

## Use of Financial Benchmarks in TMPG-Covered Markets: Three Sample Case Studies

The concept of a financial benchmark is very broad, but for purposes of the TMPG's current work we reference the definition provided below, which is extracted from the July 2013 IOSCO *Principles for Financial Benchmarks* ("IOSCO Principles"):<sup>1</sup>

**Benchmark:** *The Benchmarks in scope of this report are prices, estimates, rates, indices or values that are:*

- a) *Made available to users, whether free of charge or for payment;*
- b) *Calculated periodically, entirely or partially by the application of a formula or another method of calculation to, or an assessment of, the value of one or more underlying Interests;*
- c) *Used for reference for purposes that include one or more of the following:*
  - *determining the interest payable, or other sums due, under loan agreements or under other financial contracts or instruments;*
  - *determining the price at which a financial instrument may be bought or sold or traded or redeemed, or the value of a financial instrument; and/or*
  - *measuring the performance of a financial instrument.*

In recent years, there have been a number of serious cases of inappropriate and illegal conduct involving the setting of and trading around certain benchmarks. These events have raised questions about the procedures used by benchmark administrators, the suitability of benchmarks selected by benchmark users, and the trading patterns that evolve due to the existence of benchmarks.

The TMPG has developed a set of recommended best practices related to the use of benchmarks in TMPG covered markets, based on an examination of three case studies and informed by relevant policy initiatives such as the IOSCO Principles, the Financial Stability Board's *Foreign Exchange Benchmarks*, the Foreign Exchange Committees' *Global Preamble: Codes of Best Market Practice and Shared Global Principles* and the Bank of England's *Fair and Effective Markets Review*.<sup>2</sup> The TMPG examined the following case studies for its covered markets:

- **BrokerTec 10am Repo Average:** an overnight collateralized borrowing rate that is prepared and used as a benchmark and, according to its publisher, complies with the IOSCO Principles
- **ICAP Fed Funds Open:** a financial indicator that represents the price of a transaction in the fed funds market at the beginning of the day and is *not* considered by its publisher to be a benchmark as defined by IOSCO but is nevertheless used as a benchmark
- **Barclays U.S. Aggregate Index:** a broad-based, investment grade, US dollar-denominated bond market index that is prepared and used as a benchmark and, according to its administrator, complies with the IOSCO Principles

---

<sup>1</sup> See, [IOSCO Principles](#). The goal of the IOSCO Principles is to encourage the development and use of appropriate financial benchmarks by market participants. These principles provide detailed guidance for benchmark administrators regarding data collection, calculation methodology and governance processes. In order to be considered IOSCO compliant, benchmark administrators must follow, and publically disclose the extent of their compliance, with the principles.

<sup>2</sup> See, [Foreign Exchange Benchmarks](#), [Global Preamble](#), [Fair and Effective Markets Review](#).

The case studies highlight at least three important ways in which benchmarks are used:

- Market participants sometimes price, or set the interest rate on, a financial contract or instrument using a financial benchmark or indicator, with this activity extended to both assets and liabilities. For example, this activity can include borrowing facilities that are reset daily based on spreads to the BrokerTec 10am Repo Average or the ICAP Fed Funds Open.
- Payments on financial contracts or instruments can be determined based on the returns of an index of securities that serves as a benchmark. For example, a total return swap (“TRS”) can be created where one leg receives a funding level (such as LIBOR + a spread) and the other leg pays the monthly total return of the Barclays U.S. Aggregate Index.
- Investors often evaluate a portfolio’s performance against the returns of a broad index that serves as a benchmark. For example, bond managers may evaluate their performance, or rebalance their holdings, relative to the Barclays U.S. Aggregate Index.

Given their widespread use in determining the rate or price of financial contracts and instruments, and in measuring the performance of these instruments and investors who trade them, the benchmarks/indicators included in these case studies can impact a large number of transactions and assets under management. Collectively, the aggregate notional amount referencing the benchmarks/indicator in the case studies is in the trillions of dollars, and this activity has been growing substantially over time.

The integrity and efficiency of using a benchmark is affected by a number of factors, including those described below:

- **The quality of benchmark construction.** Market participants may be using financial indicators or benchmarks that are not appropriately constructed for use as benchmarks. The IOSCO Principles identify principles for the construction of benchmarks, including their design, pricing inputs, calculation methodology and appropriate governance to address potential conflicts of interest to provide a framework of standards for benchmarks.

