



BANK OF ENGLAND

February 2017

# The reform of SONIA

A supplementary consultation and an update on timing





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This Consultation Paper includes illustrative calculations, based on the Bank of England's Sterling Money Market data collection, which are intended only to show how the proposed new SONIA methodology would work, and should not be used for any other purpose. The proposed methodology may change before it is finalised, including in response to comments made during the consultation process.



# 1 Overview

1 The Bank of England set out its detailed proposals for the reform of the SONIA interest rate benchmark, and how they would be implemented, in a consultation issued in October 2016 (hereafter the '2016 consultation').<sup>(1)</sup>

2 This supplementary consultation revises the Bank's proposed approach on one specific issue relating to the averaging methodology to be used for SONIA, and seeks further feedback on the new proposal. As part of this it also provides data on reformed SONIA up until 1 February 2017.

3 This document also provides an update on the anticipated transition timetable.

## 1.1 Revised averaging methodology

4 The 2016 consultation proposed that SONIA be calculated as the volume-weighted median rate of eligible transactions. This proposal received generally supportive feedback, but a combination of factors has prompted us to reconsider our preferred averaging methodology.

5 In doing so we have reached the view that the trimmed mean<sup>(2)</sup> – which was not considered as part of the earlier consultation – strikes a better balance between the Bank's objectives and is preferred to the median. In particular:

- **The trimmed mean is likely to behave a little more like existing SONIA.** Like the median, the trimmed mean limits the impact of those transactions at outlying rates, seen in the Sterling Money Market (SMM) data, which may not be reflective of broader market conditions. In both cases this helps to maintain overall consistency with current SONIA. However, daily moves in the trimmed mean are in general likely to track moves in existing SONIA slightly more closely. That may be most evident on days when the underlying distribution of market rates is more skewed than usual – for example as has been the case at quarter-ends in recent years.

- **The trimmed mean is less sensitive to erroneous or potentially manipulative transactions of plausible size, or data reporting problems.** In contrast, relatively small changes in the distribution of transactions can occasionally affect the median.

6 The following section explains in more detail the Bank's rationale for the switch in the proposed averaging methodology. Box 1 compares the trimmed mean and the median with current SONIA. It shows that, like the median, the trimmed mean returns a rate a little more than 1 basis point below current SONIA over the available sample period.

7 Respondents are asked for feedback on the revised proposal for averaging methodology by 16 March 2017 via email to the Bank at:

**[benchmarkadministration@bankofengland.co.uk](mailto:benchmarkadministration@bankofengland.co.uk)**

## 1.2 Update on timetable for transition to reformed SONIA

8 The Bank now anticipates that the transition to reformed SONIA will occur in March or April 2018, rather than the end of 2017 as previously stated. The change in timing reflects in part the additional time required for this consultation, and in part responds to feedback received on the proposed timeline set out in the 2016 consultation.

9 The Bank will provide a summary of feedback to this and the 2016 consultation, together with its response, by end-March 2017. In doing so the Bank will set out its final view on the design of SONIA and the transition and publication arrangements.

10 The revised implementation timetable therefore allows around twelve months between confirmation of the final design of reformed SONIA and its implementation.

(1) See [www.bankofengland.co.uk/markets/Documents/soniareformcp1016.pdf](http://www.bankofengland.co.uk/markets/Documents/soniareformcp1016.pdf)

(2) The volume-weighted trimmed mean is calculated by removing transactions at outlying rates and then calculating the volume-weighted mean of the remaining transactions.

