FOREIGN EXCHANGE BENCHMARK GROUP

Foreign Exchange Benchmarks

Consultative Document

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Executive Summary

In 2013, a number of concerns were raised about the integrity of foreign exchange (FX) rate benchmarks. These concerns stemmed particularly from the incentives for potential market malpractice linked to the structure of trading around the benchmark fixings. As a result, the FSB Plenary formed a working group chaired by Guy Debelle of the Reserve Bank of Australia and Paul Fisher of the Bank of England[1] to focus on foreign exchange benchmarks. The group was given a mandate to undertake analysis of the FX market structure and incentives that may promote particular types of trading activity around the benchmark fixings. The group was tasked to propose possible remedies to address these adverse incentives as well as to examine whether there is a need and scope to improve the construction of the benchmarks themselves.

The work of the group has been completely independent of the various conduct investigations into allegations of manipulation of FX being undertaken in different jurisdictions and the group does not have access to the evidence that is being considered by the relevant authorities.

The group has progressed its work in part by engagement with a range of FX market participants across the globe. This has included a cross-section of global and local asset and money managers, non-financial corporates and benchmark providers in FX and other markets, as well as FX trading platforms, banks and investment banks. An interim report is now being published for wider public consultation so that all market participants have a chance to submit their views and comment on the proposed course of action. The report sets out fifteen draft recommendations, and the group is particularly keen on seeking reaction to a subset of these. The full list of recommendations is given at the end of this summary, highlighting the subset on which the group is particularly interested on feedback.

A consistent view of market contacts is that there are two FX benchmarks which have pre-eminence in the global market. The WM/Reuters (WMR) 4pm London fix, produced by the WM Company is by far the dominant benchmark being used, not just in FX, but also as a key input in multi-currency equity, bond and credit indices. The euro foreign exchange rates set by the ECB at 2:15pm CET (henceforth the ECB's reference rates) are also used by a wide range of participants, specifically non-financial corporates but are thought to be also important for the non-deliverable forwards market.

The group has obtained transactional and quote data from the two main electronic trading platforms, EBS and Thomson Reuters Matching, which are used to calculate the WMR fixes. These data indicate that intraday turnover notably increases at the time of the WMR London 4pm fix and to a lesser extent around the ECB's reference rates.

The WMR benchmarks are, at least for the most widely used currencies, based on actual trades, supported by transactable bids and offers extracted from electronic trading systems. In this respect they are quite different from a benchmark such as Libor which is based on panels of banks quoting their estimate of funding rates. Even for the less well traded currencies,

[1] See Appendix for the organisations represented on the group.

active bids and offers are used. The issues arising are therefore quite different in nature from those relevant to Libor.

FX benchmarks are used by market participants for a variety of purposes, but most notably for valuing, transferring and rebalancing multi-currency asset portfolios. In particular, the mid-rates produced by WMR are embodied in the construction of published indices used for tracking multi-country portfolios of bonds, equities or credit instruments, and hence are implicit in many investment mandates. That usage incentivises asset and other money managers – particularly those with passive mandates which aim toward the replication of an index – to ensure that their FX dealing intermediaries (usually but not always banks) execute their foreign exchange trades at the same mid–market price recorded at the fix. That eliminates any 'tracking error' arising from foreign exchange, when the investor is invested in the performance of some other asset such as bonds or equities.

Other users, such as some sovereign wealth funds, or corporates (which often do not have active foreign exchange dealing desks), also tend to use the same approach of trading with their dealers at a guaranteed published fix price, in order to establish transparency of execution.

The result of this activity by their clients leads to a concentration of trading orders being transmitted to dealers, in large part shortly ahead of the fixing time. In order to manage the risk associated with this client order flow, dealers hedge by executing foreign exchange transactions in and around the calculation window, which results in the large spike in trading volume. This creates a market where the dealer is agreeing to execute these orders at an unknown price, which is established subsequently during the fixing calculation window. That price should be the clearing price which reflects the balance of supply and demand going through the market at that time and therefore prices should move as necessary in response to these flows. In most cases, the dealer agrees to give the client the mid-rate of this (as yet unknown) fix price, whether the customer is buying or selling.

At a minimum, this market structure creates optics of dealers 'trading ahead' of the fix even where the activity is essentially under instruction from clients. Worse, it can create an opportunity and an incentive for dealers to try to influence the exchange rate – allegedly including by collusion or otherwise inappropriate sharing of information – to try to ensure that the market price at the fix generates a rate which ensures a profit from the fix trading.

To help address the issues arising from this market structure, the group is proposing possible recommendations for reform in the foreign exchange market in the following broad categories:

a. The calculation methodology of the WMR benchmark rates

b. The publication reference rates by central banks.

c. Market infrastructure in relation to the execution of fix trades.

d. The behaviour of market participants around the time of the major FX benchmarks (primarily the WM 4pm London fix).

e. Recommendations from a forthcoming IOSCO review of the WM fixes.

Apart from the forthcoming IOSCO recommendations, the draft recommendations are summarised below. While comments are welcome on any aspects of the report and proposals,

the group is particularly inviting feedback on selected recommendations as highlighted (recommendations 1, 2, 3, 6 and 11). Full details on each recommendation are given in the body of this report on pages 22-28. Comments should be sent by close of business on Tuesday 12 August 2014 to fsb@bis.org with "FXBG comment" in the e-mail title. Responses will be published on the FSB's website unless respondents expressly request otherwise.

Summary of draft recommendations

Highlighted recommendations are those on which the group is particularly seeking market feedback.

1. **The group recommends the fixing window be widened from its current width of one minute. It seeks feedback from market participants as to the appropriate width of the calculation window.**

2. **The group seeks feedback from market participants as to whether there is a need for alternative benchmark calculations (such as a volume weighted or time weighted benchmark price) calculated over longer time periods of up to and including 24 hours.**

3. **The group also seeks feedback from market participants as to whether the fixing windows should continue to be centred exactly on the hour (half hour) or whether the fixing window should close or start on the hour. Market participants should consider whether this view changes depending on the size of the window.**

4. The group proposes that WM investigate the feasibility of receiving price feeds and transactions data from a broader range of sources to further increase its coverage of the FX market during the fixing window, and should regularly assess its coverage as market structure continues to evolve. In that regard the group also proposes that in the short term, WM develop its methodology to utilise the transactional and quote information from both Thomson Reuters Matching and EBS, wherever both are available.

5. The group considers that, where central banks publish reference rates, it is the responsibility of each to set internal procedures. Central banks should at least take note of guidance from the IOSCO principles. However, where central bank reference rates are intended for transaction purposes, the group encourages compliance with the relevant IOSCO principles.

6. **The group supports the development of industry-led initiatives to create independent netting and execution facilities. However, it also is interested in seeking feedback from market participants on the development of a global/central utility for order-matching to facilitate fixing orders from any market participants.**

7. The group recommends that fixing transactions be priced in a manner that is transparent and is consistent with the risk borne in accepting such transactions. This may occur via applying a bid-offer spread, as is typical in FX transactions, or through a clearly communicated and documented fee structure such as a direct fee or contractually agreed price.

8. The group recommends that banks establish and enforce their internal guidelines and procedures for collecting and executing fixing orders including separate processes for handling such orders.

9. Market-makers should not share information with each other about their trading positions beyond that necessary for a transaction. This covers both individual trades, and their aggregate positions.

10. Market-makers should not pass on private information to clients or other counterparties that might enable those counterparties to anticipate the flows of other clients or counterparties, including around the fix.

11. More broadly, the group recommends that banks establish and enforce their internal systems and controls to address potential conflicts of interest arising from managing customer flow.

12. Codes of conduct that describe best practices for trading foreign exchange should detail more precisely and explicitly the extent to which information sharing between market-makers is or is not allowed. They also should, where appropriate, incorporate specific provisions on the execution of foreign exchange transactions including fixing orders.

13. The group recommends stronger demonstration by market participants of compliance with the codes of the various foreign exchange committees, as well as their internal codes of conduct.

14. The group recommends that index providers should review whether the foreign exchange fixes used in their calculation of indexes are fit for purpose.

15. The group recommends that asset managers, including those passively tracking an index, should conduct appropriate due diligence around their foreign exchange execution and be able to demonstrate that to their own clients if requested. Asset managers should also reflect the importance of selecting a reference rate that is consistent with the relevant use of that rate as they conduct such due diligence.

1. Introduction to the foreign exchange 'fix' problem

The foreign exchange market spans various jurisdictions, time zones, and types of market participants. Daily turnover in the market is large, with the BIS reporting global average daily turnover across foreign exchange instruments at over $5 trillion in April 2013. Notwithstanding this, large orders pose execution challenges in the FX market, just as they do in the equity markets, where block orders have always been problematic to transact without disrupting the market.

The main intermediaries in the market are the foreign exchange dealers, which are generally (though not always), banks. These dealers act as both principal and agent in the market. That is, they deal on their own account and on behalf of their customers. Most foreign exchange trading takes place via electronic platforms or via broker-dealers. Over recent years, the share of trading conducted electronically has continued to increase and by some estimates now accounts for around 90 per cent of spot foreign exchange dealing.

The foreign exchange market is primarily a quote driven market, in marked contrast to the equity market which can be characterised as an order driven market. The FX market has a number of other important unique characteristics compared with other large markets. One reason for this is in the nature of the underlying product being traded. In the FX market, money is traded for money, and the price is relative, whereas in the equity market, the price is an absolute price with money being exchanged for equities. Also, there is "real economy" demand in the foreign exchange market. That is, foreign exchange is traded not only as an asset in itself, but also because of underlying global trade and capital flows.

