Independent Reference

Prices Review

Valuing gilts – the way ahead

Final Report of the Independent Reference Prices Review

October 2016

1. Introduction and overview

1.1 Background

1. The stock of gilts in nominal terms is around £1,400 billion, roughly 75% of UK GDP. Gilts make up a significant proportion of the assets of many large institutions. UK pension funds and many insurance companies own very substantial quantities of gilts; because of this, many millions of UK households own, indirectly, significant amounts of gilts. How gilts are valued matters.

2. The UK gilt market is an over-the-counter ('OTC') market. New issues of gilts are allocated by regular operations run by the UK Debt Management Office ('DMO'). Participation in this primary market is restricted to the 19 Gilt-edged Market Makers[1] ('GEMMs') who are recognised by the DMO and have to meet certain requirements set out in the DMO's guidebook.[2] Treasury bills are allocated to Treasury Bill Primary Participants[3] via weekly auction each Friday.

3. The GEMMs deal in gilts with investors through voice and through electronic 'dealer-client' platforms of which Bloomberg and Tradeweb have the largest market share. The DMO encourages GEMMs to stream continuous two-sided quotes (i.e., a quote to buy and a quote to sell) to these client facing platforms.

4. The GEMMs also deal with one another through the interdealer brokers ('IDBs'), in particular through the six IDBs endorsed by the DMO. There is no obligation for GEMMs to make markets to other GEMMs and consequently GEMMs do not continuously stream quotes to IDB platforms. Furthermore, where quotes are sent to such a platform, these may be only one-sided.

5. The DMO currently publishes end-of-day reference prices for gilts and Treasury bills on behalf of the Gilt-edged Market Makers Association ('GEMMA') and CREST, respectively. The prices cover:

- all outstanding gilts in issue;
- gilt strips; and
- Treasury bills.

6. The end-of-day gilt prices are known as the GEMMA reference prices and are calculated using pricing information submitted directly to the DMO each business day from the GEMMs. Submitting these prices to the DMO is a mandatory condition of being a GEMM.

7. The DMO also provides streamed intra-day prices for gilts which are provided on the DMO's Bloomberg and Reuters pages between 8:00am and 4:00pm.

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[1] A list of the GEMMs can be found on the DMO website, http://www.dmo.gov.uk/index.aspx?page=Gilts/Gemms_idb
[2] GEMM Guidebook: A guide to the roles of the DMO and Primary Dealers in the UK government bond market, http://www.dmo.gov.uk/documentview.aspx?docname=publications/operationalrules/guidebook160316.pdf&page=operational_rules/Document
[3] A list of the Treasury Bill Primary Participants can be found on the DMO website, http://www.dmo.gov.uk/index.aspx?page=tbills/tbills_participants

8. There are a variety of uses of the end-of-day and intra-day prices currently provided by the DMO and there is a wide group of users both within and outside of the financial sector. The end-of-day prices are used:

- for fair value accounting, including valuing portfolios;
- in the valuation of collateral (including by market infrastructure providers);
- as a reference in derivative contracts for the calculation of payments;
- in index construction, for published and custom indices;
- in benchmarking and performance measurement in fund management; and
- in transition management and portfolio rebalancing.

9. Non-financial firms and many individuals – including retail investors, tax authorities and solicitors – also use gilt prices; they are, for example, used in the valuation of holdings (e.g. for probate), as well as for research purposes (e.g. by academics).

10. The current methodologies for the reference prices are described in Annex A.

11. On 21 January 2015, the DMO announced that it intended to withdraw in due course from the provision of these prices.[4] The DMO recognised that there were benefits to the market from the provision of end-of-day reference prices, but noted several factors that might create costs in its continuing price provision, including:

- changing regulatory requirements which could lead to additional costs and obligations on the DMO to comply with new standards;
- the potential for a perceived conflict of interest in the DMO acting as the administrator of the reference prices whilst issuing bonds and setting obligations for the GEMMs; and
- that in providing free prices to the market, the DMO may have constrained commercial price providers from developing alternatives to the reference prices provided by the DMO.

