

Barclays Benchmark Index Methodology

For over 40 years, Barclays fixed income and inflation-linked indices have been the market standard for debt investors seeking objective, rules-based, and representative benchmarks to measure asset class risk and returns. From the initial three US bond market indices first launched in 1973, the scope of index products and portfolio management solutions offered by Barclays has grown substantially, mirroring broad asset class expansions and capital markets innovations that have become part of a global investor's evolving investment choice set.

While Barclays publishes a wide range of index primers, factsheets, rules documents, technical notes, and index-specific research in support of our products, the scope of our offering can make it a challenge for both new and experienced index users to get a full overview of index methodology in a single publication. This guide supplements these index-specific documents to detail index rules and methodologies in a single publication.

In particular, this methodology document will cover:

- Index eligibility criteria and inclusion rules
- Rebalancing rules and mechanics
- Return calculations, analytics and pricing conventions
- Weighting and aggregation rules
- Index naming conventions

Understanding Barclays index methodology is an important part of the portfolio management process; as such, we understand that no single document will answer every question that an index user may have. The Barclays index group has dedicated teams of research analysts in London, New York, San Francisco, Singapore, and Tokyo to work with clients on bespoke index and portfolio management solutions and assist clients with specific questions that may not be addressed in this handbook. We invite readers to direct any further questions they may have to these teams to facilitate an even stronger dialogue between index users and the research analysts who have put it together.

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Benchmark Indices: Rules and Methodology

ABOUT BARCLAYS INDICES

Barclays Research is a leading provider of indices and portfolio risk solutions with dedicated teams in New York, San Francisco, London, Tokyo and Singapore. There are three core business lines: 1) Benchmark Indices, 2) Investable Index Products and 3) the POINT® Index and Portfolio Analytics Platform.

While benchmark indices (and the risk and return characteristics they provide at the security, sector, and asset class levels) are a fundamental part of the portfolio management process, index demand has evolved beyond traditional long-only measures of broad market performance. Investors now also use indices to efficiently measure and access beta, enhanced beta, and alpha through rigorous and transparent rules-based index products. The suite of Barclays products and services reflects this evolution and offers investors a more comprehensive approach to portfolio management challenges.