Considerations from the case studies:

- The Fed Funds Open is not considered by its publisher to be a benchmark under the IOSCO Principles and is not constructed in a manner consistent with those principles.
- Notwithstanding this, many market participants may be using the Fed Funds Open as a benchmark.
- **The suitability of a benchmark for its given use.** Financial benchmarks may not always be fit for all of the purposes for which they are being used.

Considerations from the case studies:

- The BrokerTec 10am Repo Average is a benchmark based on overnight borrowing collateralized with Treasury securities. Using this benchmark for other overnight,

collateralized borrowing such as securities lending on a similar security may be a suitable use of this benchmark.

- Using collateralized overnight rates as a benchmark for uncollateralized overnight transactions may result in unexpected tracking errors; users should be mindful of such risk and manage it appropriately.
  - Using an overnight rate as a benchmark for transactions with a long duration is likely to introduce significant tracking error, making it unlikely to be fit for purpose.
- **Trading patterns that result from benchmark usage.** Trading patterns that emerge as a result of the usage of various benchmarks may not be supportive of the integrity and efficiency of markets and may constitute market abuse. When the price of a financial contract or instrument and/or payments to be made thereunder are linked to a benchmark, the potential risk exists that trading, or other activity, may take place to influence the benchmark level in order to benefit, or harm, parties to the financial contract or instrument. Inappropriate behavior could also include the improper sharing of information in order to influence the market price of a financial instrument or benchmark. The vulnerability of a benchmark to influence in part reflects both the ability to influence its level as well as the incentive to do so.<sup>3</sup> This incentive may exist for market participants that may or may not have any direct interest in the benchmark. It may also exist in instruments that are not in the benchmark, but which have values that are highly correlated to instruments in the benchmark. Moreover, other factors, such as the concentration of parties trading the underlying instruments and whether the parties trading the underlying instruments are also parties to financial contracts or instruments linked to the benchmark can also impact the vulnerability of a benchmark.

Considerations from the case studies:

- The Barclays U.S. Aggregate Index changes composition at 3:00 pm New York time on the last trading day of the month which creates a significant demand for liquidity at this time. In addition, since OTC markets have no official closing price, benchmark index closing prices may be seen as unofficial closing prices which may be referenced by market participants. Both their use as unofficial closing prices and the expectation of large known and estimated trading flows may create an incentive to influence the 3:00 pm prices for a variety of market participants including dealers and non-dealers alike.
- In order to reduce performance tracking errors, some investors may choose to transact as close to 3pm as possible. Others may choose to transact in advance of that time at a price that is to-be-determined at the close, such as the 3pm price on an electronic system. Market participants who agree to such client orders priced at to-be-determined levels may have an incentive to influence prices to benefit themselves.

---

<sup>3</sup> The FX fixing cases may illustrate the difficulty in predicting what benchmarks have the potential to be influenced. The FX markets are very large and liquid markets which may seem to be insulated from influence. However, the volume used to set the benchmarks at issue in the FX fixing cases was limited to a one minute window in which the foreign exchange WM/Reuters spot rates were set, and the amount of instruments linked to the benchmarks was very high. The setting window was subsequently widened to five minutes in an attempt to improve the quality of the construction of the benchmarks.

- If index closing prices are provided to a benchmark administrator by an affiliated trading desk that also trades in the underlying securities, it creates potential conflicts of interest. For example, the trading desk could benefit from a change in the value of an underlying security if it provides improper prices to the benchmark administrator.

### **Recommended best practices**

In response to the considerations from the case studies and informed by relevant policy initiatives, the TMPG is proposing that the following best practice recommendations be added to the existing TMPG Best Practices for Treasury, Agency Debt, and Agency Mortgage-Backed Securities Markets:

- Market participants should have a thorough understanding of how any financial benchmark (as defined in the [IOSCO Principles for Financial Benchmarks](#), “IOSCO Principles”) they use is constructed and the vulnerabilities that may exist in its usage. Users of benchmarks should have robust contingency plans to deal with the potential interruption or discontinuation of a benchmark.
- When utilizing financial benchmarks market participants should use those that comply with or are consistent with IOSCO Principles. If market participants use indicators or rates that do not comply or are not consistent with the IOSCO Principles, they should develop plans over time to move to alternate benchmarks that comply or are consistent with IOSCO Principles. In the transition, market participants should manage the risks associated with the use of benchmarks that are not compliant or consistent with IOSCO Principles.
- Market participants should carefully evaluate whether the financial benchmarks they use are fit for the purpose for which they are being used. For instance, using collateralized overnight rates as a benchmark for uncollateralized overnight transactions may result in unexpected tracking errors; users should be mindful of such basis risk and manage it appropriately.
- Market participants managing against benchmarks or engaging in transactions that reference benchmarks, including transactions conducted at to-be-determined levels, should establish internal guidelines and procedures for executing and risk managing such transactions. Firms should understand the risks associated with managing against benchmarks and engaging in transactions that reference benchmarks, and seek to minimize incentives for inappropriate conduct. For example, transactions conducted at to-be-determined levels should be priced in a manner that is transparent and consistent with the risk borne in the transactions (e.g., via a clearly communicated and documented fee structure). For these purposes, transactions conducted at to-be-determined levels include those conducted at an index setting or where the rate or yield is to be agreed in the future.
- Market participants that contribute to the setting of benchmarks through the submission of information, orders and/or transactions should have clear policies and procedures in place for ensuring that information about such activity is not misused. Examples of such misuse would include coordination of activity or sharing of information, internally or externally, in order to influence the market price of a financial instrument or benchmark.

Attached are the three sample case studies that the TMPG examined.

## **BrokerTec 10am Treasury Repo Averages<sup>4</sup> Case Study**

### **Product Description**

The BrokerTec 10am Treasury Repo Averages are the rates at which overnight borrowing collateralized with Treasury securities takes place. In this case study we will consider two distinct forms of the Repo Averages – the BrokerTec 10am GC/GCF Repo Averages and the BrokerTec 10am Specials Repo Averages. The GC/GCF Averages are based on repo trades that allow the delivery from baskets of eligible Treasury securities. The Specials Averages are based upon repo trades that are executed at the individual security level. These typically trade at lower financing rates relative to the GC/GCF rate. The benchmarks are very similar in many respects, which allow them to be considered jointly and referred to here as the Repo Averages. Meaningful differences between the Specials and the GC/GCF, when relevant, are noted below.

### **Use in Financial Transactions**

The Repo Averages are used as a benchmark in many ongoing borrowing arrangements. These tend to be facilities that are expected to be in place for long periods, but where the sizes will vary from day-to-day and the funding costs will reset on a daily basis benchmarked off the Repo Averages. The Repo Averages are commonly used for matched book funding, securities lending and firm financing. The Specials Averages appears to be used more widely than the GC/GCF Averages, but both are used across these activities.

### **Calculation Methodology**

The Repo Averages are volume-weighted average prices (VWAP) of actual repo transactions executed through BrokerTec beginning at the 7:00 am NY time market open until 10:00 am NY time. The customer base that transacts in these products on BrokerTec consists of members of FICC maintaining a repo netting/GCF dealer account. It is believed that a significant share of all interdealer broker transactions in the repo market is captured in this methodology. The Repo Averages are designed to comply with IOSCO Principles for Financial Benchmarks according to its administrator.<sup>5</sup>

### **Dissemination**

The Repo Averages are distributed via email (Excel or PDF) or over a Secure File Transfer Protocol (SFTP). The reports are distributed upon request to repo traders, managers, and in some cases middle office personnel of the customers who trade the product on BrokerTec. There is no widespread dissemination of the Repo Averages (e.g., Bloomberg), and it may be less readily available to smaller market participants.

---

<sup>4</sup> For the purpose of this study we will be considering only the BrokerTec 10am Treasury Repo Averages, which is based on completed repo trades in US Treasury securities. However, BrokerTec produces 10AM Repo Averages based on repo rates for Treasury securities, Agency debt and Agency MBS issues.

<sup>5</sup> See, ICAP's [framework](#).