12. Following the announcement, the DMO engaged with the market to consider how a transition to a new arrangement for price provision could best be achieved. The findings of this exercise, which were reported in two update papers available on the DMO website,[5] were that:

- the UK gilt market had grown around a single accepted reference price and that there were advantages in having a single successor arrangement to the reference prices provided by the DMO;
- methodologies based on submissions from GEMMs (or other market participants) may not be sustainable and it was observed that there was a general direction of travel by other benchmarks away from submissions-based methodologies. Other approaches, including those based on taking prices streamed to trading venues, were suggested as potentially more feasible;

[4] DMO Press notice, 21 January 2015. http://www.dmo.gov.uk/docs/gilts/press/pr210115.pdf

[5] 'Interim update', 12 March 2015 and 'Feedback on stakeholder engagement', 29 May 2015. http://www.dmo.gov.uk/index.aspx?page=PriceProvision/Information

- there was an expectation that the reference prices would be provided in a manner consistent with IOSCO's[6] Principles for Financial Market Benchmarks and that they would eventually be treated as a regulated benchmark; and
- while it was acknowledged that the prices would probably not remain available free of charge, it remained important to maintain access to the reference prices for wider public use (e.g., by academics and individual retail investors). It was suggested that the prices could be made freely available after a delay.

13. In July 2015 it was announced that there would be an independent review (the 'Review') into the successor arrangements for the reference prices provided by the DMO. Professor David Miles CBE was appointed as the Head of the Review in January 2016.[7] The Review was asked to:

- establish a process to identify and implement successor arrangements for the end-of-day reference prices;
- help facilitate the selection and transition to the successor arrangements;
- provide advice on whether successor arrangements are required for intra-day prices; and
- ensure that the Review is brought to a successful conclusion while managing costs, risks and business issues.

14. From discussions with stakeholders, the Review noted at the outset that it was possible that if the DMO simply ceased producing reference prices then a single alternative source might emerge. However, whether or not that were to happen, it was likely that without some coordination there would be a period of uncertainty and disruption. The Review has seen its role as helping to guide the transition to successor arrangements, in the light of the views of all stakeholders, so as to reduce any disruption.

1.2 Process taken by the Review

15. The Review began meeting stakeholders in March 2016. Meetings were held with representatives of the primary dealers – the GEMMs; institutional investors; other end-users such as FTSE and CREST; and trade associations including the Investment Association and the Wholesale Markets Brokers' Association. The Review also met with several firms who had expressed an interest in providing successor arrangements.

16. In May 2016, the Review published a consultation document so that all interested parties could give their views on successor arrangements to the DMO's provision of end-of-day and intra-day reference prices. The consultation covered the following topics:

- uses and features of the reference prices and whether successor arrangements are necessary;
- input data and methodology;
- competition and access to the reference prices;
- industry standards (in particular IOSCO's Principles for Financial Market Benchmarks); and
- managing the transition to successor arrangements.

[6] IOSCO is the International Organization of Securities Commissions.
[7] David Miles was supported in his role by David Mendes da Costa on secondment from the Financial Conduct Authority.

17. The Review received 28 responses to the consultation from a wide variety of stakeholders including GEMMs, end-users, index providers, individual retail investors, academics and the official sector. A summary of the responses to the consultation can be found in Annex B.

18. Following an analysis of the information received from the consultation, as well as from the extensive stakeholder engagement conducted by the Review, a Request for Proposals was published on 5 July 2016.[8] This invited potential providers to submit proposals explaining their approach providing gilt reference prices and administering that process. It set out what the Review would be considering in the light of the feedback from stakeholders. The proposals were asked to describe:

- **Firm information** – structure of the firm (including wider group structure); activities of the firm and its standing in the market; staff involved with the provision of the reference prices

- **Business model** – planned revenue model; how users will be able to access the reference prices (and on what terms); use of third parties

- **Input data –** what input data will be used; where the data will be sourced from; data sufficiency; operational, market or conduct risks associated with the choice of input data

- **Methodology** – design of the methodology including how it is robust and sustainable; details of contingency plans; back testing and comparison with current prices provided by the DMO

- **Systems and resources –** resources required to provide the rates and how long these will take to implement by the administrator; business continuity plans; cyber security

- **Governance, oversight and accountability –** identification of conflicts of interest and how these will be managed; oversight of provision of the reference prices including of any third party firms involved; governance of the provision of the reference prices

- **Industry standards** – whether the reference prices will be provided in a manner consistent with IOSCO's Principles for Financial Market Benchmarks; plans and timelines for the implementation of these principles

19. The Review received six proposals by the 5 August 2016 deadline. The potential providers were invited to give detailed presentations to the Review team.