**Box 1**

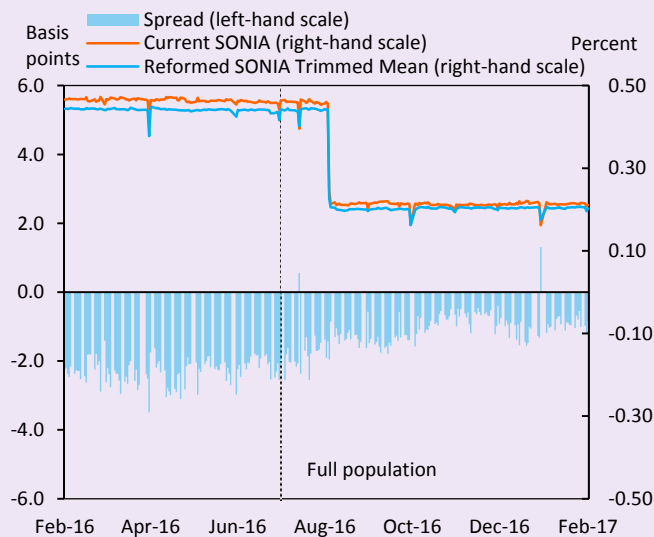
**The characteristics of reformed SONIA**

This box outlines the illustrative statistical characteristics of reformed SONIA, comparing the use of a volume-weighted trimmed mean and a volume-weighted median.<sup>(a)</sup> For the purposes of this analysis the eligibility criteria for input data proposed in the 2016 consultation have been used.

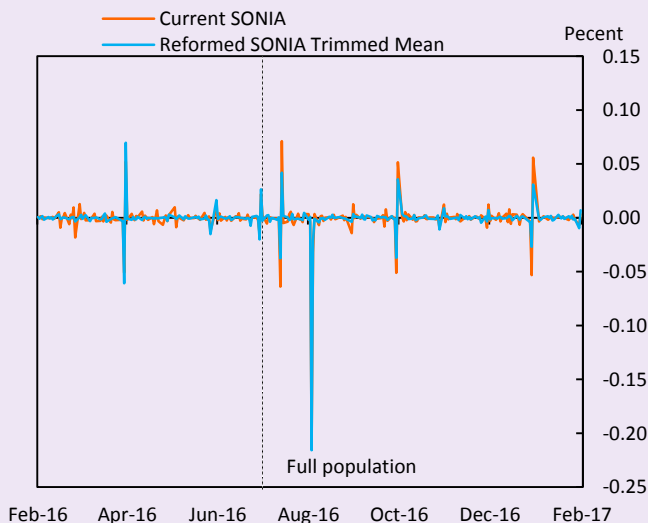
The data presented have been compiled using contributions to the Bank’s Sterling Money Market (SMM) data collection, up to and including 1 February 2017. For a provisional set of ‘early adopters’, comprising roughly 80% of the full population, data are available from 1 February 2016. The full reporting population has been contributing since 1 July 2016.

Over the available sample both methodologies return a rate that is on average a little more than 1 basis point below current SONIA (Charts A and B), reflecting that some bilateral transactions in the sample occur at slightly lower rates than brokered transactions.

**Chart A** Comparison of current and reformed SONIA using volume-weighted trimmed mean



**Chart C** Comparison of daily changes in current and reformed SONIA using volume-weighted trimmed mean



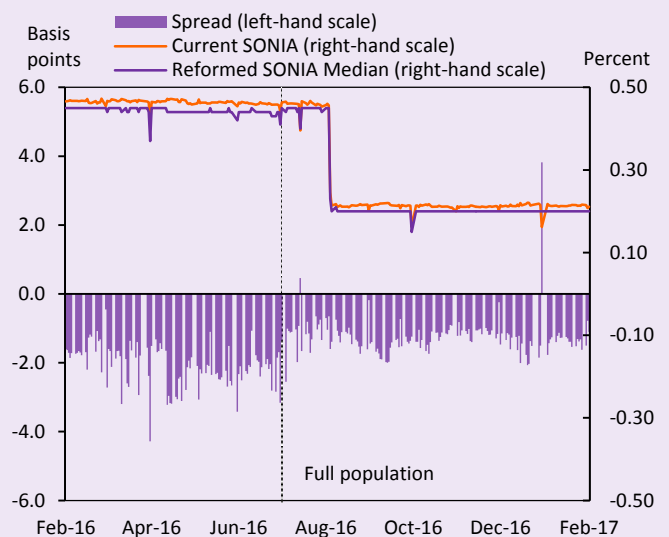
Daily changes in the proposed rate have tracked changes in current SONIA closely over the sample period, with a high correlation between the series (Charts C and D).