### **Trading Patterns around Setting**

Daily notional volume in the Treasury repo market executed through BrokerTec is over \$100 billion per day. Due to same day settlement conventions in the repo market, the majority of daily volume in the market takes place during the 3-hour time window which is used to calculate the Repo Averages. The Specials Repo Averages are based on trading volume at the individual security level, and repo volumes for individual securities tend to be lower and more variable than GC/GCF repo rates.<sup>6</sup>

### **Legal Documentation**

Although the Repo Averages are not currently included in industry standard master agreements, they are conventionally referenced in the terms or confirmation of a financing transaction and may be added on a bespoke basis to master repo and swap agreements.

### **Rationale and Suitability for Use**

Market participants note that the Repo Averages are based upon a substantial portion of the repo volume for Treasury GC. They are also attractive because they are available on a daily basis and widely accepted by market participants. The use of actual market transactions in an active market over a three-hour time window may help to limit the ability to influence the index, which is a volume weighted average, with individual trades.

---

<sup>6</sup> While the aggregate volume referenced in the setting of the Repo Averages is substantial, the volume referenced in the setting of specific Treasury securities could be modest – creating a potential vulnerability in the Specials Repo Average for that specific Treasury security.

## **ICAP Fed Funds Open Case Study**

### **Product Description**

The Fed Funds Open is a financial indicator published by ICAP, a broker in the fed funds market, as to where a “representative” transaction in fed funds may be priced at the beginning of the U.S. trading day. A federal funds transaction, or fed funds transaction, is an unsecured loan of U.S. dollars to a depository institution (DIs) by another DI or other eligible entity. These transactions are uncollateralized and are same day settlement.

### **Use in Financial Transactions**

The Fed Funds Open is a financial indicator that is not considered by its publisher to be a benchmark under the IOSCO definition, but in practice is used as one in many ongoing borrowing arrangements. These tend to be arrangements that are in place over long periods, but where the sizes will vary from day-to-day and the funding costs will reset on a daily basis versus the Fed Funds Open. The Fed Funds Open is commonly used for prime brokerage and securities lending, but it is also used for firm financing, matched book funding and some rate and equity swaps. Some usage is contractual in nature, where open-ended funding arrangements are priced based on a specific spread to the Fed Funds Open. Other usage is more informal with the Fed Funds Open merely serving as a reference point for negotiation of daily pricing levels.<sup>7</sup>

### **Calculation Methodology**

The Fed Funds Open is determined by ICAP based on fed funds trading activity that occurs at ICAP in the U.S. morning session, including forward transactions that occur, as well as transactions that occurred the previous day. ICAP uses its judgment in including specific transactions and will only use trades that are above a minimum size (usually \$250 million) and with highly-rated counterparties. The Fed Funds Open does not necessarily reflect the first transaction of the day, nor is there a fixed time that the level is determined each day. Rather, ICAP seeks to base the Fed Funds Open on activity that occurs during a period of time when there is meaningful market participation. This typically is between 7:15 and 7:45 a.m. NY time, but it may vary based on market conditions and participant activity.

### **Dissemination**

The Fed Funds Open is distributed, under license, to major vendors (e.g., Bloomberg and Thomson Reuters) and is displayed on Bloomberg and Thomson Reuters Terminals. The Fed Funds Open is usually released around 8:00 a.m. NY time.

### **Trading Patterns around Setting**

Trading activity in the fed funds market has been less robust in recent years, given the significant excess

---

<sup>7</sup> Market participants note that changing usage when referenced in contracts would require a longer lead time than informal applications.

reserves in the banking system. While there are still significant volumes that will trade in the fed funds market, transactions are highly concentrated with a few market participants. ICAP attempts to address the risk of limited participation by employing judgment as to which rates and transactions are appropriate for consideration as reflecting where fed funds may be priced at the beginning of the U.S. trading day.

### **Legal Documentation**

Although the rate is not currently included in industry standard form master agreements, it is often referenced in “rate sheets” and trade and master confirmations. Further, it may be added on a bespoke basis to master repo agreements.

### **Rationale and Suitability for Use**

Market participants note that they use Fed Funds Open as a benchmark because it is an overnight rate that floats on a daily basis which is readily available very early in the trading day. It is also widely accepted because of the fact that it is widely used and some client investment guidelines specifically reference use of the Fed Funds Open.