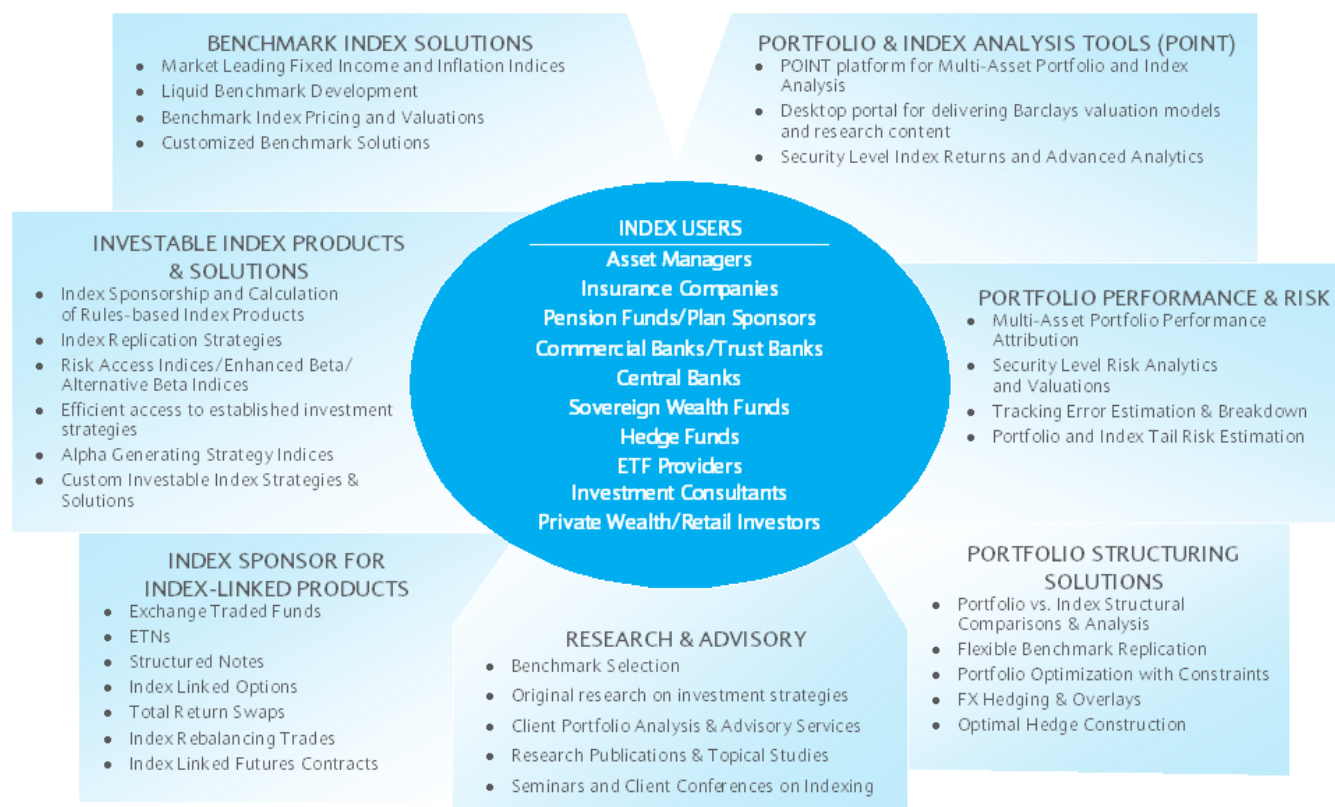
Overview

The range of products and services offered by Barclays extends well beyond benchmark fixed income indices to include investable index products, as well as portfolio analytics through POINT®

The Barclays index brand is most commonly associated with market-leading fixed income and inflation-linked benchmark indices such as the Global Aggregate Index and World Government Inflation-Linked Bond Index. However, the range of products and services offered by Barclays extends beyond benchmark indices to include investable index products designed to offer access to systematic strategies (beta, “smart” beta, and alpha) across multiple asset classes (fixed income, equities, commodities, FX, etc.), as well as portfolio analytics and modelling available through the POINT® portfolio management platform. As illustrated in Figure 1, these complementary products and services allow Barclays to work with its clients on integrated portfolio management solutions beyond simple benchmarking needs.

With dedicated teams in the US, Europe and Asia, Barclays is able to offer products and services for a broad array of investor types and portfolio management functions. By firm type, users of Barclays index and portfolio analytics and services include asset managers, insurance companies, pension funds/plan sponsors, commercial banks/trust banks, central banks, sovereign wealth funds, hedge funds, ETF providers, investment consultants, and private wealth and retail investors. By function, investment professionals that use Barclays indices and portfolio analytics include portfolio managers, investment officers, asset allocators, performance analysts, risk analysts, research analysts, traders, marketing professionals, structurers, pricing analysts, operations and market data teams, and investment consultants.

FIGURE 1

Index and Portfolio Management Products and Services

Source: Barclays Research

Benchmark Indices

Barclays indices are the most widely used fixed income and inflation-linked benchmarks and are an integral part of the active and passive global portfolio management process. With broad product coverage, a strong history of innovation, and objective and transparent rules, Barclays has continually been recognized in both the US and Europe as the top index provider.¹ Barclays indices are also the most widely used benchmarks for fixed income exchange traded funds (ETFs).

History and Evolution

The Barclays index platform can trace its genealogy back to 1973, with the launch of the first generally available total return bond indices for the US bond market: the US Government and US Investment Grade Corporate Indices. At the request of the Bond Portfolio Managers Association, two Kuhn Loeb researchers² created these new bond market benchmarks on July 7, 1973, to offer investors a performance target akin to those that had long been available for equities. At the time, bond indices consisting of yield averages had been around for decades, but bond total return indices did not exist.