SONIA is widely used as the reference rate in overnight index swap contracts. In this context the behaviour of the compounded rate may be of interest to users. Charts E and F show that, on a one-month compounded basis, the volatility of reformed SONIA using both methodologies is low and very similar to that of existing SONIA.

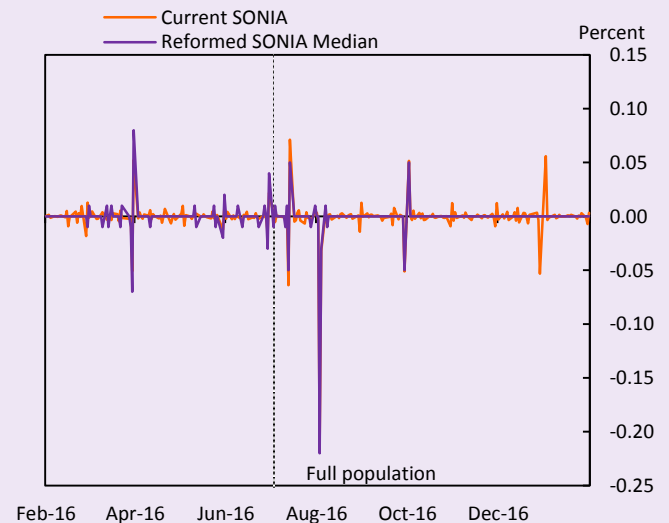
The largest difference between the two methodologies is at year-end, when the trimmed mean fell by more than the median in response to the negative skew in the transaction rates in the Bank’s SMM data collection (Chart G). It should be noted that in similar circumstances at the end of September the median fell by slightly more than the trimmed mean.

Table 1 presents summary statistics comparing the two calculation methodologies for reformed SONIA with current SONIA.

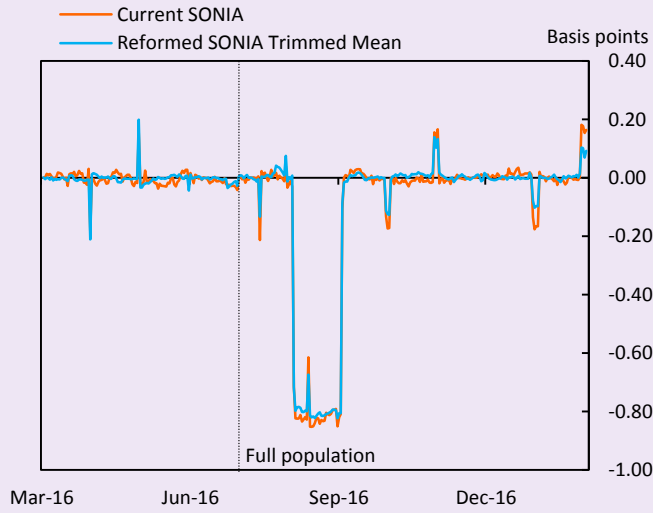
**Chart B** Comparison of current and reformed SONIA using volume-weighted median



