasionally
6	Mean reversion rate	0.47	Estimated, but changes infrequently
7	Calculated mid price	0.391	Calculated (changing realtime)
8	The variance from the mid-price to the minimum bid price (and the resulting min bid)	0.10 0.291	Max variance from mid is fixed calculated price
9	The variance from the mid-price to the maximum offer (and the resulting max offer)	0.10 0.491	Max variance from mid is fixed calculated price
10	Actual offer	0.471	Less than max offer – incorporate dealers' other specific interpretation of market factors

Figure 15: Example of a complex internal model – an electricity call option

In illiquid markets where these prices will be most relevant:

- *Dealer firms currently have access to significantly more pricing information than their unsophisticated clients, and asymmetry of information is greater for these clients than in liquid markets*

but

- *Most market participants are sophisticated clients. For these market participants, there is limited information asymmetry, since these sophisticated clients generally have access to significant market information*
- *There is limited participation in these markets by less sophisticated clients, although there may be some participation by parties who could be very sophisticated participants in the markets for other instruments, but who have limited experience in a particular class of instruments. In addition, some smaller, less sophisticated fund managers may trade in the more complex derivative products because their mandates prevent them from investing in the underlying assets. For these clients, there can be significant information asymmetry.*

Best Execution

Two aspects affecting Best Execution for an internal model benchmark are the level of validation of the model and its inputs, and the size of the spreads applied to the resulting price.

Validation

Using an internal model price as the reference price where no external pricing information is available could still meet MiFID's "best possible result" requirement.

This is most likely to happen where the internal pricing model is based on market parameters which have integrity and can be easily observed by market participants and thus validated. This would ensure that the internal model price is unbiased and assist in demonstrating that all reasonable steps have been taken to the obtain the best price.

Therefore, an important aspect of the proposed internal model benchmark is that internal models should be validated both internally and externally.

- ***Internal*** *validation could involve both comparisons with mid-office valuations, and exception reports highlighting the frequency with which model inputs are amended. This should ensure that these inputs are unbiased, and are only altered when market conditions change to reflect market information.*
- ***External*** *validation could include either an independent external audit to test periodically that the pricing engine provides an unbiased market price, or disclosure to clients of the research underlying the choice of parameter values (for example, in research notes on* θ *values in option pricing models).*

These validation activities will be relatively straightforward for simple models. However, the ability to conduct the checks in a timely, efficient and practical manner decreases as the complexity of the models used increases. Where these checks cannot be conducted in an appropriate manner, it would not be possible for firms to demonstrate, and therefore claim, they are providing Best Execution.

Should Best Execution models be separated from pricing models?

This analysis assumes that the internal model used to derive the Best Execution price is the same internal pricing model used by dealers to derive the price available to the client. This obliges dealers to provide their own view on the market value of an instrument, and relate the price available to the client to this value, rather than decoupling the price available to the client from the Best Execution price.

However, under this policy, clients could be offered different estimates of market value (and therefore different Best Execution prices) by different dealers. This is completely valid. Some of the factors which could be different for different dealers include different views on risk, different proprietary valuation methods or even different views on the direction of the market (possibly based on flow information from this or related products). Where these internal views cannot be externally validated, there is greater uncertainty regarding the validity of the internal price and whether it represents a true market value.

One alternative approach is to use an internal 'Best Execution model' which only includes factors which can be externally validated. This model will be used to derive a mid-price. The actual bid or offer quoted to the client is likely to still be based off the firm's normal model, but the mid-price (and therefore the assumed spread the firm is making), could be based on the Best Execution model.

Spreads
There is the potential for very wide spreads to be applied to illiquid, customised or complex products, reflecting the higher risks the dealer takes in dealing on own account in these products. So it would be particularly important in providing Best Execution for these products for the bid/offer spread to be pre-determined and disclosed. If this is not the case, the disclosure of a 'market-mid' reference price based on internal model may not be useful because of the wideness of the spreads. However, if a client can obtain information on the pre-determined spread limits, they can "shop around", and help themselves to get a better deal. Clearly, the returns on this search activity will be greater, the greater the potential dealer spread.