Broad acceptance of total return debt indices took several years; however, asset management trends in the 1970s – specifically, the need for greater portfolio accountability – contributed to the demand for such indices. By the late 1970s, public and private plan sponsors, as well as active money managers, had embraced these initial US Government and US Corporate Indices.

¹ Based on Institutional Investor magazine research rankings for bond market indexes.

² Art Lipson and John Roundtree were analysts at the investment bank Kuhn, Loeb & Co. when these first two indices were created. Kuhn Loeb merged with Lehman Brothers in 1977, and the fixed income index platform existed as part of the Lehman Brothers research offering through a number of subsequent mergers and spinoffs before ultimately being acquired by Barclays in 2008.

The US Aggregate Index was created in 1986

The expansion of the platform remained largely rooted in the US capital markets during the 1980s. The Municipal Bond Index was launched in January 1980 to track the market for tax-exempt municipal securities in the US. In 1986, the Government/Credit Index (created in 1979 and used as a first generation broad-based measure of investment grade debt) was expanded to include Mortgage Backed Securities (MBS) securities. This expanded second-generation macro index was called the US Aggregate Index and was backdated with data to 1976.

Since the mid-1980s, the global debt capital markets have evolved and expanded because of the acceleration of economic and capital market globalization, rapid technological change and increased availability of information, and the steady emergence of new issuers and security types. A substantive high yield corporate market emerged first in US and later in Europe. Emerging markets (EM) debt was disintermediated from commercial banks to the public security markets, with new countries issuing debt in hard currency, local currency, and inflation-linked formats. Fixed- and floating-rate asset backed securities (ABS) were issued in the US, Europe and Asia. Commercial mortgage backed securities (CMBS) and agency hybrid ARM MBS were introduced. Inflation-linked bonds and floating-rate notes emerged as distinct fixed income asset classes. Issuance of capital securities, hybrid instruments and convertibles appealing to both debt and equity investors accelerated. Interest rate, currency and credit default swaps were created and became widely used as instruments to express market views in fixed income portfolios. Encouraged by the support of our many index users among plan sponsors, money managers, consultants, issuers, and academics, the index franchise added performance metrics for these new debt asset classes to match the pace of market innovation with benchmark indices.

The Euro Aggregate Index was launched in 1998 and the Asian-Pacific Aggregate and Global Aggregate in 1999

Indices for new asset classes, such as inflation-linked bonds,³ ABS, CMBS, and EM, were introduced in the 1990s. The multi-currency Global Treasury Index was launched in 1992. A third generation of macro indices, including the US Universal Index (1999), tracking investment grade and high yield debt in one benchmark were originated. In tandem with market and asset management evolution, the index franchise became a truly global platform with the creation of the Euro Aggregate Index in July 1998, Pan-European Aggregate Index in January 1999, Asian-Pacific Aggregate Index in July 2000, and Global Aggregate Index in January 1999. The Global Aggregate has seen steady expansion into new investment grade debt markets since its initial launch and now tracks 24 different local currency debt markets.

In 1997, the first Index Advisory Council was held in the US to collect external feedback to be used in the governance of benchmark indices. Subsequent Index Advisory Councils have been held globally in London, Singapore and Tokyo as part of the formal index governance process.

In the 2000s, US and Euro Floating-Rate Notes Indices, the Global Capital Securities, Floating Rate ABS Indices, the High Yield Loan Index, the Agency Hybrid ARM, and a Taxable Municipal Index were introduced. In 2002, the Canadian Aggregate Index was launched, and in March 2003, a US Convertibles Index was created, with subsequent EMEA and APAC Convertibles Indices launched in 2010 and 2011, respectively. Local currency indices for China (2004), Russia (2006) and India (2007) were launched to delve deeper into new local currency debt markets. In 2007, the EM Government Inflation-Linked Bond Index further expanded both the inflation-linked and EM index families. In 2010, a standalone EM Local Currency Government Index family was launched tracking both Global Aggregate eligible and non-Global Aggregate eligible nominal local currency government debt. In 2012, the Barclays-Russell LDI Index family was launched as a new replicable benchmark for US liability driven investors.