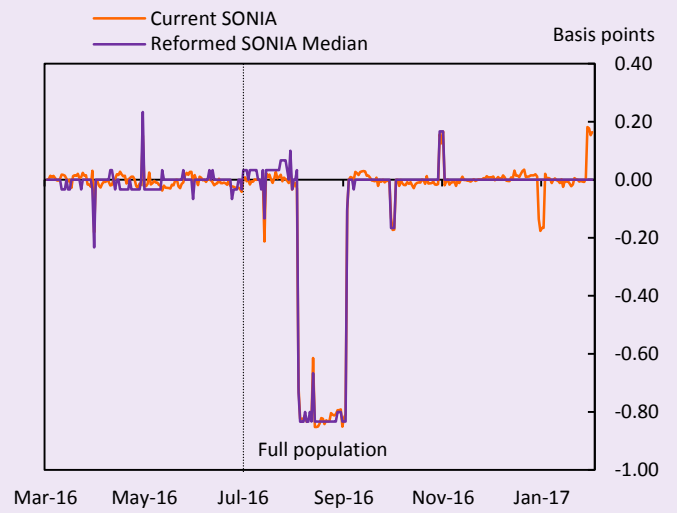
**Chart D** Comparison of daily changes in current and reformed SONIA using volume-weighted median



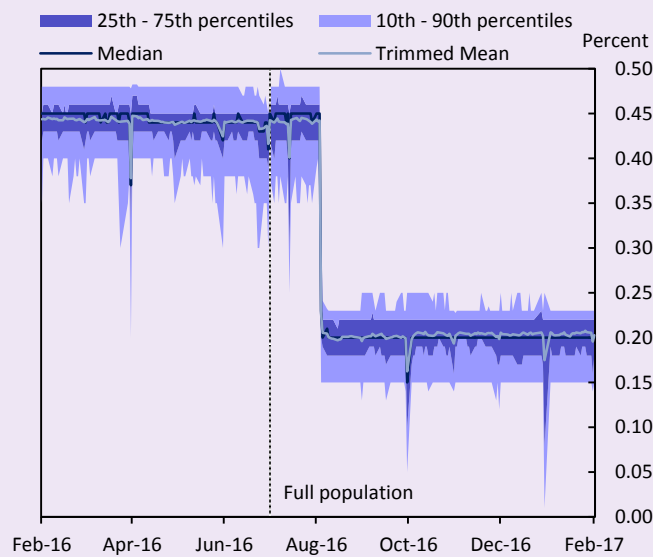
**Chart E** Comparison of daily changes of one-month compounded rate for current and reformed SONIA using volume-weighted trimmed mean <sup>(b)</sup>



**Chart F** Comparison of daily changes of one-month compounded rate for current and reformed SONIA using volume-weighted median <sup>(b)</sup>



**Chart G** Reformed SONIA and percentiles



**Table 1** Indicative summary statistics of the characteristics of current and reformed SONIA based on data since 1 July 2016

	Trimmed mean	Median	Current SONIA
Average spread to SONIA (basis points)	-1.14	-1.25	-
Correlation with SONIA	1.00	1.00	-
Correlation of daily changes with daily changes in SONIA	0.96	0.93	-
Standard deviation of daily changes (basis points)	1.92	2.00	2.12
Standard deviation of daily changes, excluding 4 August Bank Rate change (basis points)	0.77	0.89	1.26

(a) Sources: Bank of England, Wholesale Market Brokers' Association Ltd and Bank calculations. All data presented in this box and throughout this consultation are available on the Bank's website at [www.bankofengland.co.uk/markets/Documents/soniareform0217.xlsx](http://www.bankofengland.co.uk/markets/Documents/soniareform0217.xlsx)

(b) Note that there was an error in the equivalent chart in the 2016 consultation, published as Chart G, which has now been corrected.

## 2 Averaging methodology

1 In the October 2016 consultation, the Bank considered three volume-weighted averaging methodologies for reformed SONIA: the mean (as used for existing SONIA); the median; and the iteratively trimmed mean.

2 These options were assessed against three main criteria: transparency; consistency with the current measure of SONIA; and sensitivity to erroneous or manipulative trades. The mean and median were preferred to the iteratively trimmed mean on the grounds of simplicity and transparency. The median was preferred to the mean for being robust to outliers and producing a rate more consistent with existing SONIA, while being sufficiently simple and sufficiently insensitive to erroneous or potentially manipulative trades.