20. The proposals generally fell into one of two groups, depending on the type of input data they planned to use. The first group planned to derive prices primarily from data taken from IDBs; the second group relied on data from platforms used by end-investors, or directly from GEMMs. Within the second group, some proposals relied primarily on data available

[8] 'Request for Proposals (document)', 5 July 2016. http://www.dmo.gov.uk/index.aspx?page=PriceProvision/Information

from ‘dealer-client’ platforms, while some required the GEMMs to submit data directly for calculating the reference prices.

21. The Review held two large roundtable meetings on 24 and 25 August 2016 with GEMMA (including representatives from most of the GEMMs) and with major end-users of the reference prices. These meetings allowed the Review to discuss and gather feedback on some of the broad differences between the proposals, as well as on technical issues around implementation and the transition. The participants in the roundtables were not told the identities of the potential providers, nor did they see individual proposals.

1.3 Overall conclusion of the Review

22. Taking account of all the information and views shared with the Review during the course of its investigations, the Review has concluded that the joint proposal for provision of gilt and Treasury bill reference prices from **FTSE Russell** and **Tradeweb** is the strongest and that its successful implementation is likely to provide reliable prices.

23. This conclusion reflects the Review’s assessment of the type of arrangements for provision of reference prices that are likely to be reliable and sustainable. We outline this assessment in the next section.

2. Findings of the Review: Successor arrangements

24. This section summarises the Review's conclusions on the type of successor arrangements to DMO price provision that are likely to be reliable and sustainable.

2.1 Single vs multiple providers, competition and access

25. The UK sovereign debt market has come to rely on there being a single accepted set of reference prices. The Review heard from many stakeholders who said that this created significant efficiencies within the market. In particular, having a single accepted set of reference prices reduced the risk of disputes around valuations and payments on contracts such as Total Return Swaps ('TRS').

26. These comments echoed those reported by the DMO in their stakeholder feedback statement in May 2015, which also noted that the structure of the UK repo market (where Delivery by Value is more common than tri-party repo) relies significantly on having a common source of prices.

27. In early discussions with end-users of the reference prices, a common view was that if the DMO had decided to cease providing prices, and multiple providers had looked to fill the gap, then over time the market would gravitate towards one of these. It was noted, however, that this process would create a risk of disruption in the market.

28. The Review sees one of its main roles as helping the market avoid this disruption. To this end, the Review concluded that it would be preferable to recommend a single provider of successor arrangements.

29. A potential risk with having a single set of reference prices used by the majority of the market is that of risk of creating a monopoly for the provider. It has been noted in other markets that there is a 'winner takes all' dynamic to benchmarks which can lead to one set of rates or prices coming to be the most widely used. In itself this is no bad thing but it could give the provider significant market power.

30. In the light of such risks, the Financial Conduct Authority published a statement in February 2016[9] setting out that it would create a rule requiring the administrators of the UK's eight regulated benchmarks to supply access to those indices on a fair, reasonable and non-discriminatory ('FRAND') basis. FRAND requirements are also featured in EU legislation, in particular MiFIR[10] and the recently adopted Benchmarks Regulation[11].

31. The Review consulted on whether it would be appropriate for licencing and access to the successor arrangements to be on a FRAND basis and concluded (in part because of the direction of benchmark regulations) that this would be a desirable.

[9] https://www.fca.org.uk/news/ps16-04-access-to-regulated-benchmarks
[10] Article 37(1), http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014R0600
[11] Article 22, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R1011

32. End-of-day reference prices are used by a variety of non-financial professionals, academics and individual retail investors. Many of these users may not be in a position to pay for access to the prices. For other important benchmarks, indices are freely available after a delay. The Review thinks that such an approach would be suitable for gilt reference prices, a view which was echoed by the responses to the consultation paper.

2.2 Input data and methodology

33. In evaluating the methodologies proposed, the Review was mindful of the transition process; in particular the view of many of the respondents to the consultation that transition would be more complex if there were significant differences between the methodologies used to produce the current reference prices and the successor arrangements. The Review favoured methodologies which were clear and transparent. There were great advantages in having reference prices which reflected prices that GEMMs were willing to trade at.