There are several concerns regarding the suitability of this rate as a benchmark. First, the publisher of Fed Funds Open does not consider it to be a benchmark under the IOSCO Principles for Financial Benchmarks yet it is utilized as if it did have the attributes of a benchmark. Second, due to the limited volume which is concentrated in discrete transactions early in the trading day, the indicator is based on the best judgment of the publisher as to which transactions to consider when setting the Fed Funds Open. While the application of judgment may be prudent in light of the limited volume, the indicator may be less reflective of the underlying financial interest it is trying to measure than if it were a calculation based on a large volume of data points. Finally, there may be a mismatch between the uncollateralized funds transactions on which the rate is based if it is used in collateralized lending arrangements. Overall, while the Fed Funds Open may be a useful financial indicator, its use as a financial benchmark should be reassessed.



## **Barclay's US Aggregate Bond Index Case Study**

### **Product Description**

The Barclay's US Aggregate Bond Index is a broad-based index that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market.<sup>8</sup> The index consists primarily of Treasury and agency securities, corporate debt and securitized product. There are almost 10,000 securities with a market value of over \$18 trillion in the Barclays US Aggregate Bond Index. Approximately 1,300 securities and \$12 trillion are within TMPG covered markets. There are detailed rules that qualify individual security inclusion or exclusion in the index that varies based on market sector. The US Aggregate Index is part of a family of indices and includes numerous sub-indices. Examples of this would include specific portions of the Treasury curve or just the MBS portion. In addition, the US Aggregate itself is a sub-index of the Global Aggregate Bond Index. Going forward we will generically refer to the US Aggregate index as the Aggregate Index.

### **Use in Financial Transactions**

The Aggregate Index is used explicitly and implicitly in transactions of various financial contracts and instruments. The most prevalent usage of the Aggregate Index is as a means to judge the performance of a portfolio. This leads to trading activity where one party (usually an index-benchmarked portfolio) will purchase and sell cash securities that exactly, or approximately, match the constituents of the Aggregate Index. It is estimated that over \$3 trillion is managed versus the Aggregate Bond Index, or similar indices. Aggregate Index ETFs are another specialized form of portfolio management against the Aggregate Index. Since the portfolios created to back the ETF are built to mimic the return of the Aggregate Index they will behave very similarly to other portfolios that benchmarks returns to the Aggregate Index.

In addition, Total Return Swaps (TRS) are explicitly traded based upon the Aggregate Index. In an Aggregate Index based TRS, one party to the transaction will pay and the other party will receive the returns of the Aggregate Index relative to a short-end rate (usually LIBOR + spread). With this transaction the receiver will match the returns of the index through this swap alone. Trading volumes in Aggregate Index TRS are modest relative to the volume of securities transacted in cash products.

### **Calculation Methodology**

There are two processes in the calculation of the Aggregate Index. On a monthly basis the composition of the index is updated, and on a daily basis the returns of the index are calculated. The Aggregate Index is designed to comply with IOSCO Principles for Financial Benchmarks according to its administrator.<sup>9</sup>

The composition of the Aggregate Index is adjusted on a monthly basis in a rule-based manner. Rules for selecting securities to be included in the index are based on factors such as currency, sector, credit

---

<sup>8</sup> Other index providers have similar Aggregate indices; however, the Barclay's indices are the most widely used as benchmarks.

<sup>9</sup> Barclays Risk Analytics and Index Solutions serves as the index administrator for the Barclays Aggregate Index and is a separate, though affiliated, legal entity of Barclays Capital trading desk. See Barclays' IOSCO compliance framework [here](#).

quality, amount outstanding, time to maturity, country, market of issue, taxability, coupon type and place in the capital structure. Different factors and rules are used for different sectors of the fixed-income market.<sup>10</sup>

The returns of the Aggregate Index are calculated on a daily basis. Each security in the Aggregate Index is priced as of 3pm New York time based on input from both the Barclays trading desk and valuation models employed by the Barclays index pricing group. The daily returns are calculated based on the closing price in the current day, the closing price in the previous date and interest earned. Interest earned includes coupon payments and changes in accrued interest. There is no consideration for the payment of interest on cash received (interest on interest) and no transactions costs included. For securities that have partial principal payments (agency MBS), a paydown impact is included when principal paydowns are realized.

Since OTC markets have no official closing price, index closing prices, many of which are provided by the Barclays trading desk, may be seen as unofficial closing prices which may be referenced by market participants.