In addition, the FX market is a geographically dispersed, decentralised and (except for futures and options) primarily an OTC market - there is not a single market place - and is often not subject to formal regulation, although individual participants are often bound by the securities and commodities trading conduct laws of their local jurisdictions. In contrast, equities are primarily traded on regulated exchanges in most jurisdictions, although there is also a large OTC market in some jurisdictions.

Reflecting this, the foreign exchange market is global and cross-border, with regular trading occurring continuously from 5am Sydney time on a Monday morning until 5pm New York time the following Friday. In contrast, equity markets are country-specific with a fixed (and finite) trading day. Hence there is no equivalent concept in the foreign exchange market to the closing price in the equity market. The FX market continues to trade through and after the main 4pm London fixing window, even though the 4pm rate is sometimes referred to as a 'closing' rate.

Further, there is no single market place for foreign exchange as there is no dominant venue. Rather, prices are quoted on a number of different trading platforms. The potential for arbitrage between these platforms helps to ensure that any pricing discrepancies that may arise are short-lived. In recent years, technological improvements have enabled customers to "stream" (access) multi-pricing sources simultaneously rather than rely on single quotes from their dealers[2]. This has contributed to the increased share of electronic trades in the market.

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[2] Dealers traditionally include commercial banks, investment banks and, increasingly, non-banks. Voice brokers can also be an important venue for trading, particularly during the fix. Further details can be found in the BIS triennial survey of the foreign exchange market which can be found here: http://www.bis.org/publ/rpfx13.htm

Foreign exchange benchmarks are typically, but not always, based on trades and bid and offer quotes extracted from electronic trading systems and methodologies can differ based on currency market liquidity. They are calculated from a fixed time window around a set reference time. These benchmarks – particularly the dominant WM/Reuters (WMR) 4pm London fix created by the WM Company (WM) – are used by a broad set of market participants for a variety of purposes, but notably for valuing, transferring and rebalancing multi-currency asset portfolios. In particular, the mid rates produced by WM are used in the construction of published indices used for portfolios tracking multi-country benchmarks of bonds, equities or credit instruments, and hence are implicit in many investment mandates. As this report explains, that usage incentivises asset managers – particularly those with passive mandates which require replicating an asset index – to ensure that their dealers execute their foreign exchange trades at the same mid–market price recorded as the fix. This eliminates any 'tracking error' arising from foreign exchange in the investor's international asset portfolios.

Other users – such as some corporates who do not have active foreign exchange dealing desks – also use the same approach of trading with their dealers at guaranteed fix prices, in order to establish transparency of execution. It is important to stress that trading at the fix price, even at the mid rate, is not necessarily going to give best execution for a customer in the sense of the best possible price. In fact, trading at the fix leaves the client exposed to the price movements arising from the net order flow taking place at that point in time. While this was widely understood by the market participants the group spoke to, many end customers placed priority instead on the transparency around the fix price and/or the need to minimise tracking error, as well as the perception of the wide use of such rates. Those who place more weight on best execution in the sense of getting the best possible price, generally used other methods, including algorithmic execution facilities provided by their dealers and/or by spreading transactions out across the day.

The result of the fix usage by their clients leads to a concentration of trading by dealers during the calculation window, although trading volumes start to rise shortly ahead of the fixing time. It also creates a market where the dealer is agreeing ahead of the fixing time to execute at an unknown price, which is established subsequently during the fixing window as the clearing price which reflects the balance of those fixing transactions and other transactions undertaken in the calculation window. In many cases, the dealer agrees to give the client the mid-rate of this (as yet unknown) fix price, rather than applying a spread, whether they are buying or selling. Given the market structure, the dealers can be placed under strong pressure to try and offset the risks they face given the price commitment.

At a minimum, this creates optics of dealers 'trading ahead' of the fix even if the dealer is managing the risk in relation to their client orders. Worse, it can also create an opportunity and an incentive for those dealers to manipulate the market to make it more likely that the market price at the fix generates a rate which results in a profit from their fix trading. Further, the concentration of large volumes around the fixing window, and the need for dealers to execute potentially large orders (as well as to manage the risk associated with these transactions if needed) in a short time span, has the potential to create increased volatility and price movements that may be disadvantageous to end users. As we show in this report, the evidence does not suggest that the increased volumes do in fact lead to much change in volatility relative to market activity most of the time.

Recent concerns about the integrity of trading around the setting of FX benchmarks were first aired publicly in June 2013[3]. This was followed by increased media interest and the launch of investigations by a number of regulators into alleged misconduct in the FX market. In early 2014, the FSB established a sub-group to incorporate a globally coordinated assessment of FX benchmarks alongside its ongoing programme of interest rate benchmark analysis. In this report the sub-group presents greater detail on this market structure and make recommendations which it believes would reduce the incentives to manipulation.

In making these recommendations, it should be noted that the work of the group is completely independent of the various conduct investigations being undertaken and the group does not have access to the evidence that is being considered by those investigations.

2. The construction of foreign exchange fixes

The WMR fix was launched in 1994 and aimed to provide a clear single independent reference rate for the foreign exchange market. It sought to address previous problems perceived in the pricing of FX trades by custodian banks. A number of central banks have also historically published FX reference rates for a range of other purposes. The ECB, for example, introduced a set of euro foreign exchange reference rates in 1999, which were initially intended for the use of the European Commission, which publishes these rates in the Official Journal of the European Union.

Data from the market indicates that turnover is notably increased at the time of the WMR London 4pm fixing and the ECB 2.15pm CET reference rates. Although there are other possible explanations for this occurrence, a wide variety of market contacts support the assertion that these are the two most frequently used FX benchmarks globally, by some distance. In particular, the WMR 4pm London fix is now by far the most common FX reference rate used in the market. This arises in part as a result of its use in the MSCI equity indices, and most bond and credit indices. The ECB 2.15pm CET reference rates are used by a wide range of economic agents, particularly European corporates. Their use was reported to have increased following the recent enquiries into FX benchmarks.

Most of the FX dealers surveyed in producing this report indicated that the service offering to transact against specific FX benchmarks is not usually profitable, but is offered on account of client demand, and competitive pressures.

The precise methodologies used by WM and the ECB are outlined below. In the case of WMR it is based on published material, but expanded for clarity:

a. WM/Reuters

WMR provides spot, forward and non-deliverable forward benchmark rates at fixed points daily. WMR provide spot fix rates for 160 currencies, forward rates for 82 currencies and non-deliverable forward rates for 12. Given its significance, and to limit repetition, the following information refers to the spot methodology only. The methodology for forwards is broadly similar to that used for the non-trade currencies. WMR splits currencies into 2

[3] Bloomberg article 'Traders said to rig currency rates to profit from clients'.

groups: 21 trade currencies[4] and 139[5] non-trade currencies depending on their underlying liquidity. The methodology differs for each group.

Trade Currencies

Trade currency rates are set every half hour between the hours of 6:00 a.m. (Hong Kong/Singapore time) on Monday to 10:00 p.m. (United Kingdom time) the following Friday. A single bid order rate, single offer order rate and single executed trade are taken every second over a one minute window from -/+ 30 seconds either side of the specified fix time from a single trading platform. The output is a published median mid-rate and calculated bid and offer rates around that mid rate.

Trade currency methodology

1. WMR captures the rates for single executed trades and orders. Data are taken from Thomson Reuters Matching[6] or EBS[7] (with Currenex used as secondary source, subject to liquidity). The majority of trade currencies do not use a secondary source; seventeen trade currencies use Thomson Reuters Matching as a single data source and the Russian rouble uses EBS as a single data source. The rates are calculated separately by data source. Secondary sources are used where trade data is insufficient on the primary platform or for validation purposes. Ultimately, the choice of rate used for any particular currency lies with WM on the basis of which is most appropriate to represent the market.
2. 61 single snapshots of trade and order rates are taken over the minute from 30 seconds before to 30 seconds after the fix time. The snap from Thomson Reuters Matching takes the current/last trade and current/last best order rates as at the capture time. The EBS snap gives either the best bid or the best offer trade and the best bid and best offer orders that second.
3. A trade is identified as being on one side of the market ('sell' or 'buy') depending on whether it is hitting a 'bid' or a 'offer' order. The best bid and best offer rates are captured simultaneously. Only executed prices or quotes are captured, no volume or counterparty information is identified.
4. The bid/offer spreads are calculated from the difference between the best bid and best offer for each valid snap. This spread is then applied to the captured trade data in that particular second to establish the opposite side of the market. The result is a bid and offer rate for each trade, one from the traded rate, the other inferred.

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[4] AUD, CAD, CHF, CZK, DKK, EUR, GBP, HKD, HUF, ILS, JPY, MXN, NOK, NZD, PLN, RON, RUB, SEK, SGD, TRY, ZAR.

[5] Additional currencies can be suggested by clients and will be moved to trade currencies depending on liquidity and subject to a full review and research by WMR.

[6] AUD, CAD, CZK, DKK, GBP, HKD, HUF, ILS, MXN, NOK, NZD, PLN, RON, SEK, SGD, TRY, ZAR.

[7] CHF, EUR, JPY, RUB.

5. A validation process identifies whether trade data should be excluded from the calculation. This process is fully automated. This can either be because there are no new trade data since the last snap time or because the trade falls outside of the best bid and best offer data (outliers). Data from these one second time intervals is excluded from the calculation. Given that, and the normal randomness of when trades are conducted, the calculation often does not include trade data from every second, i.e. there are often fewer than 61 data points, even at the 4pm fix. This can happen even for the most traded foreign exchange rate (EUR/USD).