³ Inflation-linked indices were independently launched and offered under the Barclays and Lehman Brothers brands. These indices were unified under a single brand in September 2008, but maintained as two distinct offerings: Series-L and Series-B Indices.

Recent innovations in “smart beta” indices include the launch of GDP Weighted Indices, Fiscal Strength Weighted Indices, ESG themed indices and Duration Hedged Indices

While the primary expansion of the Barclays index platform has focused on added coverage of new asset classes and a quest to fully map the global fixed income debt markets, there has also been parallel development to create new measures of already covered asset classes that reflect alternative investment themes. In 2009, float-adjusted versions of Barclays indices that exclude publicly announced government holdings were introduced, as well as GDP weighted versions of existing flagship indices, such as the Global Treasury, Global Aggregate, and Euro Treasury Indices. In 2011, Fiscal Strength Weighted Indices further expanded alternative weight index offerings, integrating objective measures of a government’s financial solvency, dependence on external financing, capacity, and governance to determine index weights. In 2013, Barclays MSCI ESG Fixed Income Indices were introduced to offer debt investors a new market standard for benchmarks that formally integrate ESG criteria into their design. In addition, Barclays Mirror Futures and Duration Hedged Indices were introduced in 2013 to provide investors with fixed income benchmarks that replicate and hedge interest rate duration exposure of existing flagship indices using liquid futures contracts.

Product Coverage

Barclays offers a comprehensive set of fixed income benchmarks spanning the investment grade, high yield, inflation-linked, hard and local currency EM, municipal, and convertible markets. Product coverage is currently at more than 70,000 securities with over USD50trn in market value representing 110 countries and 39 local currency debt markets. Barclays publishes more than 40,000 standard and bespoke indices daily. Figure 2 illustrates the coverage of flagship benchmark index families.