### **Dissemination**

Barclays disseminates data on the Aggregate Index through its own systems as well as via Bloomberg. Each of these methodologies requires a subscription that is available either for an explicit cost or is made available only to Barclay's clients. Pricing and returns data is released on a daily basis shortly after 3pm New York time. In addition, on a monthly basis changes in index composition are released several days prior to the end of the month for the following month's index.

### **Trading Patterns around Setting**

When the Aggregate Index composition changes, a variety of trade types take place near the end of the last trading day of the month or in reaction to these anticipated flows. The amount that investors have benchmarked against the Aggregate Index, broadly defined to include sub-indices and competing indices, is estimated to be over \$3 trillion dollars. Index benchmarked investing has also been growing significantly over a long period of time. Therefore, these types of transactions can have a meaningful impact on market pricing.

Passive investors may try to exactly mimic the behavior of the Aggregate Index. This means they may aim to own each individual security in the index to match the weighting change for that specific security. Even if the only change to the index is the addition of one new security that will mean that every existing security in the index will now have a slightly different weighting.

---

<sup>10</sup> For example, in the Treasury sector, all fixed-rate securities, not inflation-linked, greater than \$250 million and greater than 1-year remaining until maturity, are included in the index. Securities included in the Aggregate Index are weighted based on the amount outstanding. Monthly composition changes of the Treasury sector of the Aggregate Index tends to consist of newly auction securities being added to the index and securities falling under 1-year remaining to maturity being removed from the index.

Active investors that are benchmarked versus the Aggregate Index may manage relative to the benchmark. Therefore, at month-end they may trade to match broad risk factor changes. This can include adjusting duration levels, curve weightings or sector weightings of their portfolio. These trades would likely take place near the close on the final day of the month, although some may trade at a slight time offset if they felt that was likely to be beneficial.

The change in month-end Aggregate Index composition is available to many market participants. Therefore, non-index based investors may trade in anticipation of the market impact of index rebalancing trades. For example, if the Aggregate Index duration was increasing by a substantial amount at the end of the day, non-index based investors could use this information to make judgments about the potential market effect of the duration extension.

To the extent that TRS on the Aggregate Index are outstanding, the dealer that is paying the swap will be at risk for index performance and will behave in a manner similar to passive index investors noted above.

The change in composition of the Aggregate Index at 3:00 pm New York time on the last trading day of the month creates a significant demand to transact at this specific time. This may create an incentive to influence prices around this time. This incentive may exist for a wide variety of market participants including dealers who may be aware of likely trading flows and those who may only estimate likely flows.<sup>11</sup> While some investors will transact under normal procedures as close to 3pm as possible, others will transact in what is essentially a market-on-close order.

### **Legal Documentation**

The use of the Aggregate Index as a benchmark is specified in investment management agreements, the fund prospectus and fund declaration documents for funds that are benchmarked to it. Trades that are executed to manage versus the Aggregate Index are typically processed and documented in the same manner as any other trade. For TRS trades, legal documentation is typically in the standard form published by the index sponsor and electronically confirmed at DTCC. Confirmations are normally produced for all trading events, including daily rebalancing activities. The customer ordinarily returns a signed copy of these confirmations. Trades in ETFs are driven by the ETF Offering Documents, and trading typically takes place on an exchange under standard market conventions.

### **Rationale and Suitability for Use**

Market participants note that the desire to use the Aggregate Index as a benchmark is generally client-directed. The rationale for this is that it appears to be the best representation of a broad exposure to the US taxable fixed-income universe.

---

<sup>11</sup> The change in index composition and overall risk factors is available to market participants well ahead of time which provides a level of transparency to this process. However, market participants can only estimate the amount of AUM that will choose to transact to adjust its composition and risk factors based on the changes in the Barclays Aggregate Index.

The Treasury Market Practices Group (TMPG) is a group of market professionals committed to supporting the integrity and efficiency of the Treasury, agency debt, and agency mortgage-backed securities markets. The TMPG is composed of senior business managers and legal and compliance professionals from a variety of institutions—including securities dealers, banks, buy side firms, market utilities, and others—and is sponsored by the Federal Reserve Bank of New York. Like other Treasury Market Practices Group publications, this document represents the views of the private-sector members. The ex-officio members do not express a position on the matters herein. More information is available at [www.newyorkfed.org/tmpg](http://www.newyorkfed.org/tmpg).