3 Respondents were generally supportive of the proposal to adopt the volume-weighted median for reformed SONIA. However one respondent noted that in circumstances where the distribution of rates is dispersed – including for example where there are gaps between the rates at which significant volumes of transactions occur – relatively small shifts in the distribution could result in relatively large changes in the rate. The Bank recognised this issue in raising the proposed republication threshold of reformed SONIA from 1 to 2 basis points.

4 Further data and analysis have shown that there are scenarios in which the volume-weighted median could plausibly be affected by 2 or more basis points by reporting errors. This would in practice be highly unlikely to occur, since it would require both an exceptionally low volume of transactions in the vicinity of the median and significant reporting problems at one or more of the larger reporting institutions.

5 More broadly, this analysis has reemphasised that the properties of the volume-weighted median are somewhat more sensitive than alternative methodologies to the distribution of transacted rates. This distribution may change over time, whether for idiosyncratic reasons such as reporting period-ends or days when policy rates are changed, or for unforeseen longer term reasons, reflecting possible structural changes in the market.<sup>(3)</sup>

(3) For example, the dispersion of transacted rates for current SONIA, measured by the interquartile range of the volume-weighted distribution of rates on brokered transactions, has averaged around 5 basis points over the past 10 years. However in the final quarter of 2008 it averaged over 40 basis points.

6 We believe our judgement that the median is ‘sufficiently insensitive to erroneous or potentially manipulative trades’ remains sound under the observed distribution of transactions. However the considerations noted above prompted us to reopen the question of averaging methodology.

7 In doing so we have reconsidered the available options for the averaging methodology, and included one additional option. While the 2016 consultation considered the iterative trimmed mean (but discounted it as too complex), we now consider the simpler ‘static’ trimmed volume-weighted mean (hereafter ‘trimmed mean’).

8 The trimmed mean is calculated by sorting all eligible transactions in rate order, lowest to highest; excluding (‘trimming’) the highest and lowest 25% by volume of transactions; and calculating the volume-weighted mean of the remaining 50% (by volume) of transactions. Annex 1 provides an illustrative example.

9 Conceptually the trimmed mean can be thought of as lying between the mean – in which all of the transactions are included in the calculation – and the median – which depends only on the rate of the transaction at the centre of the distribution.

10 The Bank judges that, in the context of the SMM data, trimming the outer quartiles (and calculating the volume-weighted mean rate of the remaining 50% of transactions by volume) strikes the best balance between: simplicity; limiting the impact of outliers; and reducing susceptibility to small changes in the distribution of transactions.

11 The remainder of this section compares the performance of the volume-weighted trimmed mean and volume-weighted median methodologies. We use the same criteria as for the 2016 consultation.

### 2.1 Transparency

12 Consistent with IOSCO Principle 9 (Transparency of Benchmark Determination), the Bank considers stakeholder understanding of the calculation methodology to be core to the transparency of benchmark determination.

13 A volume-weighted trimmed mean is a commonly used and understood statistical approach which can be transparently explained.



## 2.2 Consistency with current SONIA

14 When applied to the SMM data, both the volume-weighted trimmed mean and median are highly correlated with current SONIA. Focusing on daily changes, the correlation between the trimmed mean and current SONIA is 0.96, compared to 0.93 for the median.

15 The 2016 consultation discussed the negative skew exhibited in the Bank's Sterling Money Market (SMM) data and how this is reflected in the different averaging methodologies. The median was preferred to the mean because, by minimising the effect of SMM transactions at outlying rates, it produces a rate more consistent with existing SONIA.

16 The trimmed-mean performs similarly to the median in this regard, returning – like the median – average rates a little over 1 basis point below current SONIA over the available sample period.<sup>(4)</sup>

17 However in circumstances where the distribution of transacted rates is skewed for reasons that are reflective of broader money market conditions, it may be desirable for this to be captured in the averaging methodology, as it would be for current SONIA. To take an example, it has been common in recent years for sterling money market rates at reporting-period ends to dip below their average levels, reflecting among other factors a reduced supply of bank balance sheet capacity. **Table A** compares the December 2016 average and year-end values using the different methodologies.