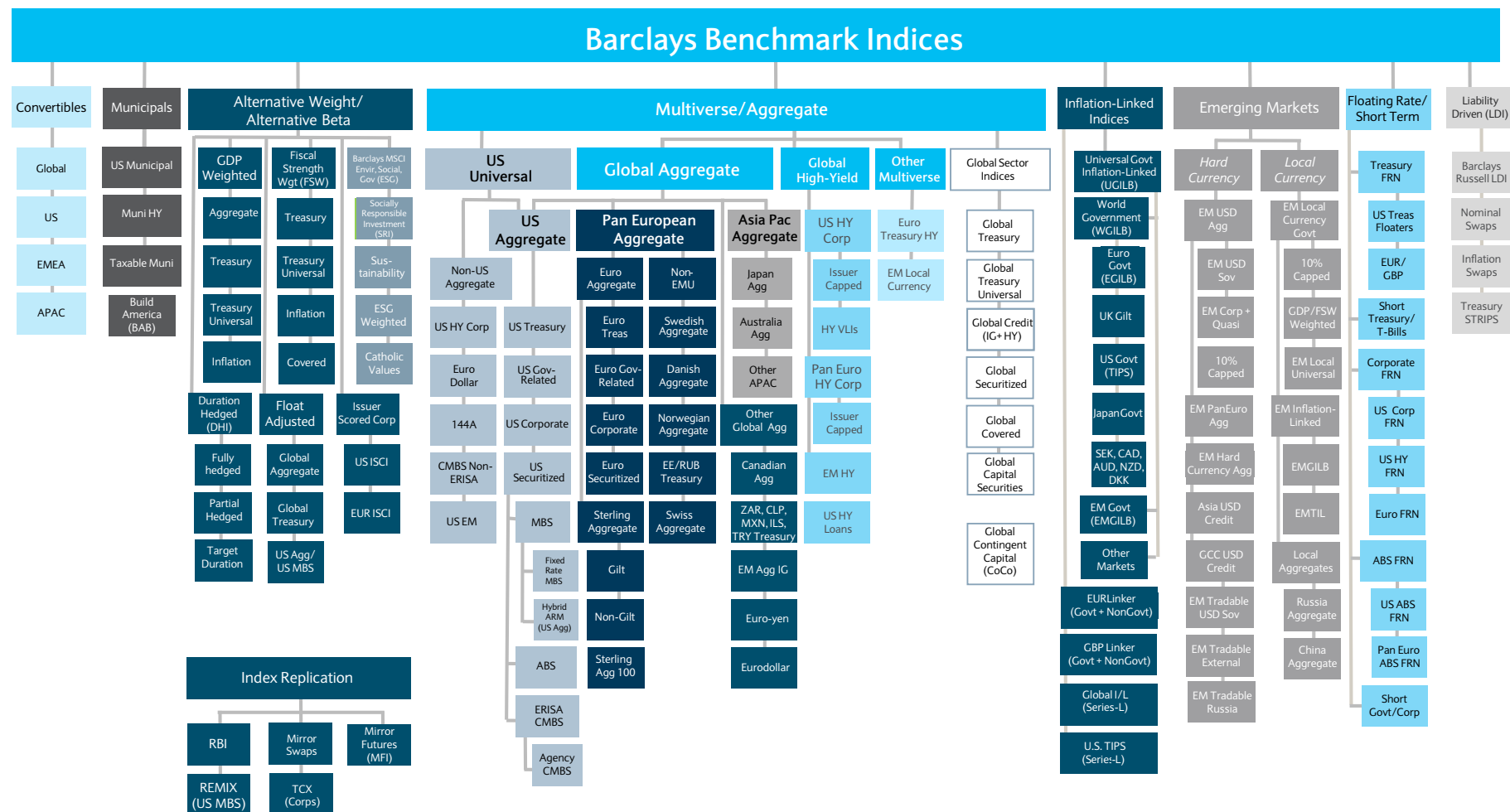
Benchmark Index Solutions

Benchmark indices are used by global investors for three primary purposes: 1) as portfolio performance targets, 2) as informational measures of security-level and asset class risk and return characteristics, and 3) as references for index-linked products. Barclays offers index users a number of benchmark-related services and solutions supporting these primary uses in the portfolio management process.

Customized Benchmark Index Solutions

With the proliferation of standard benchmark indices offered as part of the Barclays benchmark index platform, there has been increased demand for bespoke measures of asset classes that may be more consistent with investor-specific portfolio objectives.

FIGURE 2
Barclays Benchmark Indices



Source: Barclays Research

Barclays recognizes that no single benchmark design is universal or appropriate for all investors. Our goal is to offer a broad and evolving suite of unbiased index products from which investors may select or customize the most appropriate benchmark for their portfolio needs. In addition to our flagship indices, Barclays now publishes thousands of bespoke benchmarks and actively works with index users in a consultative manner on benchmark design, methodology, back-testing, selection, and documentation of their custom indices. The types of customizations available through Barclays index platform are shown in Figure 3.

FIGURE 3

Common Types of Index Customizations

Sub-Index Type	Description	Examples
Enhanced Constraint	Applies a more or less stringent set of constraints to any existing index.	Global Aggregate ex Baa Global Aggregate 1-3 Year
Composites	Investors assign their own weights to sectors or other index sub-components within an overall index.	50% Global Treasury; 50% Global Aggregate ex Treasury
Issuer Constrained	Indices that cap issuer exposure to a fixed percentage. Options available for applying issuer caps and redistributing excess MV to other issuers.	Global Aggregate 2% Issuer Capped
“Smart Beta” / Alternative Weights	Uses other rules-based weighting schemes instead of market value weights.	Global Aggregate GDP Weighted Global Aggregate Fiscal Strength Weighted
ESG Screened/Weighted	Applies Environmental, Social and Governance filters and/or tilts to a standard index.	Global Corporate Socially Responsible Index Global Aggregate ESG Weighted
Duration Hedged	Indices constructed to reflect the underlying return of an index with its duration fully or partially hedged using a futures-based replication (Mirror Futures Index).	Global Aggregate Duration Hedged Index

Source: Barclays Research

Replication Strategies

The Barclays IRPS team offers tools for clients seeking to passively replicate fixed income benchmarks with cash bonds and/or isolate fixed income beta through other strategies and products so that it may be repackaged in new ways (eg, portable alpha strategies). Barclays also licenses its indices to third parties for use in index replication products, such as ETFs.