6. The tolerance checks are performed both at the time the fix data is sourced and after the benchmark has been calculated. Decisions are verified and quality assured by a third party within the WMR fix team. Validation is supported by a round the clock capture process which snaps spot rates every 15 seconds to help identify currency issues or outliers.

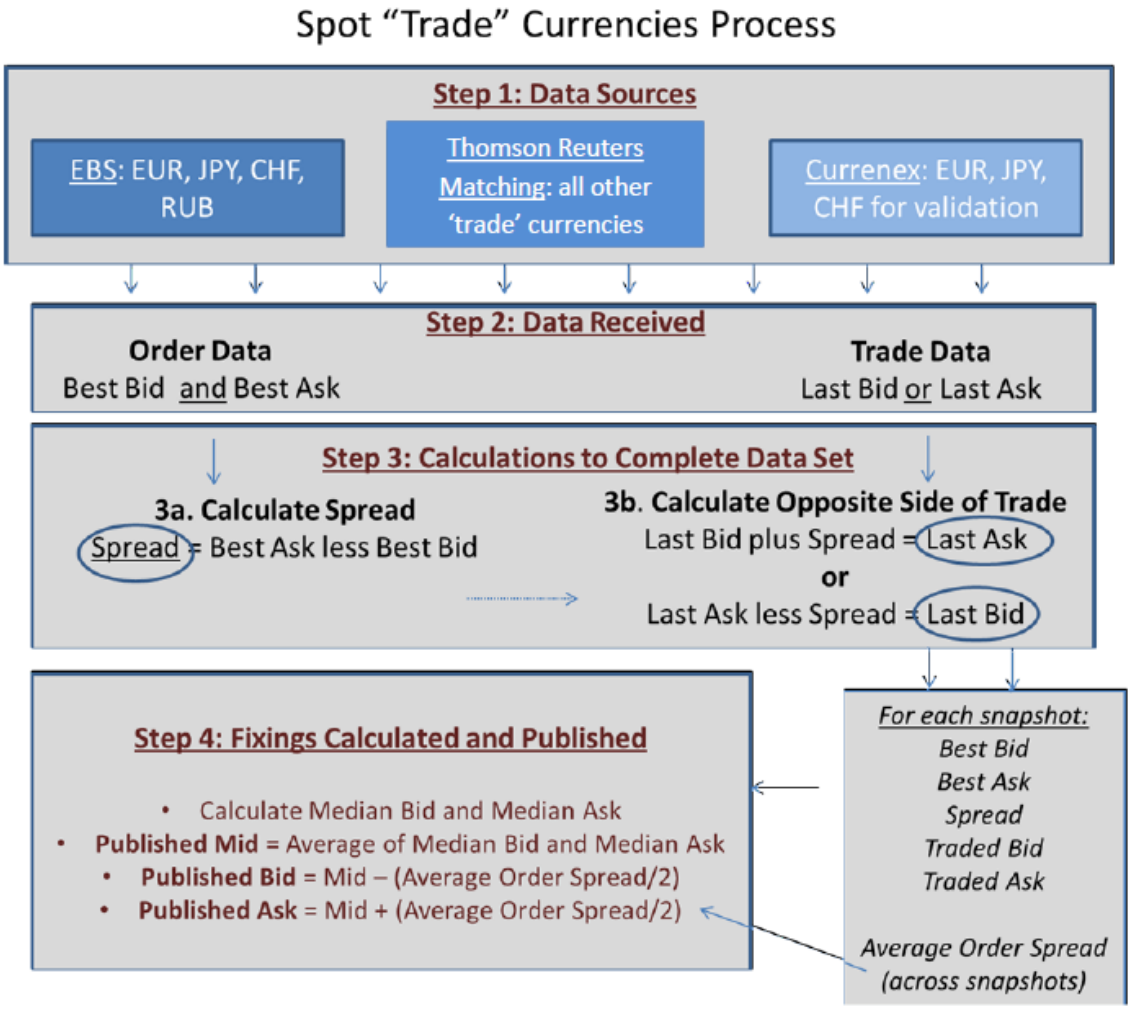
7. Once the data has been verified, the median bid and median offer are averaged to calculate the market mid-rate. A spread is calculated from the average of the order spreads observed, subject to pre-set maxima and minima. This spread is then applied to the mid-rate to generate a published bid and offer rate to 4 decimal places. The methodology chosen seeks to reflect spreads consistent with normal market volatility[8].

If there is insufficient data, the order rates provide an alternative methodology for calculating the rates. If neither trade rates nor order rates are available, the indicative quotes from Thomson Reuters are used.

A graphical representation of the key steps in this process is presented in Figure 1. As noted, WM utilises data from three transaction systems and uses four key data points to publish the fixing rates - best bid, best ask, last traded bid, and last traded ask.

[8] If Average Order Spread < Minimum, apply Minimum. If Minimum < Average Order Spread < Maximum, apply Average Order Spread. If Maximum < Average Order Spread, apply Maximum.

Figure 1:



Non-trade Currencies

Non-trade currency rates are set on the hour between 6:00 a.m. (Hong Kong/Singapore time) on Monday to 10:00 p.m. (United Kingdom time) on the following Friday. Snapshots of 'quoted rates' are taken over a two minute window -/+ 1 minute either side of the fix from a single indicative quote platform. The median rate is calculated independently for bid and offer quotes for each currency and averaged to calculate a median mid-rate. These are the published rates.

Non-trade currency methodology

1. WMR captures the rates for single quotes. 9 single snapshots of quoted rates (bid and offer rates) are taken every 15 seconds from 1 minute before to 1 minute after the fix. The snap takes the last quote that happened in that 15 second window.
2. Data are taken in the form of indicative quotes from Thomson Reuters information service. The financial institutions that provide these captured rates are not anonymous.

3. There is a systematic process on the captured data to identify where quote data should be flagged for validation. This process is run both round the clock and prior to publication of the calculated fix rates. In addition to the standard checks, operation specialists who oversee the fix can identify certain institutions that repeatedly miss the tolerance threshold, by providing rates that are different to those in the market, and, where the institution quotes for a particular currency, add them to a Quality Watchlist. Operations specialists can confirm a rate as accurate and include it in the fix, or confirm it as inaccurate and replace the rate.

4. The mid-rate is calculated from the average of the median bid and median offer. Decisions are verified and quality assured by a third party within the WMR fix team. The bid and offer rates are published to 4 decimal places and the mid-rate is published to 5 decimal places.

If there is little or no market, the central bank official reference rate can be used.

Forward and NDF Currencies

Forward and NDF rates are calculated in a similar manner to the non-trade currencies but a single snapshot is taken during the window rather than multiple snaps.

b. ECB

The ECB owns and administers euro foreign exchange reference rates for 32 different currencies on a daily basis.[9] The rates are published for currency pairs that are actively traded against the euro, accounting for newly acceded countries and also reflecting public demand. The reference exchange rates against the euro published by the ECB are released for reference purposes only.

ECB Methodology

The ECB reference rates are based on a daily concertation procedure between central banks within and outside the European System of Central Banks (ESCB), which normally takes place at 2.15pm CET.

1. Only one reference exchange rate (the mid-rate) is published for each currency. The ECB uses the 'certain' methodology i.e. that 1 EUR = x foreign currency units.

2. The ECB pays due attention to ensuring that the published exchange rates reflect the market conditions prevailing at the time of the daily concertation procedure. Since the exchange rates of the above currencies against the euro are averages of buying and selling rates, they do not necessarily reflect the rates at which actual market transactions have been made.

[9] http://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html

3. The reference exchange rates are published both by electronic market information providers and on the ECB's website shortly after the concertation procedure has been completed.

3. How the market uses foreign exchange fixes

From the working group's discussions with a wide range of market participants on both the buy and the sell-side, most of the trading at the fix relates to orders from asset managers, including ETFs, or corporate end users.

a. Asset Managers

Asset managers execute their FX transactions either indirectly via their custodians or directly via their own FX desk if they have one. They use a range of methodologies in relation to FX benchmarks. In general, there is a clear separation in the market between actively and passively managed funds.

Actively managed funds tend to execute as exposures arise, rather than seeking to replicate fix prices. Execution is often carried out in competition, with a range of counterparties providing quotes for orders. In a number of cases, transactions are put through a third-party platform to monitor and ensure best execution. A number of asset managers state that they purposefully avoid the fix and the resulting volume peaks in the market, for example in relation to share class hedging. Others noted that transacting at the most liquid time of day in the market does not necessarily guarantee best price.

Passively managed funds, including ETFs, are more likely to use the WMR fix to minimise index tracking error and meet mandate transfer requirements, because it is believed to transfer execution risk to the brokers and that the price is a reasonable representation of the market. Many asset managers noted that they had progressed to using the fix because of previous concerns about the non-transparency of bilateral pricing by custodian banks. In some cases, the portfolio manager is given limited discretion to transact ahead of, say, the month-end rebalance. However, even in these cases it is very much dictated by the mandate with the end-client.

Trading at the WMR fix has also been viewed as a convenient execution method because it is set at the end of the London trading day when the market is liquid, and allows managers to aggregate their orders over the course of the day, and if possible, take advantage of internal netting opportunities. The WMR fix is also seen to have a significant cost advantage as it is easily replicable[10] and provides a mid-rate, while offering a wide pool of liquidity since large fix orders are concentrated around that time. However, some asset managers realise that executing FX transactions at the fix did not guarantee the very best execution, in particular when compared to, say, a time weighted average price over a longer time period. The most sophisticated asset managers (especially those having a centralised FX desk) more generally

[10] There are sufficient information and data provided to be able to transact as close as possible to the exchange rate used in the index calculation.

execute their trades throughout the day, possibly using a range of facilities (eg direct execution, algorithms etc).