34. The Review maintained an open mind as to what precise types of input data should be used to construct reference prices. In the proposals received, the following were suggested as the primary sources of input data:

- Direct submissions from GEMMs and/or IDBs
- Executable quotes taken from IDB platforms
- Quotes taken from dealer-client platforms

35. The Review considered the merits of different sources of input data and the findings are described below.

2.2.1 Transactions data

36. The Review considered the feasibility of using transactions data (i.e., data derived from actual trades) to construct reference prices. Many respondents to the Review noted that some gilts do not trade on a given day. Even for gilts that trade every day, there might not be any transactions close to 4:15pm. Therefore basing the reference prices on transactions prices would likely require a methodology which evaluated prices over a relatively long period (e.g., the whole day) and could often involve interpolation or using other sources of input data for a large number of gilts for which trade data would be insufficient.

37. This would represent a significant shift from the present approach. Most market participants would prefer to avoid the use of interpolation and wanted prices that reflected the state of the market at around 4:15pm (see Annex B). It was also unclear where trade data would come from; there is no post-trade transparency in the gilt market at present. Some proposals did suggest that the GEMMs could submit this data directly. The findings of the Review on this point are discussed below.

2.2.2 Submissions

38. At present, the DMO calculates end-of-day gilt reference prices based on submissions from each of the GEMMs for each of the gilts in which they make markets. The GEMMs are mandated to make these submissions as a requirement of being primary dealers in gilts, although the DMO does not set down any requirements or guidelines as to how the submissions should be made (other than the format and timing of the submissions).

39. From the outset, the Review has been aware that if a firm is seen as a submitter to a benchmark that raises legal and reputational risks for it. Several GEMMs and IDBs made it plain during the course of the Review that they would not be comfortable contributing input data to a new administrator if it was possible that this would be a regulated activity.

40. The Review notes that there is uncertainty surrounding whether firms would in fact be regulated as submitters under the EU Benchmarks Regulation if they contribute input data. This is, however, an area where it appears that firms are risk averse and the Review sees this uncertainly as a significant downside to any submission-based methodology.

41. There is a risk with a submission based methodology that it could become difficult to create a representative panel of submitters. This is not to say that such a methodology could not be implemented; rather that, all things being equal, a methodology which did not rely on submissions (for instance one which relied on taking prices or quotes from a trading venue) would be preferable.

<u>2.2.3 Quotes taken from platforms</u>

42. Information available on IDB platforms differs from that available on dealer-client platforms. With dealer-client platforms, GEMMs continuously stream live quotes both to buy and sell individual gilts for each issue in which they make markets. The GEMMs consider this to be part of their obligations as market makers. The quotes are not visible to all users of the platforms, rather clients are tiered according to their relationship with each GEMM and the spreads of the quotes, as well as whether they are indicative or executable, will change according to the tier.

43. In contrast to dealer-client platforms, the quotes available on IDB platforms tend not to be for individual securities but are instead for trades in the differences in spreads between gilts. GEMMs do not stream quotes continuously and where there are quotes these are often one-sided (either to buy, or sell, rather than both). According to several respondents to the Review, including a number of IDBs themselves, different brokers will specialise in different types of gilts and as a result, for IDBs to price all gilts would likely require the use of interpolation or estimated yield curves.

44. In discussions with GEMMs and end-users of the reference prices there was a clear preference towards taking quotes from dealer-client platforms over IDB platforms. There was some scepticism that IDBs would have sufficient data to create a full set of prices without frequent use of interpolation; many respondents to the consultation were wary of interpolation and preferred to see securities being prices individually to capture the idiosyncrasies of each gilt. The fact that GEMMs all stream two-sided quotes to dealer-client platforms was seen as an advantage to their being a source of input data.

45. There was a general view expressed, and echoed in the final roundtable meetings held by the Review, that the main users of the reference prices are market participants who do not have access to the interdealer markets. So basing reference prices on information derived from IDB platforms would result in a lack of transparency to the main users of the reference prices making it difficult for these end-users to replicate or hedge against the reference price. In a situation where the prices formed in the interdealer markets differed from those formed in the dealer-client markets, the Review was of the opinion that it was the latter prices which were most relevant to the end-users of the reference prices.

46. The Review, on the basis of comments from a variety of stakeholders, felt that methodologies built around taking quotes from dealer-client platforms represented greater consistency with the present approach and therefore would aid with the transition.

47. The Review has concluded that there are clear advantages to methodologies which take quoted prices from dealer-client platforms over those which are based on quotes or transactions from IDB platforms.