Meets FSA objectives
Market efficiency
In illiquid markets, dealers currently have access to significantly more pricing information, and asymmetry of information is greater than in liquid markets, so any additional information should improve market efficiency. This effect could potentially be larger than for assets traded on ECNs, where the information asymmetry is less.

However, this effect will be limited by the nature of the clients dealing in these instruments. Many market participants are well-informed professional clients and eligible counterparties, and may have their own complex pricing models which they can use to challenge a dealer's price.

For those less sophisticated clients who are involved in these markets, there is likely to be some improvement in market efficiency, because these clients will receive more information (albeit potentially of a relatively complex nature). This will lessen the information asymmetry and may also improve clients' confidence to trade.

Two further issues regarding the impact on market efficiency of an internal pricing model benchmark are:

- *Wide variations in inputs, values and models leading to a wide variation in reference prices among dealers. As discussed earlier, this could be minimised by using parameter inputs which have integrity and can be externally verified rather than those which would be subject to unconstrained dealer choice, and potentially by disclosing the model used to the client*
  - *However, even when external verification is not possible, market efficiency could improve, provided there is consistency between clients in the way models are used (that it, the models are non-discriminatory)*
- *Spreads applied to the reference price could be very large, although, as we have discussed, competitive pressures should lead these spreads to become tighter.*

Investor protection

Because of the additional information available to clients, the level of investor protection should be improved under the suggested benchmark policy. However, as discussed above, there may be relatively few clients who trade in this market who would benefit from the increased investor protection.

There is of course a danger that, in the case where firms do not disclose their models nor demonstrate that they use verifiable external market inputs into their models, investor protection could decrease if clients placed unwarranted additional trust in the price they were being offered because of the additional information being provided, even though the method used to derive that price was no different to that given at present.

Costs and benefits

The cost of implementing internal model benchmarking would be minimal, since it largely reflects the current pricing activities of OTC market dealers.

Most costs would be the result of disclosure and compliance requirements. These would include the cost of validating internal models, the cost of adapting standard systems for reporting trades to clients, and the cost of storing additional information.

Should a market dealer decide to use separate models for calculating internal prices and Best Execution prices they use in the market, the costs could be significant, since this would involve duplicating some calculations and would risk increasing the time taken to update pricing information – a critical element for successful market dealing.

Acceptability to industry

The approach described above for an internal model benchmark policy is in line with current pricing approach used by investment firms acting as dealers.

OTC market dealers invest significant amounts of money in developing proprietary models for pricing instruments, and the accuracy and speed of these models can be a significant source of competitive advantage for firms. For this reason, dealers could be reluctant to adopt a business model involving disclosure of model formulae to their clients.

Instead, dealers may move to a ‘two model’ approach, where one proprietary model is used for internal pricing, and a simpler, more generic one is given to clients to demonstrate Best Execution. Dealers would then need to ensure that their spread limits were wide enough to incorporate potential deviations between the two models.

Issues over the disclosure of internal model formulae and parameters

A firm that is using an internal model will typically calculate a mid-price from that model. Therefore, they will be able to give their spread even where they are not prepared to deal both ways.

In addition to revealing their spread, there are two further elements a firm could disclose regarding its internal price model:

- **Assumptions** such as benchmark, risk premiums, yield spread, bid/offer spread etc. Even in a simple model these assumptions may change frequently, making disclosure, comparison and external verification more difficult. Moreover, in a complex model, the usefulness of this information to an unsophisticated client is questionable unless there is a directly-observable market analogue. So, for example, clients could observe market yield spreads, but not parameter inputs into options pricing models.
- **Model/Calculations** – Firms are moving away from simple pricing models as they try to gain a competitive edge, for example by using their own synthetic yield curves rather than standard benchmarks. This greatly complicates comparisons between competing models (e.g. synthetic curves) from different firms. In addition, these complex models represent proprietary information and firms may be unwilling to reveal them for fear that competitors would exploit weaknesses in the pricing mechanism.