**Table A** Rates at year-end using different methodologies (%)

Methodology	Dec 2016 average excluding year-end	30 Dec 2016
Current SONIA	0.2152	0.1618
SMM: VW-median	0.2000	0.2000
SMM: VW-trimmed mean	0.2039	0.1742

18 The fall in current SONIA reflects a number of brokered transactions executed at rates significantly lower than those typically seen in preceding days, and a consequent negative skew. While the distribution of bilateral transactions at year-end exhibits the same feature – a greater than usual negative skew – the median based on the SMM data remained at 20 basis points. The trimmed mean fell by 3 basis points and in this instance behaved more like current SONIA.

19 This illustrates the general point, reflected in the correlations noted above, that the trimmed mean is likely

to behave somewhat more like current SONIA than is the median.<sup>(5)</sup>

## 2.3 Sensitivity to manipulative or erroneous trades

20 It is important to ensure that reformed SONIA is not overly sensitive either to potential attempts to manipulate the benchmark through off-market transactions, or to data-reporting problems, for example where technical issues lead to late reporting.

21 As noted in the 2016 consultation, the volume-weighted median is generally sufficiently robust to being influenced by individual transactions of plausible size. It is also generally robust to the absence of particular reporters. However the nature of the median, together with the tendency for transacted rates to be whole numbers of basis points, means that on a minority of days relatively small changes in the distribution could have a significant impact on the median.

22 In general, the trimmed mean performs better for these purposes than the median. For example, the frequency of days on which an erroneous or potentially manipulative transaction of a plausible size would affect the rate by a basis point or more is much lower. A £1 billion trade added to the distribution of rates observed each day in the available sample, 3 basis point above or below the existing median, would have impacted the median by 1 basis point or more on a little under 10% of occasions. The trimmed mean would not have been affected by as much as a basis point on any of these days.

23 Similar arguments apply in relation to the potential for data reporting problems to affect the benchmark. Our analysis suggests that both the volume-weighted median and the volume-weighted trimmed mean were robust to any three reporters failing to report on a typical day in our sample period (i.e. once the missing data was included, the proposed republication threshold of 2 basis points difference was not breached).

24 However, in a very limited number of scenarios, it was found that the impact of late submissions of reporters could have a material impact on the calculation of the volume-weighted median; this is a natural consequence when there is a low volume of transactions in the vicinity of the median. We would expect these occasions to be extremely rare – since they require both multiple reporting failures and a relatively unusual distribution of transactions. We note

(4) If the underlying distribution of SMM rates were to become more skewed in future, these measures could diverge.

(5) Consistent with this, we note that the volume-weighted trimmed mean of brokered transactions over the past 10 years has a smaller average absolute spread to actual SONIA than does the volume-weighted median, and its daily changes are more highly correlated.

that, even in these early stages of SMM data reporting, there has been only one occasion so far where three reporters failed to report on time; as the data collection continues to bed in, we anticipate performance will improve.

## 2.4 Conclusion

25 In conclusion, the Bank proposes to use a volume-weighted trimmed mean as the averaging methodology for reformed SONIA. It is preferred to the volume-weighted median and mean because it: is simple to understand; produces a rate somewhat more consistent with the existing measure of SONIA; is robust to outliers and unrepresentative trades; and is less sensitive to erroneous or potentially manipulative trades of plausible size, or the late submission of data by a number of reporters.