Our discussions with market participants indicated that asset managers responsible for equity, bond or global mandates focus primarily on security selection to track or exceed the performance of their benchmarks. Currency exposure is considered as a residual risk they try to mitigate to the largest extent in order to minimise their tracking error. Currency risk emerges in the event of in/outflows from clients, transactions between their portfolios or asset classes and the rebalancing of benchmark indices to reflect movements in the underlying prices. Most investment mandates are benchmarked against global equity indices (eg MSCI), bond indices (eg Barclays, BAML, Citi, JP Morgan) or credit indices (Markit) that use the WMR 4pm London fixing for FX valuation and transaction purposes. Moreover, given the tendency for most passive managers to execute their foreign exchange at the same time and hence the same rate, differences in fund performance because of foreign exchange rates are minimised.

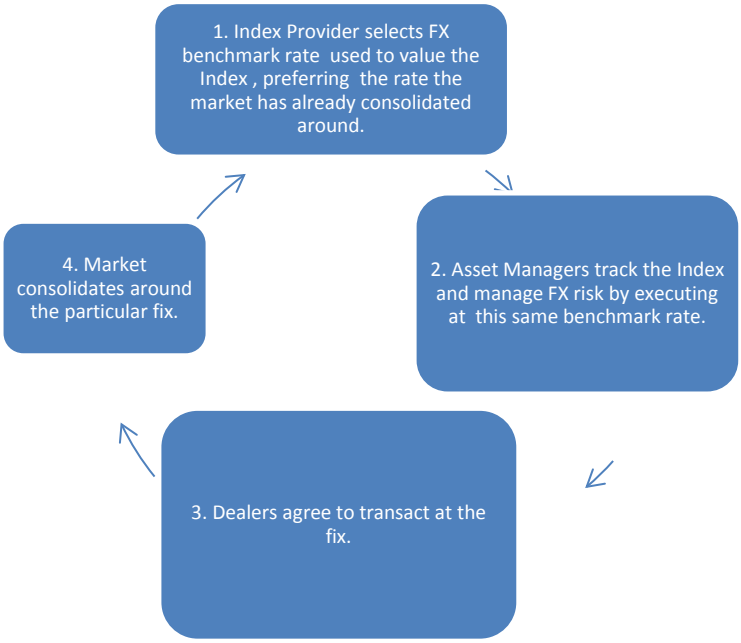
As a result, there is a self-reinforcing dynamic whereby indices are benchmarked versus these fixes, investors tracking those indices seek to minimize their FX risk by transacting directly at those same fixes. This builds a strong base of demand for the fixes and attracts further activity accordingly (Figure 2).

There was slightly more concern about the fix from passive index trackers, reflecting recent publicity. While active users of the indices would be seeking to outperform the benchmark, passive index trackers were trying to match the indices precisely. As a result, passive users were seeking to replicate the fix and their clients were most likely to be exposed to volatility in the rate, while noting that the volatility was also incorporated in the index being tracked.

The dominant use of the WMR fix is a global phenomenon, given the widespread use of international indices for a range of assets. Our discussions have found very similar responses in the UK, the euro area, Australia, Singapore, Canada and the US. But there are some regional variations. For example, the use of the WMR fix for transaction purposes is less prevalent for those currencies where there are restrictions on access (such as capital controls).

Japanese asset managers, operate somewhat differently in this regard and can be classified broadly into two major categories: One type is called “management type trusts” where trust banks act as an asset manager investing on behalf of clients such as pension funds who entrust their assets to the trust banks. The other type is called “investment based trusts”, where a third party asset manager gives instructions to investment trust banks, which in turn act as an agent (or custodian). While management type pension trusts commonly reference the WMR 4pm London fix to execute FX transactions, investment trusts tend to conduct transactions following the judgment of fund managers without referencing FX benchmarks. Although the structure of the asset manager industry is different, the motivations for using a fix or not are very similar to those in other jurisdictions.

Figure 2:



Overall, most of the asset managers surveyed, across all jurisdictions, noted that they have not and do not currently plan to change their usage of the WMR benchmark for valuation or transaction purposes. For passive funds, options are very limited, given that the indices that they track generally use the WMR 4 pm London fix and building internal FX trading capabilities is not considered cost effective. Those asset managers who had not done much due diligence on the costs of their FX management were more likely to be doing so now.

b. Non-financial corporates

Non-financial corporate usage of the WMR fix is mixed. Some corporations execute their FX transactions as exposures arrive and do not transact around the fix. Others use the WMR fix for certain currency pairs (particularly smaller pairs) or where their relevant time zone is not when the FX market in that currency pair is most active. A number of corporates use execution algorithmic trading (through facilities provided by their dealers) for particular currency pairs or larger orders, and there is appetite in the market to increase their usage. The WMR fix was generally viewed to be independent and transparent.

Fix usage has grown over the past decade and, as with asset managers, was routinely attributed to a dissatisfaction with the service provided by their banks. Increased visibility of the FX market for participants had led to corporates seeking more transparent execution arrangements and pricing structures.

Those corporates that do use the fix, cite the same motivations as the asset managers: the rates are seen to be widely used, they are set at relatively liquid times in the market, and in some cases execution at this rate minimizes FX risk given valuation practices. However, since corporates are less likely to operate under restrictive mandates, using the fix is more likely to be used for a subset of their transactions, particularly those in which the business is small, with other trades being done at market prices.

Some non-financial corporates may seek to transact at the fix to help enhance efficiency. For example, some dealers offer fixing services whereby a client can send orders during the day which would be netted off, with the residual executed at the fix price via an automated, straight-through-process. Other non-financial corporates may choose to transact at the fix for other reasons, for example to fund their forecasted currency needs for the month ahead and to minimise the FX volatility associated with currency positions which may be valued at the same fixing rates.

As with asset managers there are regional and time zone differences. In Australia, large corporates with extensive foreign exchange needs generally do not transact around the fix. They are more likely to execute on a best endeavours basis throughout the course of the trading day. Given liquidity is generally greatest in the Australian dollar in the London trading day, for a number of corporates, the bulk of their transactions will occur during that time.

Throughout Asia there is also a mixture in the usage of FX benchmarks across corporates. Corporates rely on FX benchmarks for valuations, to benchmark hedge effectiveness and for merger and acquisitions transactions. In general, the WMR benchmark is not frequently used. Instead the use of benchmarks published by central banks is preferred given the need to utilise a transparent rate which can be verified by auditors. In terms of FX transactions, this is more likely to be carried out through dealers at prevailing market prices during Asian hours.

In the euro area, corporates mostly rely on the ECB's reference rates for valuation, but also hedging purposes, as they are perceived as providing a transparent and independent reference.

c. Index providers

Many index providers use the WMR 4pm London fix to aggregate indices into a common currency. Forward rates are used to provide hedged versions of some indices, but the majority of clients who track an index use unhedged versions which take that 4pm spot rate. The level of due diligence around the fix calculation conducted by these providers varied considerably, but there was a general sense that the rates were selected based on their prevalent use with a reliance on the FX rate providers to have carried out sufficient checks.

Neither the bond index providers nor their clients had noted any concerns with the fix calculation. Any queries on calculation accuracy tended to be focused around bond prices rather than FX rates. Bond prices were generally taken at local market close for each respective jurisdiction, creating a discrepancy between the timing of the bond prices and the fix. But this was not thought to be important by the index providers: they cited market convention and the difficulty of changing to a different benchmark.

In contrast, a large equity index provider had conducted thorough due diligence of the WMR rate and had a good understanding of the methodology. Nonetheless, they did not note any concerns about the calculations. One other index provider indicated that their data is provided via automated feeds and data checks are performed to determine whether the currency value is sensible (for example, does not have a misplaced decimal) and that the daily move is consistent with the broader market moves in that currency for that day. If not they would check with WM.

Nonetheless, there was little appetite in the market to move to alternative FX benchmarks. Index providers generally seek to choose a rate around which the market has naturally coalesced. It was noted that all index providers aimed to make their indices investable, easily accessible and replicable, which results in clients further favouring a common rate such as the WMR 4pm London fix. Other than being the most widely used in the market it was felt that no other benchmark with similar properties existed, and that the WMR fix has a historical track record of providing credible and robust data. Furthermore, replacing the WMR fix would present substantial logistical challenges.

Contacts amongst the index providers said they had not seen any increase in clients querying benchmark calculation methods following allegations of front-running and benchmark manipulation. Overall, like other market participants, index producers agreed that any issues around benchmark accuracy would be centred on the possibility of market manipulation around the fix, rather than the current calculation methodology.

4. Observed characteristics of market price movements

Data Analysis

The group analysed the general daily trading patterns of seven currencies against the U.S. dollar[11], using high-frequency transactional data from the EBS and Thomson Reuters Matching trading platforms (the main data sources for WMR fixes) over the April to September 2013 period. These venues are the two key electronic trading platforms used to execute interdealer foreign exchange trades. The goal of the exercise was to better understand the average behaviour of exchange rates and of trading activity on these two platforms around the WMR 4pm fix and to put this in the context of the observed behaviour over the rest of the day.[12] While the data analysis provided reasonably similar patterns for all the currencies, including for the 90th percentile, it did not focus on analysing outliers. We report aggregate market behaviour; the data used in our analysis does not contain information on the identity of individual market participants.