48. Both GEMMs and end-users also stated that they were comfortable with the idea that the data might only come from a single dealer-client platform. This was because the prices streamed to the various platforms tended not to differ significantly, although some highlighted operational risks associated with such an approach.

<u>2.2.4 Treasury bills and gilt strips</u>

49. Markets in Treasury bills and gilt strips are relatively illiquid and therefore it is reasonable that a different approach to that taken for gilts would be necessary for the construction of reference prices for these instruments.

50. For gilt strips, the Review did not see any problem with continuing the current practice of deriving the prices from an estimated (and theory-based) model of the zero-coupon gilt yield curve, taking the end-of-day gilt reference prices for conventional gilts as an input. In the final roundtable with the GEMMs, several participants thought that there might be some improvements made to the model currently used by the DMO and thought it would be useful to work with the new provider to help improve the model. The Review would encourage the new administrator of end-of-day gilt reference prices to take up this offer and then to review the model over time.

51. There is not a very active secondary market in Treasury bills; many participants purchase them on a buy-and-hold basis. The use of these prices was also seen to be fairly limited, with Euroclear UK & Ireland (the operator of CREST) being the main user. As a result, in considering the successor arrangements for the end-of-day Treasury bill reference prices, the Review focused more on looking for a ‘safe pair of hands’ with the necessary technical expertise and, critically, governance and oversight arrangements in place to ensure that a suitable methodology could be proposed and adapted over time where necessary.

52. For ease of transition, the Review concluded that the end-of-day gilt, gilt strip and Treasury bill reference prices should ideally be provided by the same administrator.

2.3 Intra-day gilt prices

53. The Review was asked to consider whether there was a need for successor arrangements to the intra-day gilt prices provided by the DMO. This question was included in the consultation and the response was that while such prices would be a positive feature of successor arrangements they were by no means necessary as there are available alternatives.

54. In the light of this, the Review did not feel that providers of end-of-day gilt reference prices had to publish intra-day gilt prices or that the DMO needs to ensure a specific successor arrangement before ceasing its publication of intra-day prices.

2.4 Industry standards

55. A consistent view expressed in meetings with stakeholders has been the need for the successor arrangements to be provided by a credible administrator, particularly given changing regulatory requirements.

56. The Review has been mindful of the EU Benchmarks Regulation which will take effect, for EU Member States, from 1 January 2018. In particular, administrators will require authorisation or registration from the Financial Conduct Authority. In light of this, and noting that the European legislation does not yet apply, the Review took into account how the potential providers had approached implementing IOSCO Principles for Financial Market Benchmarks.

3. FTSE-Tradeweb proposal

57. On the basis of the analysis discussed above, the Review found that the joint proposal from **FTSE Russell** and **Tradeweb** was the strongest and that its successful implementation is likely to provide reliable prices.

58. Under the proposal, FTSE Russell will operate as the administrator of the reference prices taking overall responsibility for their provision. Tradeweb will operate as the calculation agent. The main input data will come from the Tradeweb (Client to Dealer) Gilt trading platform. This will be reviewed over time and it is possible that, as the market evolves, other sources of data could be used.

59. As the administrator of the successor arrangements, FTSE Russell will be responsible for the governance arrangements. The Review noted that the firm already administers many benchmarks and has published a detailed and independently audited statement of compliance with the IOSCO Principles. As part of the proposal, FTSE Russell and Tradeweb will produce end-of-day gilt, gilt strip and Treasury bill reference prices in a manner consistent with IOSCO's Principles. The current FTSE EMEA Bond Indices Advisory Committee (which includes the DMO as an observer) will function as the oversight committee for the reference prices and both the current Terms of Reference and membership of the committee will be reviewed to ensure that the committee has the required expertise to carry out its functions.

60. As part of the final roundtable meetings, the Review considered the question of whether basing prices on information obtained from a single platform would be problematic. The feedback from those present was that this did not pose any obvious problems since quoted prices are generally consistent between trading venues. Relying on a single platform does present increased operational risks. In their proposal both FTSE Russell and Tradeweb described the business continuity and disaster recovery plans they have in place.

61. Under the proposal, the input data for the end-of-day gilt reference prices will be executable quotes which GEMMs stream to the Tradeweb platform. These are two-sided quotes at which users of the platform can transact with an individual GEMM (and without needing to send a further request to the GEMM). The use of executable quotes as the primary source of input data was widely supported in the responses to the Review's consultation.