6.4 Summary

Our overall summary is that a benchmark model may be a feasible and attractive way of providing Best Execution in dealer markets and should improve access to pricing information for some clients (particularly less sophisticated investors such as small fund managers and retail clients) for some trades. As we noted in the introduction, the impact (and corresponding benefit) will be the least for sophisticated clients trading liquid instruments, where market efficiency is already high.

However, it seems reasonable to say that a tightly-defined benchmark model, as specified here, would allow investment firms to show that they had taken “all reasonable steps” to provide the best possible result within the context of MiFID requirements, on a basis excluding dealers’ spread.

Improved access to pricing information should reduce the number of ‘poor’ or uncompetitive trades, and improve confidence to trade, which would both improve market efficiency and investor protection against poor execution.

In terms of where the greatest impact will lie, it seems clear therefore that the benefits will be greatest where:

- *There is a high proportion of 'uninformed' investors (e.g. smaller fund managers, less experienced corporates)*
- *There is significant inequality of access to pricing information.*

From Figure 16 on page 56, it would seem that the costs are greatest for those assets where the reference price needs to be based on a complex internal model, and least for assets where reference prices can be derived from ECNs; and monitoring and compliance functions will incur the most significant additional costs.

The greatest net benefit should therefore occur for OTC trades in assets such as corporate bonds, 'vanilla' commodity derivatives, and interest rate swaps and options where the reference price is likely to be based on a simple internal model. These markets will have some uninformed and partially informed investors, some with significant inequality of access to information, while the costs of using a benchmark model are expected to be less than for assets (such as customised derivatives) where the reference price is based on a more complex model.

Conversely, the least net benefit may occur for the instruments priced using complex models, as, while there is likely to be significant inequality of access to information, there could be few uninformed investors. Moreover, the costs appear to be the highest of the different categories examined.

Assets priced from ECNs (for example, foreign exchange derivatives) or from IDBs ('vanilla' interest rate derivatives) lie in between, with:

- *Some uninformed investors*

but

- *Less inequality of access to information than for more illiquid products*

and

- *Lower costs, particularly for assets where ECNs are used for reference pricing.*

This ranking broadly corresponds with a ranking based on the 'transparency' of the relevant benchmark – i.e. how easy it is for a client to verify or for regulators to be confident that it is likely to provide the best possible result. Using complex internal models will certainly provide the least transparent benchmarks, and those based on client-dealer ECNs the most transparent, with IDB prices and simple internal models being in between.

These benefits will, however, impose additional costs on dealers, and potentially on the buy-side as well. These dealer costs are summarised in Figure 16. Overall, the pattern shows the largest cost impact where internal complex models are used.

As discussed earlier in this section, this diagram assumes that firms will not have to store quote information. If firms do have to store quotes, the relative costs will increase for the more liquid, more frequently quoted products at the top of the diagram.

In current economic conditions, we believe these changes should be acceptable to the industry. Views of market participants will be particularly relevant on proposals which depend on disclosure of proprietary IDB information and internal models, and the implementation timetable (as this timetable could have a significant impact on implementation costs).

Key

S&M – Sales/Marketing
Client coverage – additional information must be communicated to clients in pre-trade marketing and at a time of trade/price enquiry. This will include the publication of Best Execution commitments and benchmark data for all instruments or instrument categories.

TP – Trading processes
Pricing systems will need to be upgraded to accommodate the benchmark models and relevant Best Execution prices. This will also require additional resource in ensuring compliance at time of trade. Additional data will need to be captured for client contract confirmation. Benchmark models will require regular review.

M&C – Monitoring and Compliance
The monitoring of compliance with Best Execution will require additional resource aligned with Trade Control and Valuation Groups. This will require new process and systems relating to requirements for data storage, trade review policy review.