Trading Patterns during the Day

All currencies exhibit sharp spikes in trading volume at certain times of the day, with the timing of some spikes common to all currencies and the timing of other spikes dependent on the specific currency[13] (Chart 1). For all the currencies we analyse, when using a 1-minute

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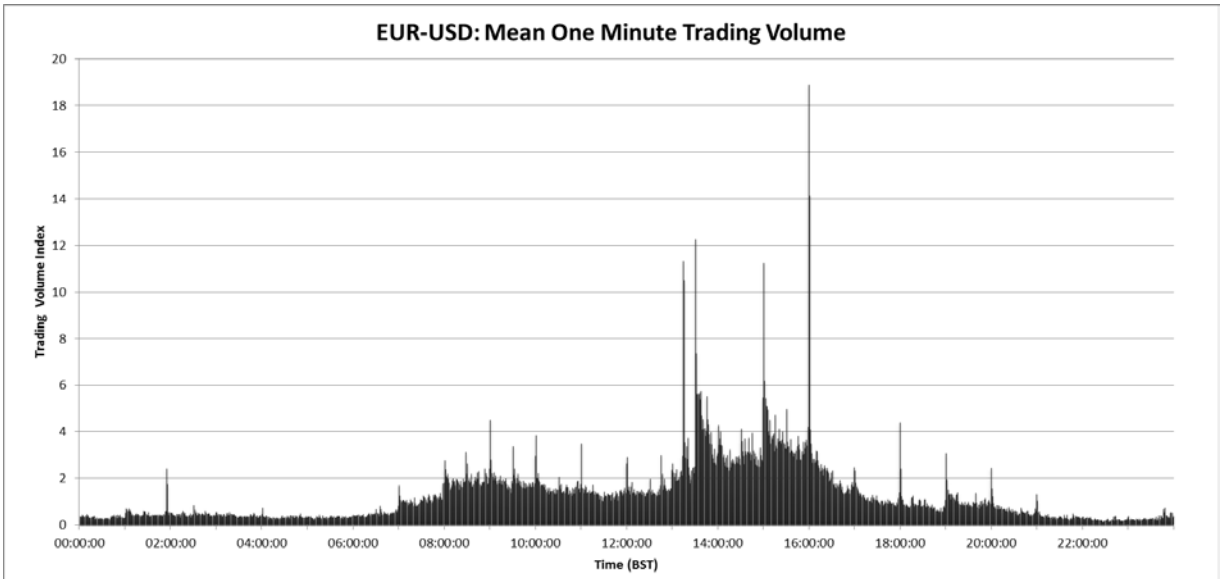
[11] The seven currencies are: EUR, JPY, GBP, CAD, AUD, CHF, MXN. We thank EBS and Reuters for the data.

[12] We note that a large share of the trading activity around the time of the WMR 4pm fix also occurs on other venues, such as directly with dealers (much of it "internalised" by those dealers) and voice brokers.

[13] We only show graphs describing the behaviour of EUR-USD in the report as they are representative of the behaviour exhibited by the other six currencies.

window over which to measure trading volume, the WMR 4pm London fix generates the highest average volume spike of the day, in most cases being at least 10 times greater than the 1-minute mean trading volume for that currency.[14] The other common significant peaks in volume include the North American data releases at 8:30 ET and the 10:00 ET North American option expiration time[15]. Trading volume can also be high during a specific currency's local fixing window, such as for the euro at the time of the ECB's reference rates at 14:15 CET, and for the yen in Tokyo at 09:55 local time[16], or during their specific data release times. In general over the day, trading volume rises during London daytime hours and is highest when both London and New York are actively trading. The volume spikes associated with the WMR 4pm fix tend to be largest at month ends and quarter ends, likely reflecting larger portfolio rebalancing needs at those times.

Chart 1



Index: 1 = Average one minute volume over the sample period (April 2013-September 2013). Source: EBS.

Our analysis, which measures "volatility" as absolute price changes[17], shows that the large spike in average trading volume at the time of the WMR 4pm London fix is not associated with a correspondingly large spike in average volatility at that time (Chart 2). In fact, for all currencies, the highest average volatility experienced during the day in a 1-minute trading window is associated with the 8:30 ET North American data release, a time when important macroeconomic information is incorporated into asset prices. The 10:00 ET option expiration

[14] For several currencies, there are a few days when the 1-minute WMR 4pm London trading window can account for over 10% of the platform's daily trading volume.

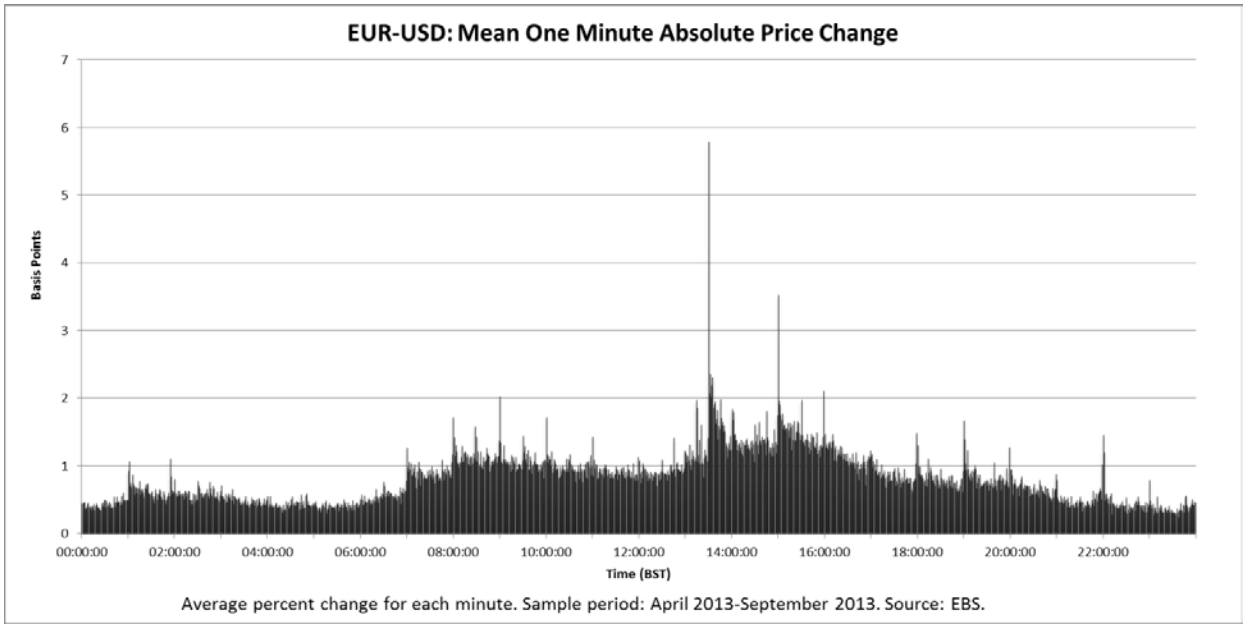
[15] Data can also be released at 10:00 ET.

[16] Each financial institution aggregates clients' orders on a daily basis and executes them around 09:55 Tokyo time at a single price applicable to all orders. The prices are determined by individual financial institutions and in many cases differ from each other.

[17] We measure volatility as the absolute value of the difference in the natural log of the mid-price over a given time interval, so essentially as the absolute percent change in the mid-price over that interval.

time is also associated with higher average price volatility than the WMR 4pm London fix. Average volatility during the 4pm fix rises somewhat relative to the minutes before and after the fix, but the increase is not particularly large, particularly when taking into account the high volume of trades and the order imbalance at that time. Even when looking at the 90th percentile of price movements at the time of the fix, the movement in price is moderate in the sample we studied[18].

Chart 2

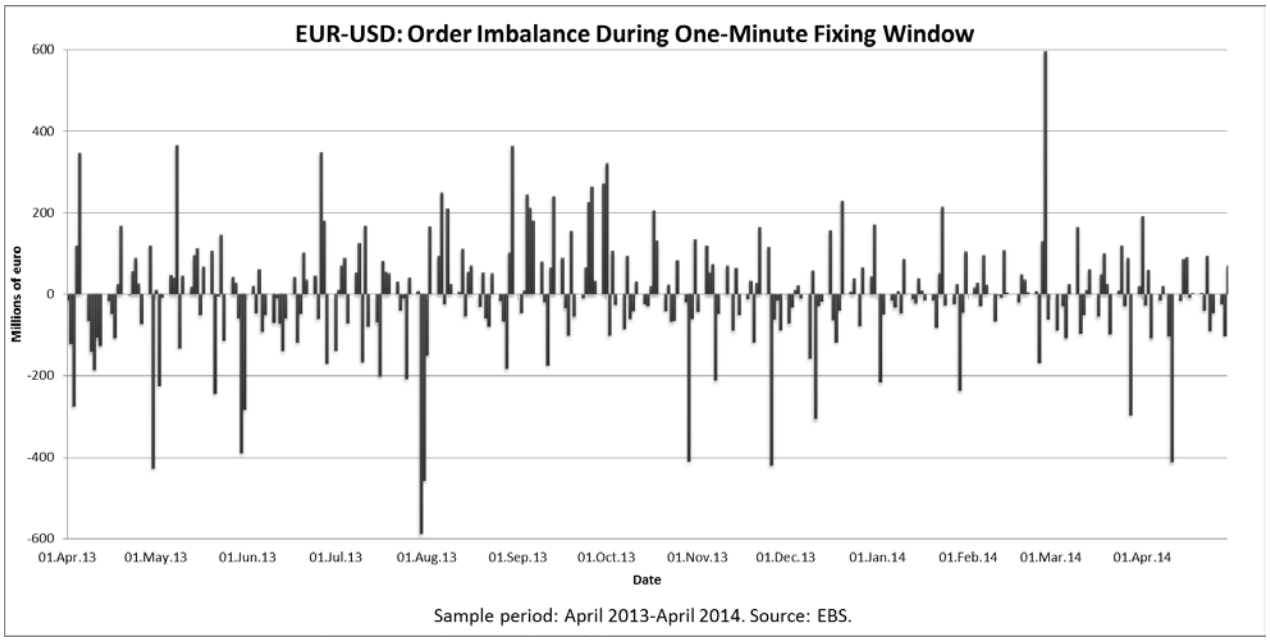


We measured the order imbalance in our data as the net of trades done at the ask price and of trades done at the bid price over a given period of time[19]. On average, there is a significantly larger order imbalance, positive or negative, during the WMR 4pm London fix window than at any other period of the day, including the time of the North American data release. The size and the direction of this order imbalance does not have an obvious predictable pattern from day to day, with a notable exception: for most currencies, similar to what we observe for trading volume, the imbalance tends to be largest at month ends and quarter ends (Chart 3).