62. While a positive feature of such quotes is that they are live and can be executed, the Review is aware that the vast majority of transactions on the Tradeweb platform do not occur this way but are instead arranged via a Request for Quotes (RfQ) process. Under the RfQ process, clients request quotes directly from GEMMs in the light of the immediately executable quotes that they can see. These quotes typically improve upon the executable quotes. Nonetheless, the executable quotes serve to show where GEMMs are willing to trade and therefore provide information to the client which helps them assess the quality of quotes obtained through the RfQ process. As such, executable quotes can be seen as a good basis for *reference* prices.

63. Reference prices are mid-prices (the average of bid and asks). Quotes obtained from the RfQ process, while generally being inside the bid-ask spread of executable quotes, may still imply similar mid-prices. That would obviously be true if the degree to which price was improved on the bid side was very similar to the improvement on the ask side. This was

discussed at the final roundtables and there was general agreement that it was a reasonable assumption. Data received from Tradeweb comparing GEMM quotes streamed to their platform with prices at which gilts were transacted after request for quotes were consistent with this.

64. The planned methodology for providing end-of-day gilt prices is to collect executable quotes at random intervals over a two minute collection window around 4:15pm. After removing outliers, and randomly removing some of the quotes, the average is taken of the remaining mid-prices to give the end-of-day reference price. This approach is followed for each issue so that every gilt is priced individually.

65. Under this proposal it is very clear how the reference prices are constructed. There is no interpolation or reliance upon complex, proprietary models which could make it hard for users to fully understand the process by which reference prices are constructed.

66. A close variant of the above methodology, taking a snapshot at 4:15pm rather than using a collection window, has been trialled by Tradeweb since May 2015. The prices produced are very close to those produced by the DMO with the largest variations being at the long end of the yield curve (although these variations remain small).

67. Tradeweb and FTSE Russell recognise in their proposal that changes in the market might occur that could lead to the input data becoming less representative. Any such changes will be monitored by the oversight committee. The terms of the arrangement between Tradeweb and FTSE Russell sets out that alternative data sources would be sought if future changes to market structure were to lead to the integrity of the pricing mechanism being compromised.

68. While some difference between the current arrangements and the successor arrangements was inevitable, the Review sought to maintain as much continuity as possible and, on the basis of discussions including the two final roundtables, the Review believes that the market will see the proposed methodology as a sensible evolution of the present one. FTSE Russell and Tradeweb assured the Review that they will continue to provide the same outputs that are currently provided by the DMO (i.e., clean and dirty prices, accrued interest, yields and modified duration). These will be available on a website maintained by Tradeweb, free of charge after a 24 hour delay. Retail users will also have access to historical data, as is currently the case.

69. For gilt strips, the proposal is to continue using a similar approach to that presently adopted by the DMO. A model for the zero-coupon yield curve has been developed with the aim of imitating the present approach. The Review would encourage FTSE Russell and Tradeweb to discuss their model with the wider market.

70. FTSE Russell and Tradeweb stated that they will also provide end-of-day reference prices for Treasury bills and have several methodologies under consideration. The Review would encourage them to work closely with market participants, in particular Euroclear UK & Ireland (operators of CREST, the main users of these prices), to determine the most appropriate, robust and reliable methodology.

71. The proposal stated that access to reference prices would be on a fair, reasonable and non-discriminatory (FRAND) basis.

4. Findings of the Review: Transition

72. As part of its Terms of Reference, the Review was asked to advise on how the transition could be managed.

73. The Review consulted on how long would be needed for the transition. In line with the DMO's previous consultation on the matter, several respondents indicated that a lead time of at least six months would be necessary to update their systems and processes. In their proposal, FTSE Russell and Tradeweb state that they will need three months in order to implement their solution and start providing the new reference prices.

74. Both representatives of the GEMMs and end-users of the reference prices stated that it would be useful to have a parallel run, for at least one month, of the FTSE Russell-Tradeweb reference prices and the prices currently provided by the DMO.

75. In light of this, the Review expects that the DMO could be in a position to cease provision of end-of-day reference prices in spring 2017.

76. Although the Review is not advising on specific successor arrangements for intra-day prices, the Review recommends that the DMO ceases its provision of these prices at the same time as the end-of-day reference prices in order to give market participants time to make any necessary arrangements.