Colour key:

Green	Minor impact
Amber	Medium impact
Red	Marked impact
Black	Does not apply

Relative costs

	ECN/IDB	Simple model	Complex model
Government bonds	S&M (Green)	S&M (Black)	S&M (Black)
	TP (Amber)	TP (Black)	TP (Black)
	M&C (Green)	M&C (Black)	M&C (Black)
Liquid inv grade bonds	S&M (Green)	S&M (Amber)	S&M (Black)
	TP (Green)	TP (Green)	TP (Black)
	M&C (Amber)	M&C (Amber)	M&C (Black)
High yield/emerging mkt/ low liquidity bonds	S&M (Black)	S&M (Amber)	S&M (Amber)
	TP (Black)	TP (Amber)	TP (Amber)
	M&C (Black)	M&C (Amber)	M&C (Red)
Int rate derivatives	S&M (Green)	S&M (Green)	S&M (Amber)
	TP (Green)	TP (Green)	TP (Amber)
	M&C (Red)	M&C (Red)	M&C (Red)
Credit derivatives	S&M (Green)	S&M (Green)	S&M (Green)
	TP (Green)	TP (Amber)	TP (Red)
	M&C (Amber)	M&C (Red)	M&C (Red)
FX derivatives	S&M (Green)	S&M (Green)	S&M (Green)
	TP (Green)	TP (Amber)	TP (Amber)
	M&C (Amber)	M&C (Red)	M&C (Red)
Equity linked derivatives	S&M (Green)	S&M (Green)	S&M (Green)
	TP (Amber)	TP (Amber)	TP (Amber)
	M&C (Amber)	M&C (Red)	M&C (Red)
Commodity derivatives	S&M (Green)	S&M (Green)	S&M (Green)
	TP (Amber)	TP (Amber)	TP (Amber)
	M&C (Amber)	M&C (Red)	M&C (Red)
Structured products	S&M (Black)	S&M (Amber)	S&M (Red)
	TP (Black)	TP (Amber)	TP (Red)
	M&C (Black)	M&C (Red)	M&C (Red)

Figure 16: Relative cost estimates for dealers implementing the proposed benchmark model

7 Outstanding questions

The work described in this document has been arrived at without discussion with investment firms. As such, there are preliminary conclusions in our work that need to be validated and questions that remain unanswered. Some of these concern regulatory policy and interpretation of MiFID. In this section, we set these out, as they identify key issues which further work could usefully address.

Outstanding questions and matters to be validated by investment firms:

- *Which firms would seek to exempt themselves from the requirements of Best Execution under MiFID, and for which lines of business?*
- *What would be the cost of implementing such an approach to Best Execution in the OTC markets (one-off and ongoing)?*
- *What would be the impact on an investment manager of a sell-side firm examining whether or not to provide Best Execution to that firm?*
- *Would ECN operators, and the investment firms using them, permit IDB prices to be used as an external benchmark?*
- *How closely are the benchmark proposals aligned to work already being undertaken by investment firms?*
- *To what extent is it feasible for investment firms to disclose their pricing models, and the inputs to such a model, to clients?*

Matters relating to regulatory policy and interpretation of MiFID:

- *Should benchmarking of OTC trades exclude dealer spreads as recommended here?*
- *How would the FSA encourage tight limits to be set around external pricing benchmarks, or should this be left to competitive markets?*
- *Does the MiFID framework (Level 1 and 2) permit the FSA to conclude that Best Execution cannot be provided in certain markets (i.e. where prices cannot be externally validated)?*
- *What data would need to be retained in order for the firm to prove compliance with its Best Execution policy?*

Matters relating to how the market might evolve:

- *There are also outstanding questions regarding how investment firms will develop the required benchmark models, particularly insofar as establishing reference prices for a multiplicity of different instruments is concerned. There are clearly economies of scale here, indicating that either a market solution or a cooperative industry solution would be more efficient, in terms of cost, than the development of reference pricing techniques on a firm by firm basis.*
- *A market solution could develop if one of the major information providers (such as Reuters or Bloomberg) saw a market opportunity here which they wished to exploit.*
- *A cooperative solution could occur if a group of investment firms joined together, possibly under the aegis of one or more trade associations, to develop reference pricing techniques. The FSA might wish to be represented at such a forum. Competition policy issues would also need to be considered: the intention would be for investment firms to cooperate in developing reference pricing techniques, but to compete on the dealer spreads they offered.*