[18] This does not preclude the possibility that prices could move more substantially at the time of the fix, as some dealers could work to minimize their order execution risks by aggressively filling orders, particularly if the market is relatively illiquid and/or the order imbalance particularly large at that time.

[19] This is equivalent to netting the buying and selling actions of the aggressors (takers) in the market. We used trading volume for the EBS currencies, and number of trades for the Thomson Reuters currencies.

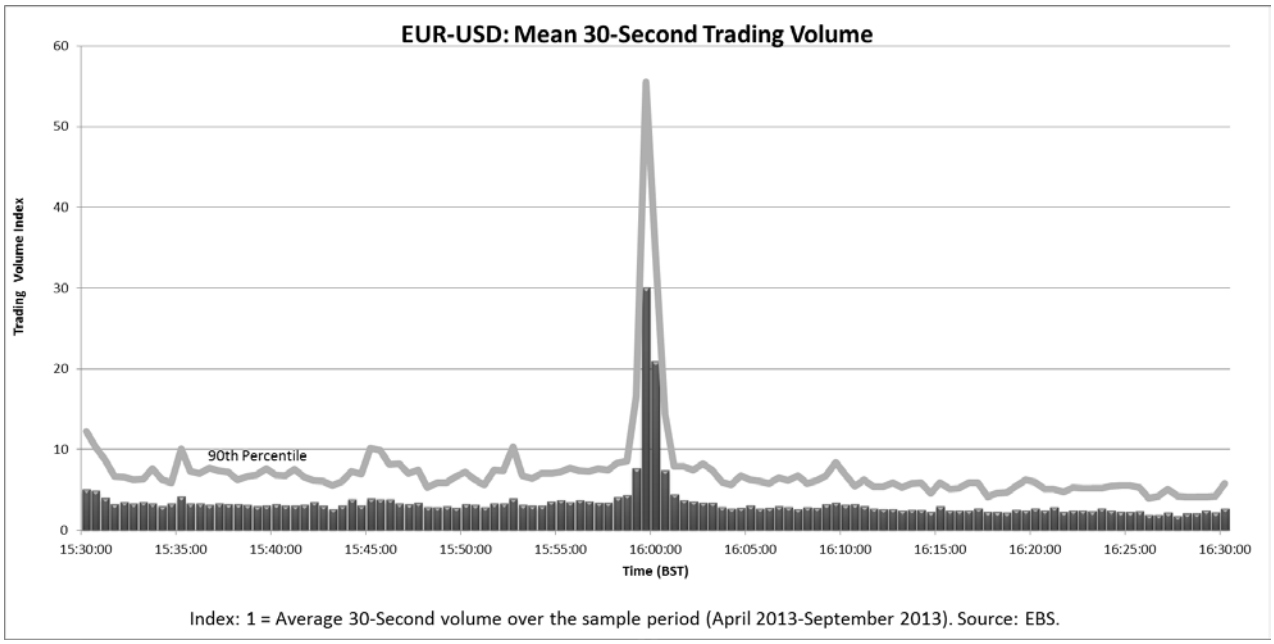
Chart 3



Trading Patterns around the WMR 4pm London Fixing Window

Trading around the 1-minute fixing window for the WMR 4pm London fix is very concentrated for all seven currencies (Chart 4). Based on analysis of the EBS and Thomson Reuters trading data, it appears that, on those platforms, traders often do not begin to execute to hedge their fixing order commitments until they are very close to the start of the 1-minute calculation window. This likely reflects the fact that dealers are trying to minimize their tracking or pricing error relative to the fixing price they guarantee their customers. Generally, only the prior 30 seconds show any noticeable rise in trading volume, and in all cases the vast majority of the trading takes place during the actual 1-minute calculation window. Studying second by second data, we see that the trading volume rises substantially as the fixing window opens and then often gradually declines as the fixing period proceeds. Trading activity then falls off quickly after the fixing window closes.

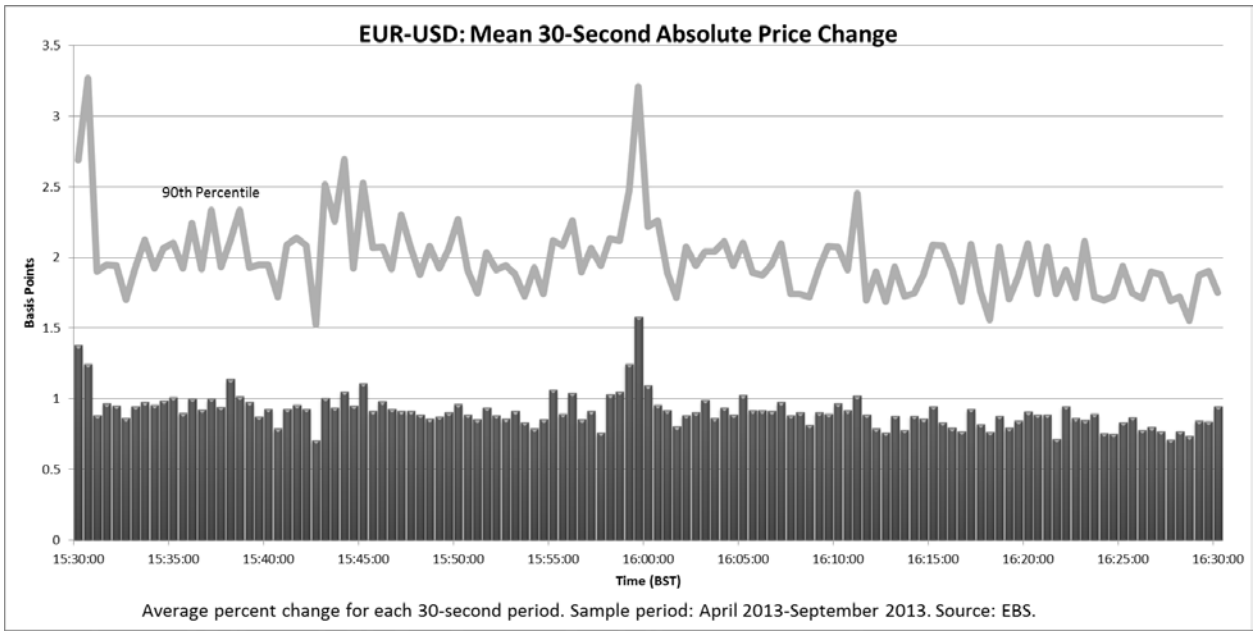
Chart 4



Index: 1 = Average 30-Second volume over the sample period (April 2013-September 2013). Source: EBS.

The moderate price volatility experienced during the fixing window (Chart 5) is probably due in great part to the high market liquidity present at that time. In fact, for most currencies, and despite the slight uptick in volatility, bid-offer spreads during the 1-minute window remain at or drop to their lowest levels of the trading day. We believe this likely reflects the fact that some traders attempt to fill their currency needs at the fix by posting very aggressive limit orders, instead of crossing the spread to complete their transaction, thereby limiting their execution cost relative to the mid-rate guaranteed to the customer. The average size of individual trades rises during the fixing window, also reflecting the high liquidity during that time.

Chart 5



Average percent change for each 30-second period. Sample period: April 2013-September 2013. Source: EBS.

In response to questions on the role of high-frequency trading (HFT) at the time of the WMR 4pm London fix, we studied EBS euro-dollar data which breaks down trading volume into activity by three broad groups of traders: dealers trading manually, dealers trading algorithmically, and prime-brokered customers trading algorithmically. HFT activity accounts for a majority of the third group's trading volume. Our analysis shows that, at the time of the fix, trading volume increases for all three groups. However, the share of overall trading volume accounted for by the HFT group declines sharply, while the share of trading volume accounted for by the manual group rises sharply. The large increase in trading volume on EBS at the time of the WMR fix therefore owes primarily to an increase in the activity of dealers trading manually.

5. Considerations of alternative fix calculations

The IOSCO Principles (Principle 6) emphasize that benchmarks 'seek to achieve, and result in an accurate and reliable representation of the economic realities of the interest it seeks to measure, and eliminate factors that might result in a distortion of the price, rate, index or value of the Benchmark'. There are many different ways of calculating a benchmark rate from a given data set. In this section of the report we briefly examine the different methods that can be adopted and their merits. Appendix 1 details some of the methods which include the median approach used by WMR and various forms of averaging, including volume weightings. There can be a general conflict between those methods which represent the best statistical representation of the central tendency of a data set and those which are least open to manipulation. That arises because the best statistical measure will usually be the one which makes most use of all the information available – but manipulation can operate precisely by providing information that does not represent the true market.

In choosing a preferred fixing method there are several other opposing considerations. First the users wish the fix to be replicable in the sense of being able to carry out their rebalancing transactions at the fix rate. In the case of executing dealers, replicability reduces the risk they are incurring. In the case of the asset managers, replicability minimises (or eliminates) their tracking error from foreign exchange.