77. The Review recommends that the DMO plays an active role in assisting the market with its transition to the successor arrangements. The DMO should use its existing relationships with market participants and presence on relevant committees to monitor the progress of the transition. In particular, before it stops providing reference prices, the DMO should be satisfied that:

- the new prices are freely available (after a 24 hour delay) and easily accessible to all users (including those outside of the financial system). The DMO should make it clear on its website how users can access the new freely available reference prices;
- the GEMMs and end-users (including CREST) have been given adequate lead time to prepare for the transition; and
- the terms of reference of the oversight committee of the new reference prices have been updated and the DMO observes that the committee is operating effectively.

78. The Review notes that significant time has elapsed since the announcement in January 2015 that the DMO would be ceasing provision of reference prices. To give clarity and aid market participants with their planning, the DMO should publicise the forthcoming transition and, in coordination with the new provider, give an indication of when it intends to stop providing reference prices.

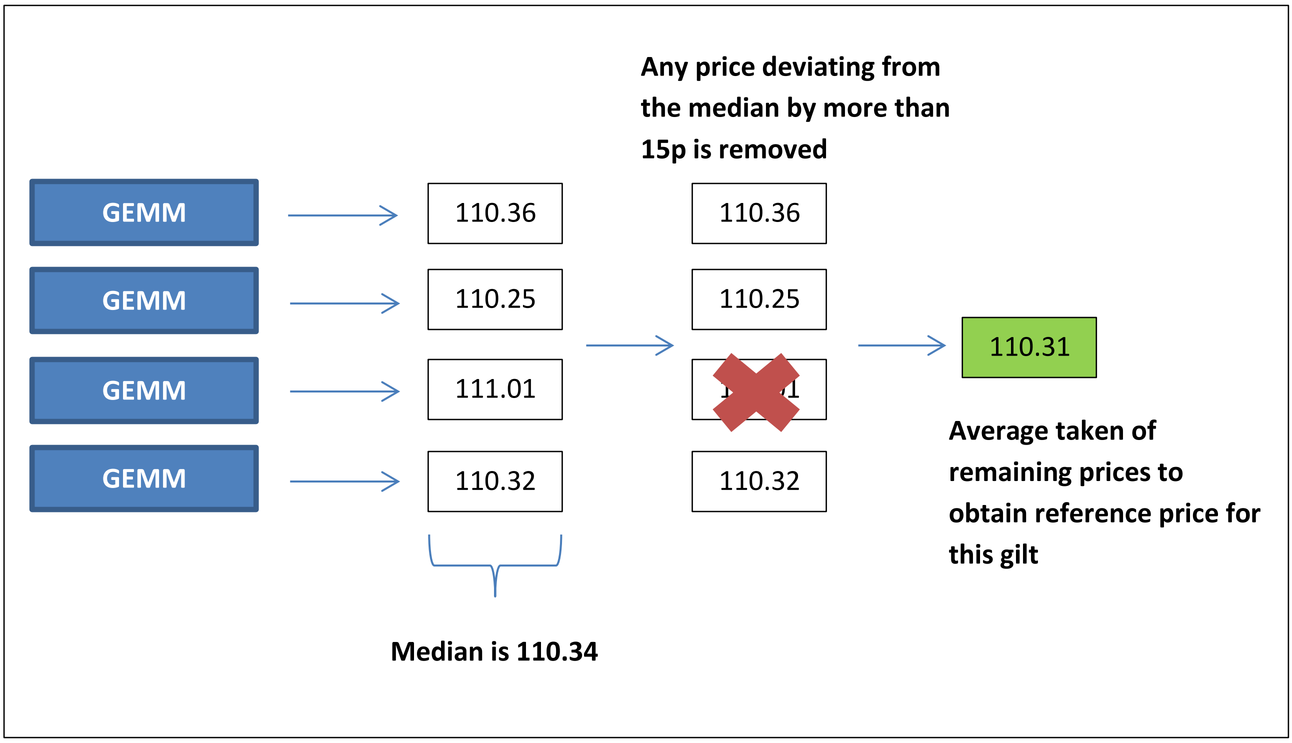
Annex A: Methodologies for the current end-of-day reference prices

Gilts

Every GEMM provides clean, mid-market prices for all conventional gilts and index-linked gilts to the DMO representing the market at 4:15pm. The median value of prices contributed for each gilt is first derived; any outlying prices are then excluded and the arithmetic mean of the remaining prices is then calculated.