Appendix A – Assumptions underlying venue size data

The data used to estimate the likely applicability of each benchmark in the bond market is ICMA TRAX data from a typical day in 2005 taken from an FSA discussion[22] paper along with the following assumptions:

- *ICMA TRAX data represents European bond trades, so the applicability of each benchmark can only be estimated for the European bond market*
- *Bond issues which have a higher volume of trade are more likely to be traded on an ECN:*
  - *Issues that trade more than 10-49 times daily are likely to be traded on a client-multidealer ECN, so a client-dealer ECN benchmark could be created for this proportion of OTC trades*
    - *For the issues falling in the 10-49 trades daily band, assume that one third is likely to be traded on a client-multidealer ECN*
  - *Issues that trade more than twice daily are likely to be traded on an IDB, so an IDB benchmark could be created for this proportion of OTC trades*
  - *Issues that only trade once daily are unlikely to be traded on an IDB/ECN, and the benchmark would have to be created using an internal model*
- *650 bond issues are likely to have price quotes available on a client-dealer ECN (data taken from MTS Web site)*
- *9,400 bond issues have daily prices reported to ICMA. Of these:*
  - *650 bond issues are likely to have price quotes available on a client-dealer ECN (data taken from MTS Web site)*
  - *Approximately 1,300 bond issues may have one or more ICMA reporting dealer, but are unlikely to be liquid enough to trade on IDBs*
  - *The remaining 7,450 bond issues are likely to be traded on an IDB, although an indicative price may not be available on the IDB all of the time.*
- *There are 111,000 outstanding bond issues on the ICMA CUPID database, according to their Web site.*

[22] *FSA discussion paper 05/5 Trading transparency in the UK secondary bond market (September 2005), p15-21.*

This is based on summaries of the data available from ICMA databases. Access to the raw data would allow a more robust analysis.

This is reflected in Figure 17 below, where the blue-shaded cells represent the information available in the FSA discussion paper, while the rest of the data represent calculations based on the assumptions above.

# of trades per issue per day	Mid point	# of issues traded	# of trades per day
400+	400	1	400
300-399	320	2	640
200-299	220	3	660
100-199	120	7	840
50-99	59	25	1,475
10-49	20	434	8,680
4-9	5.5	1,197	6,584
2-3	2	1,713	3,426
1	1	1,981	1,981
Total		**5,363**	**24,686**

	# of issues traded	# of trades per day	# of issues available
ECNs	183	6,908	650
IDBs	3,199	15,796	7,450
Internal	1,981	1,981	101,900
Total	**5,363**	**24,686**	**110,000**

	# of issues traded	# of trades	# of issues available
ECNs	3%	28%	1%
IDBs	60%	64%	7%
Internal	37%	8%	93%
Total	**100%**	**100%**	**100%**