Second, the rate should not be easy to manipulate. That argues for more complex calculations, longer periods and for being unpredictable. Third, the rate should be resilient to changes in trading patterns, particularly in times of market distress. Fourth, one might take into account that a 'market price' is a moment in time – the price fluctuates along with news such that a long period of data would average across many different market clearing prices reflecting different information sets. Fifth, there is a question of whether the market is best served by being concentrated at fix times or more spread out. In general more concentration would give better liquidity. But it can also create greater risks (generating incentives for inappropriate behaviour) as the net trade sizes are likely to be larger. Many of these considerations are more prevalent for non-trade currencies where the markets are smaller and more vulnerable to shocks. Non-trade currencies are therefore potentially easier to manipulate, but the same considerations of less trading mean that the incentive will also be less.

The median method favoured by WMR, seems at least as defensible a way of dealing with these trade-offs as any other, such as a volume weighted or time weighted price. It is more difficult to ensure that any given trade will or could affect the median outcome. To influence

the median, the extra trade or trades would have to be such as to hold the whole market close to the desired outcome throughout a large part of the fixing window, with the effect that that trades in the fixing calculation would be close to the median desired. Nevertheless, our recommendations include some suggestions in which the fix calculation might be made more robust to manipulation without sacrificing replicability.

6. IOSCO assessment of methodology

IOSCO is completing an assessment of the implementation by the WM Company of the IOSCO Principles in respect of the WM/Reuters 4pm fix. IOSCO's findings and recommendations will be included in the final version of this report.

7. Recommendations

The FX benchmark allegations led a number of institutions to conduct independent research into how and why benchmarks could be manipulated. Conclusions differ slightly but there is compelling evidence that it is the potential for improper trading behaviour of market participants around the fix, more than the methodology for computing the fix (although the two interact), which could lead to potential adverse outcomes for clients.

Several banks informed the group that they have already sought to address concerns about trading behaviour and manipulation through revisions to their internal guidelines and procedures for executing orders at the fix. In parallel, there is a growing demand from the asset management industry to request these changes. In what follows we make a series of recommendations which we believe would lead to improved governance and controls in banks or other institutions trading FX.

The recommendations for reform of benchmark rates in the foreign exchange market can be divided into the following broad categories:

a. The calculation methodology of the WMR benchmark rates.

b. The publication of reference rates by central banks.

c. Market infrastructure to support the execution of fix trades.

d. The behaviour of market participants around the time of the major FX benchmarks (primarily the WM 4pm London fix).

e. Recommendations stemming from the IOSCO review of the WMR fixes.

a. Benchmark calculation

Currently, WMR utilise a single primary data source for the calculation of the fixing rate for each currency pair, with the source varying depending on which platform most trading in the currency pair is traditionally based. However, it receives data feeds from three different platforms, in some cases using the others as back-up when the primary source is insufficient. The core electronic platforms of Thomson Reuters Matching and EBS are particularly important for price discovery, because they are where the dealers typically manage their risk. But in many of the currency pairs, the single feed covers a small share of overall market activity.

1) **The group recommends the fixing window be widened from its current width of one minute. It seeks feedback from market participants as to the appropriate width of the window.** Many buy-side contacts have suggested that a longer fixing window would allow the market 'greater time to digest the flow of fixing related trades'. Since the fix is based on the median rate, not the mean over the window, it is not clear that the width of the window should affect when market participants choose to trade in quite the way this comment suggests. There are, however clear benefits to having a wider window: more data points would be available to help fix the rate, and it would be harder to manipulate. That reflects both the fact that it would be harder to influence prices over a more sustained period and unusual price movements around the fix would be more visible. And to the extent that participants do use the whole of the window for fixing-related trades, it could have the effect of reducing volatility.

While these arguments could be extended to advocate an ever-wider fixing window (eg an all-day average), the wider the window, the less useful the fix rate as a market price at a point in time. In particular it would be more difficult to replicate the fix rate and risk would be increased for those users trying to match benchmark index rates. For example, the wider the window the more the rate could be affected by emerging news causing uncertainty about where and when the median rate would fall (this is less of an issue if an average rather than a median were used for calculation over a wider window). Most participants we spoke to said they would welcome a wider window, but the precise span varied. The group's view is that the ideal width of the window should strike a balance between reducing incentives for manipulation while at the same time still ensuring the fix is fit for purpose by generating a replicable market price.

A flexible approach with different length time windows per individual currency instead of a standard one-for-all should be considered, as quotes for less liquid currencies can be less frequent and therefore the trading activity for such currency may not be sufficiently captured in the standard time window.

2) **The group seeks feedback from market participants as to whether there is a need for alternative benchmark calculations such as a volume weighted or time weighted benchmark price calculated over longer time periods up to and including 24 hours** (see section 5 and Appendix 1). Such alternative benchmarks may be more fit for purpose for specific uses (eg valuation).

3) **The group also seeks feedback from market participants as to whether the fixing windows should continue to be centred exactly on the hour (half hour) or whether the fixing window should close or start on the hour. Market participants should consider whether this view changes dependent on the size of the window.** Many official data and news releases are released exactly on the hour or half hour (e.g. UK ONS data releases are at 9.30am). Whilst there is seldom news or data released at 4pm London time, it is possible. Any surprise in the news could lead to a different market clearing exchange rate. The median rate would fall into either the pre- or post-news period depending on how many observations are recorded. This would create some uncertainty around what information the fix rate was reflecting. As a corollary of this recommendation, market-making dealers should generally be aware of which times of day are most likely to be disrupted by news releases, and

clients should be advised not to use fix rates at those times or when important data is due.

4) **The group proposes that WM investigate the feasibility of receiving price feeds and transactions data from a broader range of sources to further increase its coverage of the FX market during the fixing window, and should regularly assess its coverage as market structure continues to evolve.** In that regard **the group also proposes that in the short term, WM develop its methodology to utilise the transactional and quote information from both Thomson Reuters and EBS.**

While in principle, arbitrage across FX platforms should ensure the conformity of the pricing available on each platform, including the trades executed on a wider range of platforms should ensure that the fix calculation best represents the market during the fixing window. The more data sources that are utilised, the more representative and resilient the fix will be. Individual FX trading platforms may not always cover the full range of currencies, but rather specialise on certain currencies, so to cover the whole spectrum, feeds from several platforms are needed. It should also reduce the scope, at the margin, for fixing rates to be manipulated. In doing so, consideration should be taken as to how representative different platforms are of the market as a whole, including particularly, at the time of the 4pm London fix. That should reflect the size of trades on each platform, and the type of participant, as well as volumes. With the electronic market place continuing to evolve, the selected platforms should be reviewed on a regular basis, subject to keeping some stability in the computation methodology. Such changes to the methodology should be clearly communicated.

b. Foreign exchange reference rates set by central banks

Central banks compute and publish indicative foreign exchange reference rates for public policy purposes. Central bank reference rates are computed according to different methodologies, published at various frequencies and used by a wide range of economic agents for diverse purposes: mostly in legal contacts, valuation of foreign exchange denominated assets and liabilities, and, to some extent, execution of foreign exchange transactions.

Reference rates set by central banks do not fall under IOSCO principles for financial benchmarks since "Benchmark Administration by a National Authority used for public policy purposes (e.g., labour, economic activity, inflation or consumer price indices) is not within the scope of the Principles".

5) **The group considers that, where central banks publish reference rates, it is the responsibility of each to set internal procedures.** Central banks should at least take note of guidance from the IOSCO principles. However, **where central bank reference rates are intended for transaction purposes, the group encourages compliance with the relevant IOSCO principles.** In that respect, transparency in governance and computation methodology would meet expected public demand and reinforce the credibility of the relevant reference rates.

c. Market infrastructure

As noted above, there is a significant demand amongst various types of market participants to transact at the fixing price. This results in dealers having advanced information about flows as

well as having to manage risk around a particular rate which is unknown at the time they take the order. In turn, this creates a potential incentive to (a) manage their risk by finding offsetting market flows amongst other dealers and (b) move market prices beyond that determined solely by demand and supply so as to generate a profit.

One approach would be to seek to prevent dealers from agreeing trades at a yet-to-be-agreed price altogether unless dealers are properly and transparently compensated for the risk. To be effective, an outright ban on fix trading would require legislation or direct regulatory action, which is beyond the scope of this report. And given the current demand for transactions at the fix, it could have unforeseen consequences as asset managers sought alternative ways to reduce their risks. The recommendations in this section of the report are therefore designed to permit such trading activities but to minimise their scope and the potential and incentives for manipulation. This issue may need to be revisited in the light of any future discussions around market regulation.

A number of market initiatives have recently been proposed to address these issues. Most of these have the form of maximising the netting opportunities of fixing orders and then executing the order in a way that clearly delineates the separation between the dealer acting as principal (that is trading on its own account) and acting as agent (that is, transacting solely on behalf of the customer).

6) **The group supports the development of industry-led initiatives to create independent netting and execution facilities. However, it also is interested in seeking feedback from market participants on the development of a global/central utility for order-matching to facilitate fixing orders from any market participants.** The group is fully aware of the various complex issues that the creation of such a utility could raise, including whether it should be regulated. In contrast to the individual market initiatives, a central utility would have the potential to maximise netting opportunities and reduce the need to provide advance information on customer flow to a dealer. The residual trades after the netting process would then be executed or auctioned in the market during the fixing window to determine the fixing price. The precise method of executing the residuals to achieve a clearing price will determine in part whether such a utility is feasible or not and the group is also interested in feedback on appropriate execution methods for those residual flows.

d. Behaviour of Market Participants

To further address the issues of risk management and incentives to manipulate, the group proposes the following principles and guidelines for participants in the foreign exchange market, both in terms of fixing business and more generally. To be legally enforeceable, such principles and guidelines may require legislation or direct regulatory action, which is beyond the scope of this report.