For conventional gilts, the margin for outliers is 15 pence and for index-linked gilts it is 20 pence. The averaged clean prices for conventional gilts and index-linked gilts are first rounded to 2 decimal places (consistent with the normal trading convention) and then adjusted to provide dirty prices for settlement the following business day.

The process is illustrated below with a simplified example for a conventional gilt.



Gilt strips

Some conventional gilts are ‘strippable’, which means that certain GEMMs are allowed to split such a gilt into its individual coupons and the principal payment due on maturity. These can then be traded separately. As these instruments are fairly illiquid, their price is computed using the DMO’s theoretical yield curve model which is fitted around the end-of-day prices for conventional gilts.

Treasury bills

As the secondary market in Treasury bills is relatively illiquid, the DMO currently calculates Treasury bill prices analytically. The calculation involves three stages in order to arrive at a reference *yield* for each Treasury bill, these are then converted to prices using a standard formula. The steps are:

1. The DMO obtains observable SONIA swap rates for maturities from 0-2 years at around 9am each day and averages the bids and offers to obtain a set of mid-swap rates.

2. For each maturity a spread is then added to the mid-swap rate to provide an estimated or synthetic mid-GC repo rate. The spread can vary with maturity and is intended to reflect the prevailing relationship between SONIA swaps and GC repo. A linear interpolation is then applied to create a curve covering all maturities from 0-2 years.

3. Finally, a further spread is added to arrive at the Treasury bill yield. This spread can vary with maturity and is intended to reflect the difference between the GC repo curve and Treasury bill yields at the DMO’s regular weekly T-bill tenders. The spread is periodically reviewed, particularly when Bank Rate is anticipated to change.

Annex B – Main findings from responses to the consultation

Uses and features of the reference prices

- Most respondents said that reference prices are needed for all gilts, strips and T-bills; giving reference prices only for 'benchmark' instruments was not considered sufficient.

- While having continuous intra-day pricing was considered by many to be desirable, it was not seen as an essential element of successor arrangements.

- Most felt that end-of-day reference prices should aim to reflect the market at 4:15pm so as to align with the gilt futures close and to maintain continuity with the current end-of-day reference prices.

- The majority of respondents favour end-of-day prices representing the market at a point in time rather than, say, as an average across the day. Advantages include increased ability to hedge, consistency with fair value accounting and prices of all instruments being based on similar information (i.e., their value at the same point in time).

Input data and methodology

- Respondents were generally fairly sceptical of using interpolation to determine the prices of gilts as it would not represent the individual characteristics of each instrument. It was widely felt that, if possible, the methodology of the successor arrangements should aim to price every gilt individually.

- Deriving or interpolating reference prices for strips or T-bills did not raise similar concerns.

- When considering possible types of input data for end-of-day gilt reference prices, several respondents to the consultation made the following points:

  Direct submissions: While it could be useful to maintain the current submission based methodology for reasons of continuity, there were significant concerns around ensuring the stability of the panel of submitters.

  Transaction data: It was unclear to most respondents whether there would be sufficient data available to base reference rates on executed transactions for all gilts. Many me respondents were unclear on where timely data would could from and how it could be verified. Several respondents highlighted that many transactions in the market are not the outright buying or selling gilts but are instead trading spreads on the yield curve, swapping one basket of gilts for another, etc. It was not clear to respondents how these trades could be used. Several respondents felt that transaction data could be useful to supplement other data rather than on its own.

Quotes: Respondents were favourable towards the use of executable quotes to construct reference prices, although some questioned whether there would be sufficient data to always provide reference prices in this way. There were mixed views around using indicative quotes. Some respondents indicated that weighting quotes by volume (or having minimum volumes) would be useful. Others said that having criteria or a sampling method would be important but did not state what the criteria should be.

Related markets: Respondents were, in the main, sceptical about using the futures market as the primary source of data for gilt reference prices. It was felt that this would only work for the 10-year gilt future and several respondents highlighted that there are no futures for index-linked gilts and were unclear how reference prices would be obtained for these gilts.

Competition and access

- Many felt that reference prices should be freely available, possibly after a short delay. Many also felt that access should be provided to all users on a FRAND basis.

Industry standards

- Most respondents who expressed a view said that administrators should meet the objectives of the IOSCO Principles for Financial Benchmarks.

Transition

- Many respondents highlighted that the transition would be more complex if there are significant differences between the methodologies used to produce the current reference prices and the successor arrangements.