Figure 17

Appendix B – Systems thinking analysis of market dynamics

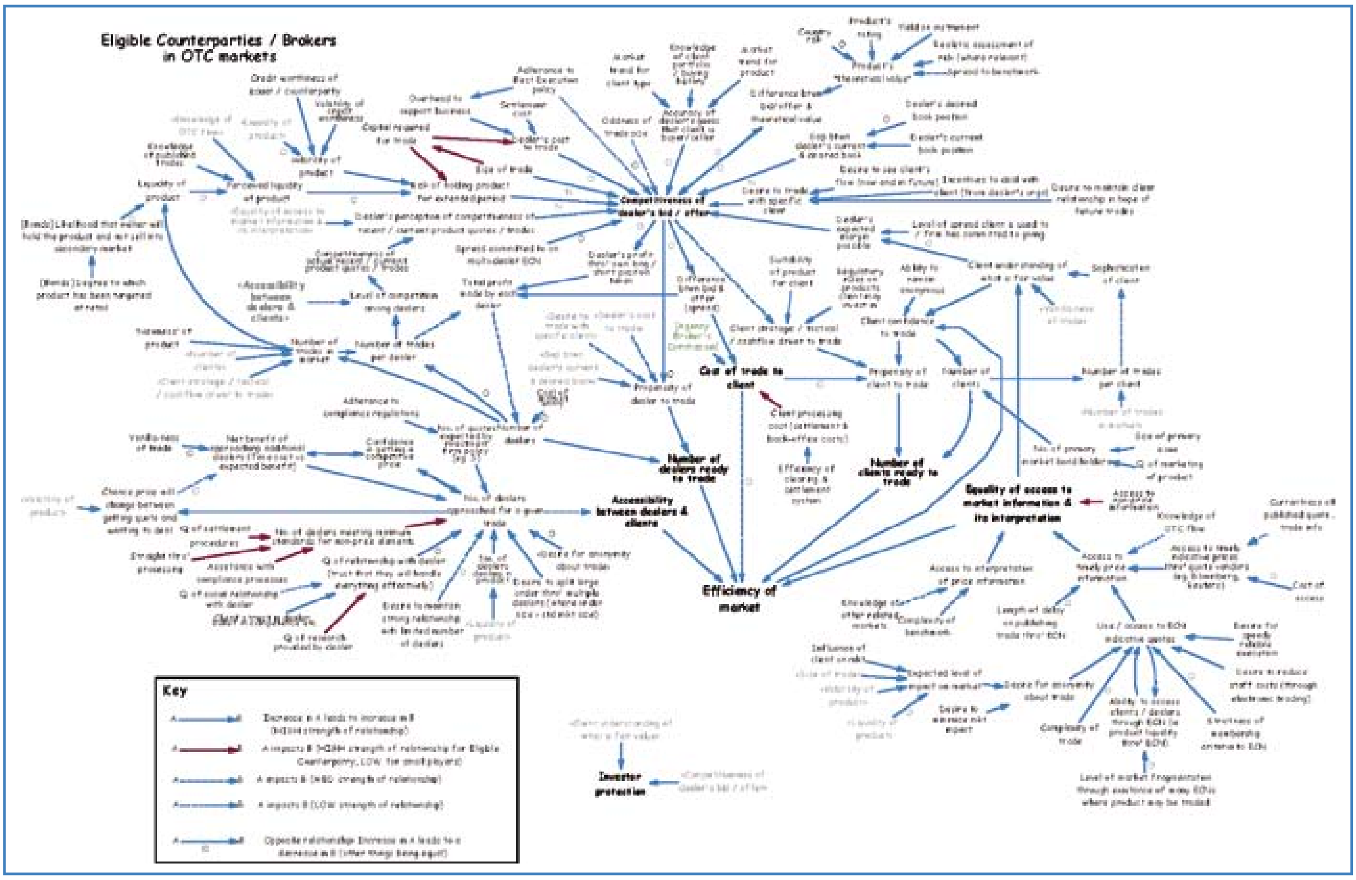


Figure 18

The systems thinking map provides a deep understanding of cause and effect within the OTC markets. It provides an essential tool for analysing how the behaviours of different market participants may change upon introduction of different benchmark models.

The map has been structured to be generic across any OTC product. However, the values of the variables (e.g. high or low liquidity) and the strength of the relationships between variables will vary by different OTC product and market player.

The map uses the following language:

- *All relationships are positive unless market with an 'O' (opposite/negative relationship)*
- *Relationship market 'N' is 'non-linear' – it could be positive or negative depending on the situation*
- *<Variables in triangular brackets> are 'shadow variables' and are copies of the variable used elsewhere on the diagram. They are used to avoid too many crossing over arrows.*

The diagram should be read from bottom up, focusing on the outcomes and following them up to understand the drivers of those outcomes.

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