- Foreign exchange dealers

Foreign exchange dealers currently receive instructions to trade, often well in advance of the fix, at a price which will be determined by the outcome of their collective trading. As noted earlier in the report, this structure creates incentives and the opportunity to manipulate the fix for example by colluding and moving the market price so as to result in favourable outcomes.

Dealers are also often agreeing to trade at mid-market rates, rather than at the bid or ask. This has a number of implications: customers are not being passed the cost of transactions in the traditional, direct manner (i.e. through the bid-ask spread) – adding to the pressure on dealers to make a return from the price movements. The dealer also faces the risk that the market in fact moves strongly against them before the fix, resulting in a potential for large losses.

In producing this report, questions have arisen about the sharing of information between dealers. In an OTC market, some information is always given up by dealing with a counterparty, but more general sharing of trade information, price or quantity, between market-makers risks inappropriate collusive behaviour.

Existing codes of conduct already describe practices for l restricting the sharing of information. For example, section 3 of the NIPS code and section 10 of the ACI Model Code state that that *"Principals or brokers should not, without explicit permission, disclose or discuss, or supply pressure on others to disclose or discuss, any information relating to specific deals which have been transacted, or are in process of being arranged, expected to or with the parties directly involved (and, if necessary, their advisors) … All relevant personnel should be made aware of, and observe, this fundamental principle."* However, recent allegations of misconduct in the FX market suggest that this principle has not always been followed by all market participants.

The next set of recommendations relate to removing the incentive for dealers to manipulate the price (note that price movements will always occur in the fixing window to reflect the net balance of supply and the demand in the market):

7) **The group recommends that fixing transactions be priced in a manner that is transparent and is consistent with the risk borne in accepting such transactions. This may occur via applying a bid-offer spread, as is typical in FX transactions, or through a clearly communicated and documented fee structure such as a direct fee or contractually agreed price.** This will help to provide greater clarity and transparency around the transaction cost borne by the customer and the risk borne by the dealer in accepting such a transaction at a yet-to-be-agreed price.

8) **The group recommends that banks (and other FX dealing intermediaries) establish and enforce their internal guidelines and procedures for collecting and executing fixing orders including separate processes for handling such orders.** Such guidelines could for instance specify a time frame for accepting orders as well as thresholds beyond which compliance offices should be informed and/or fixing orders approved by management. Firms should establish distinct and separate processes for managing fixing flows as part of their effort to ensure that customer and flow information is appropriately protected.

9) **Market-makers should not share information with each other about their trading positions beyond that necessary for a transaction. This covers both individual trades, and their aggregate positions.** This should apply at all times, not just in relation to fix orders and, at a minimum, be enforced through audited internal procedures and robust disciplinary procedures. It is not intended that this restriction should prevent information flowing from normal, bilateral OTC trading. But only the minimum amount of information should be provided during the course of such transactions.

More generally, it is understood that market-makers are expected to advise clients on the state of the market. But this should not contain information about individual trades of other customers, nor should it include information of positioning around the fix (that would allow, say, a hedge fund, to anticipate fix flows).

10) **Market-makers should not pass on private information to clients or other counterparties that might enable those counterparties to anticipate the flows of other clients or counterparties, especially around the fix.** Only the information necessary for a transaction should be provided.

11) **More broadly, the group recommends that banks establish and enforce their internal systems and controls to address potential conflicts of interest arising from managing customer flow.** For example separating trading activity for clients from own trading. **The group was told that a number of institutions are initiating changes in this regard.**

12) **Codes of conduct that describe best practices for trading foreign exchange should detail more precisely and explicitly the extent to which information sharing between market-makers is or is not allowed. They also should, where appropriate, incorporate specific provisions on the execution of foreign exchange transactions including fixing orders.**

In many jurisdictions, the existing codes already contain some of these elements, but they should be reviewed in light of these recommendations.

13) **The Group recommends stronger demonstration by market participants of compliance with the codes of the various foreign exchange committees, as well as their internal codes of conduct.** We would expect well-run organisations to have in place systems and controls appropriate to their business. Market participants should demonstrate that policies, procedures, and controls are in place and that they are operating effectively, including processes for enforcement and monitoring by them so they may be able to evaluate compliance in these areas. Stronger demonstration of compliance could also take the form of yearly reconfirmation of the codes (both internal and external) by sales and traders through specific trainings and regular exams. We would expect more public endorsement of the codes by the various foreign exchange committees and their member banks; the group is aware that such a process is currently being considered by these committees.[20]

- Index providers

The behaviour of the FX market is driven in part by the way that index providers – whether bond, equities, credit or other international indices – use FX rates to construct their indices. For example, by using the mid-rate in an index, passive trackers are motivated to similarly demand a mid-price from their market maker.

14) **The group recommends that index providers in other markets should review whether the foreign exchange fixes used in their calculation of indexes are fit for purpose.** The mid-rate may be appropriate if the index is used purely for valuation purposes, although in some index calculations, a benchmark calculated over a longer

[20] See http://www.rba.gov.au/AFXC/meetings/gfxc/2014/gfxc-minutes-20140411.html

period may be a more appropriate valuation metric, given the underlying bond or equity markets being aggregated are closing over the course of the trading day. Alternatively, if the index is intended to be used for execution, a bid or offer variation may more appropriate. FX bids and offers are already available from the WM process.

- Asset managers

Asset managers provide a steady demand for transactions at the fix due in part to the use of that fix by the indices they are tracking. In addition, many asset managers appear to have migrated to using fix prices in order to gain more transparency and better prices than other, less formal, arrangements with custodians previously provided. While the use of these fixes may meet those particular demands, there appears to be a tendency, to provide relatively less consideration of the FX risk they face in their investment activity in comparison to other the other types of market risk they face in their investment activity. That is, even if managing a bond or equity portfolio, managers should not ignore the importance of the FX component.

15) The group recommends that asset managers, including those passively tracking an index, should conduct appropriate due diligence around their foreign exchange execution and be able to demonstrate that to their own clients if requested. Asset managers should also reflect the importance of selecting a reference rate that is consistent with the relevant use of that rate as they conduct such due diligence. They should provide comfort that their foreign exchange transactions are being executed in the best fiduciary interest of their clients and giving due regard to their mandates. Considerations should include whether foreign exchange transactions should be conducted at the WMR 4pm London fix or whether best execution could be achieved at other times of the trading day. Where dealers are given discretionary mandates, the asset manager should ensure that transparency of dealing rates is available e.g. through time stamps.

Appendix 1:
Alternative methods for calculating benchmark rates of market prices

1. Time-Weighted Average Price (TWAP)

A TWAP is the average price over a predefined window, sampled at a regular frequency. The time window can be set to any length to capture a representative view of trade activity.

An advantage of the TWAP is that it is relatively easy to hedge, since the snapshot times are known in advance. A disadvantage is that it can be biased by a single snapshot taken at an illiquid point in time.

2. Volume Weighted Average Price (VWAP)

VWAP calculation takes the weighted-average price of trades over a given timeframe, where the weight of each trade is determined by its volume. As a result larger trades have a larger influence on the price.

This methodology is representative since it reflects actually traded prices and volumes in a given time span. In principle, it is difficult to manipulate, since a market participant would need to execute relatively large volumes in one direction to significantly move the VWAP.

The calculation would, however, require the centralised collection of trade data to avoid incentivising the use of particular trading platforms for large trades. It is also not able to be accurately hedged as a fix since the trade information used in the calculation is only available ex-post.

3. Stylised Volume Weighted Average Price (SVWAP)

A SVWAP calculation takes the weighted-average price of trades over a given timeframe but the weights are derived from an exchange rate's liquidity cycle over a typical trade day. The SVWAP divides the fixing period into a large number of point-in-time samples and takes trades from each. More weight is given to the more liquid times of the day. This is beneficial in markets where it is hard to capture trades throughout the day.

The SVWAP shares similarities with the VWAP but is less reliant on a large volume of actual transaction data so can be calculated during times of stress and, because the fixed volume-weights are known in advance, is more easily replicable in the market.

There is added complexity to a standard VWAP as the weights need to be calculated and maintained to accurately reflect the liquidity cycle.

4. Auction

An auction process would collect all fixing orders and determine a single fixing price that minimizes the order imbalance. The advantage of an auction is that the resulting price is a good reflection of demand and supply and that it mitigates the problem of timing mismatches between orders. Moreover, all the executed orders actually trade at the same price, hence a dealer that agreed to execute a trade at the fixing price does not run the risk of not attaining the fixing price in the market.

However, an auction process necessitates the creation of a centralised facility. Moreover, the design of the auction process can be important to insure against market manipulation. In particular it requires a non-partisan auctioneer to conduct the process.

Appendix 2: Institutions represented on the FSB FX Benchmark Group

Co-Chairs	Guy Debelle Reserve Bank of Australia
	Paul Fisher Bank of England
Australia	Reserve Bank of Australia
Canada	Bank of Canada
Germany	Bafin
France	Banque de France
India	Reserve Bank of India
Japan	Bank of Japan
	Financial Services Agency Japan
Mexico	Banco de Mexico
Singapore	Monetary Authority of Singapore
Switzerland	Swiss National Bank
UK	Bank of England
	Financial Conduct Authority
US	Federal Reserve Bank of New York
	Federal Reserve Board
ECB	European Central Bank
IOSCO	International Organisation of Securities Commissions
FSB Secretariat	Nigel Jenkinson Irina Leonova