Investable Index Products and Solutions

Alongside traditional benchmark indices, Barclays offers an array of tradable indices that capture alternative risk premia across major global markets: equities, interest rates, credit, commodities, currencies, emerging markets and volatility

Traditional benchmark indices capture the broad performance of markets and offer investors an objective measure of various markets' risk premia, or “beta,” as they are commonly called. An increasing volume of literature suggests the existence of additional risk premia, usually called “smart” or “alternative” beta, which compensate investors for other types of risk embedded in the markets, such as liquidity, value, momentum, and event risk. To isolate such risk premia, investors typically employ strategies that will take long and short positions in instruments within a specific market in order to eliminate market beta. Often, alternative beta is mixed with market beta, resulting in portfolios with long positions and market weights that deviate from the standard benchmark weights, frequently referred to as “enhanced beta.”

Enhanced and alternative beta investment strategies have regularly been employed by active managers and by hedge funds; they have been long been considered (and rewarded) as “manager alpha”. It is now understood that a large number of enhanced and alternative beta strategies can be described by a set of systematic and transparent rules that do not require manager discretion and, therefore, can be captured with an index. Alongside the

traditional benchmark indices, Barclays offers an array of indices that capture alternative risk premia across all major global markets: equities, interest rates, credit, commodities, currencies, emerging markets and volatility. These indices are developed and calculated using the same thorough, rules-based research and governance framework as Barclays benchmark indices. Their calculation is based on a set of well-defined and transparent rules, and their governance is the responsibility of the Barclays index team. An overview of Barclays systematic strategies index offerings can be found in Figure 4.

A characteristic of alternative beta indices is that they are designed to be “investable”; in other words, that they are implemented using a relatively small number of liquid instruments (usually derivatives such as futures, forwards and swaps), making the replication risk manageable. As a result, investors can enter into structured transactions and receive the exact return of an index as calculated and published by the index group in exchange for a fee. Index structured transactions take many forms, from unfunded total return swaps to fully funded structured notes to index options, offering investors a straightforward, liquid, and cost-efficient way to access alternative risk premia. The idea of investable indices can, of course, be applied to traditional benchmark indices as well. Barclays offers investable indices that range from accessing market beta (such as the RBI® suite of indices that seek to replicate the performance of standard benchmark indices), to asset allocation strategies incorporating market beta across several asset classes, to enhanced and alternative beta, as discussed above.

Governance and Usage

Barclays employs a multi-disciplinary approach in the development of investable indices. All indices are calculated in accordance to rules specified in an index rules document. Barclays is the index sponsor and, as such, is solely and independently responsible for the calculation, production, and publication of the index. A Barclays index governance committee is responsible for overseeing all investable index operations and has the responsibility of approving new indices; terminating existing indices; overseeing index restatements; and, although rarely necessary, implementing index rules changes.

Investable indices are used by institutional investors such as pension funds, foundations, endowments, and asset managers, as well as certain private banks and retail clients. The main benefits are transparency, the absence of style drift due to the rules-based nature of the implementation, minimized operational costs in accessing new asset classes or investment styles, and the potential for capital efficiency. The market events of 2008 and the losses incurred by several alternative portfolios – despite claims of market neutrality – highlighted the dangers of lack of transparency and style drift. Investable indices capturing alternative market risk premia avoid many of these pitfalls and offer liquidity and cost efficiency.