### Question

**Do you agree with the Bank's view that a volume-weighted trimmed mean should be the averaging methodology for reformed SONIA?**

## 2.5 Next steps

26 Responses or any general queries relating to this consultation are invited by 16 March 2017. These should be sent to the Bank at the following email address:

**[benchmarkadministration@bankofengland.co.uk](mailto:benchmarkadministration@bankofengland.co.uk)**

27 Responses to this document are intended to be published on the Bank's website. Individual responses will be unattributed, but a list of respondents will be published. If respondents would like their comments to be treated as confidential (and hence to not be published) they should contact the Bank using the above email address, to discuss this.

28 Where respondents provide a response which includes information to be treated as confidential, they should clearly indicate the information provided which should be treated as such. If a request for disclosure is subsequently received, in accordance with access to information regimes under the Freedom of Information Act 2000 or the Data Protection Act 1998, respondents' indications will be taken into account, but no assurance can be given that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by a respondent's IT system on emails will not, of itself, be treated as constituting notice that such respondent regards any information supplied as confidential.

29 The Bank will provide its summary and response to feedback received during this and the 2016 consultation in March 2017. This response will include:

- publication of individual responses to this and the 2016 consultation and a summary of these;
- confirmation of the reformed SONIA calculation methodology and definition;
- confirmation of the data to be published alongside the SONIA rate;
- the contingency methodology to be used when insufficient data is available;
- an update of the indicative reformed SONIA data; and
- an update on the intended mechanics of transition.

30 Prior to the transition to reformed SONIA, the Bank will publish additional information, in line with international best practice for benchmark administration, including the design of its SONIA governance arrangements.

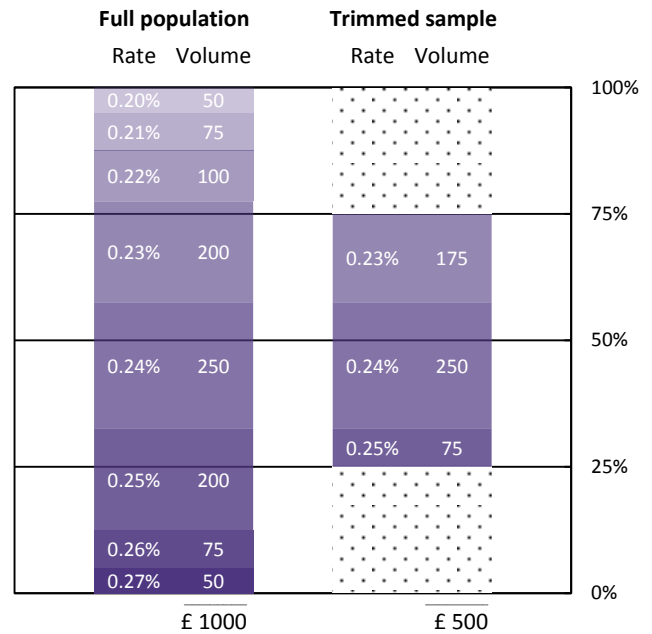
# Annex Trimmed mean example

1 The volume-weighted trimmed mean that the Bank proposes to use for reformed SONIA is calculated by sorting all eligible transactions in rate order, lowest to highest; excluding ('trimming') the highest and lowest 25% by volume of transactions; and calculating the volume weighted mean of the remaining 50% (by volume) of transactions.

2 In the case that the volume of a single transaction spans across the 25% (or 75%) threshold for trimming, that transaction's volume will be pro-rated, such that exactly 50% of the total eligible volume will be used in the volume-weighted mean calculation.

3 **Figure A** provides an example of how transaction volume would be pro-rated in calculating the trimmed mean. Each box in the column represents a single transaction at a particular rate. The left column shows the full population of transactions on a given day. On applying the trim – in the right hand column – a portion of the volume of transactions at rates of 0.23% and 0.25% falls outside the middle 50% of the total volume and is discarded, so that the calculation of the trimmed mean uses only the middle 50% of the distribution.

**Figure A** An example of pro-rating the volume of transactions at the edge of the middle 50%



Volume-weighted trimmed mean: **0.2380%**

Volume-weighted median: **0.2400%**