Barclays employs a multi-disciplinary approach in the development of investable indices

FIGURE 4

Barclays Systematic Strategy Indices

	Rates	Inflation	Credit	FX	Commodities	Equity	EM	Multi-Asset	Alternative	Index Replication
β	Bond Futures	Inflation Swaps	Credit Beta (Swaps)	Liquid Basket	BCI	Equity EM Series	EM Tradable Bond	Armour	Manager Access	RBIs® Bond Indices
	IRFix Swaps		HYIGS Beta	Borrowing Units	BGCI (Carbon)	Chips Family	EM Swaps	Optimo		REMIX (MBS)
	US Municipal Swaps			Trade-weighted	Pure Beta S2	Inflation - Response	Equity EM Series	Equal Risk Allocation		LBAR/SBAR Hedge fund
	Targeted Exposure			CPCI	Momentum Alpha	ASTRO	GEMS	XARP		
	BPX+	INSPIRE	HYIGS Enhanced Beta	World Carry	Roll Yield	Voltaire	KRW Term Premium	BCATS		
	iCRYSTAL		Dynamic HYIGS	FX Value	Multi - Strategy	TOM™	SGD Exceed			
	Exceed			World Trend	Voyager	Shiller CAPE	ZAR Transcend			
	SABER			FX Switch	Backwardation	Low Volatility	Dynamic GEMS			
	MEDES			MERCI	ComBATS	Short Strangle				
	TrendStar+				Trend	Navigator				
α	PRISM				Liquidity Timing	Q Series				

Source: Barclays Research

POINT® Portfolio Management System

POINT is Barclays' global, multi-asset class portfolio management system and is a product of more than a decade of proprietary research. POINT provides advanced quantitative portfolio analytics and functions, including portfolio risk (eg, tracking error volatility and value at risk), performance attribution, and scenario analysis. POINT also provides an advanced portfolio optimization tool that is integrated with the rest of its functionalities to assist portfolio managers in constructing, rebalancing, and hedging their portfolios. A summary of POINT functionalities can be found in Figure 5.

FIGURE 5
The POINT® Offering

Coverage	Fixed Income	<ul style="list-style-type: none"> Global Government, Credit, High Yield, Inflation-Linked, Securitized (MBS, ABS, CMBS and CMOs) Emerging Markets: Coverage in 85 currencies Municipals: Comprehensive state database Swap curves in 37 currencies; Treasury, Swap and Municipal curve-based analytics
	Equity and Commodities	<ul style="list-style-type: none"> Common Stock, Closed-End Funds, ETFs, ADRs, REITS, Convertible Bonds, etc. Developed and Emerging Markets in 84 countries and 48 currencies Commodity futures for over 20 contract deliverables
	Derivatives	<ul style="list-style-type: none"> Exchange Traded: Bond Futures, Interest Rate Futures, Currency Futures, Equity Index Futures, Options on Futures, Equity Options and Equity Index Options OTC: Interest Rate Swaps, Caps/Floors, European Swaptions, CDS, CDX/iTraxx, TRS and FX Forwards
Portfolio Construction and Index Reporting	Portfolio Management	<ul style="list-style-type: none"> Create and maintain portfolios through an automated batch process Build dynamic transactional or position-based portfolios Generate daily holdings using trade date accounting Access index prices and analytics or override using custom data sources Model or proxy private placements, OTC derivatives, and other securities as user-defined instruments
	Benchmark Analysis	<ul style="list-style-type: none"> Access both Barclays and third-party indices across the equity and fixed income markets Define custom indices with flexible inclusion and exclusion conditions Create composite indices using specific weights or analytic targets Generate index dynamics and turnover reports
	Portfolio and Index Reporting	<ul style="list-style-type: none"> Access the vast POINT database of current and historical data View constituent-level indicatives, security analytics and returns Report on market exposures and sensitivities and track performance over time Compare historical data across multiple portfolios and indices
Advanced Models	Global Risk Model (GRM)	<ul style="list-style-type: none"> Quantify the key sources of risk within a portfolio and understand the interrelationships among different portfolio exposures using intuitive, detailed, multi-factor risk models Decompose systematic, idiosyncratic and default risk exposures
	Hybrid Performance Attribution (HPA)	<ul style="list-style-type: none"> Compare portfolio performance against a standard or custom index using daily transactional data to identify the sources of outperformance Define a multi-level partition to mimic a portfolio's management structure Choose market value or risk-based weights to measure exposure to currencies or sectors
	Portfolio Optimizer	<ul style="list-style-type: none"> Construct, rebalance or hedge a portfolio incorporating user-specified objectives and constraints Target portfolio characteristics such as risk, analytics or user-provided data Replicate an index using tracking error minimization Analyze trade recommendations for strategy implementation
	Scenario Analysis	<ul style="list-style-type: none"> Apply a scenario instantaneously or over a time horizon and assess the effect of hypothetical returns across market moves Investigate returns under hypothetical and historical scenarios across fixed income, equity, and other asset classes using a factor model framework

Source: Barclays Research

In addition to its advanced portfolio modelling capabilities, POINT is a primary distribution platform for Barclays benchmark fixed income and inflation-linked Indices. Users can access standard indices, as well as build custom benchmarks that match specific portfolio strategies. In sum, POINT is an integrated portfolio management platform that facilitates detailed benchmark analysis together with portfolio applications to offer comprehensive solutions at every stage of the investment process.

BENCHMARK INDEX DESIGN PRINCIPLES

The widespread use of Barclays benchmark indices suggests they have become the market standard for investors seeking objective and intuitive measures of the fixed income asset class, while providing sufficient flexibility and adaptability to offer bespoke solutions to meet a specific investor's constraints, preferences or guidelines. One reason for such widespread usage is that the underlying eligibility criteria for bonds in the Barclays indices adhere to the following core design principles required for any "good" benchmark:

- **Representative of the market or asset class being measured and the desired risk exposures sought by index users.**
- **Replicable, offering a sufficiently sized universe without unnecessary turnover and transaction costs.**
- **Objective and transparent, with clearly defined and objective rules, as well as daily visibility into current index composition and future composition during rebalancing.**
- **Relevant as investment benchmarks for a diverse set of index uses, including both actively and passively managed portfolios.**

The Barclays indices are designed to meet these fundamental criteria, as all indices are rules based with inclusion determined by transparent eligibility criteria that have been set to accurately and comprehensively measure different fixed income asset classes. Additionally, comprehensive statistics for each index are readily available to index users, with performance statistics are available daily for most indices.

Design Principles

The principal objective of this methodology document is to guide users through each step of index design ...

...to better understand the rules, methodologies, conventions and governance of Barclays indices

Understanding Portfolio Uses of Benchmark Indices

Barclays tends to observe three common uses for fixed income indices, which influence preferences in index design and benchmark construction.

Portfolio Performance Targets

The most common use of indices is as a baseline performance target or benchmark for active or passive bond portfolios. While some investors and market participants may think of benchmarks solely in the context of ex-post performance analysis, index data are used at many different stages of the portfolio management process (eg, asset allocation, security selection and ex-ante portfolio risk analysis).

Informational Measures of Asset Class Risk and Return

In addition to benchmark performance, fixed income indices are often used as informational measures of market performance and risk characteristics. Within this context, firms use index data in a variety of functions in the development, back-testing, evaluation and implementation of investment strategies and market analysis.

References for Index-Linked Products

Finally, Barclays benchmark indices are used as a reference target for passive investment strategies and index-linked products such as, ETFs, ETNs and structured notes.

Given the variety of uses, Barclays recognizes that no single benchmark design is universal or appropriate for all investors. Our goal is to offer a broad, innovative and evolving suite of fixed income indices from which investors are able to select or customize the most appropriate benchmark for their portfolio needs. The "right" fixed income index can be viewed as the most appropriate and replicable benchmark for a specific portfolio objective

within the context of the dedicated portfolio and as part of an overall asset allocation mix. As an index provider, Barclays remains impartial to the benchmark selection decisions made by investors.

No single benchmark design is universal or appropriate for all investors. Our goal is to offer a broad, innovative and evolving suite of fixed income indices from which investors are able to select or customize the most appropriate benchmark for their portfolio needs.

Fundamental Design Questions to Construct a Fixed Income Index

Each benchmark within the Barclays benchmark index platform can be differentiated and summarized by the answers to three fundamental design questions central to all indices: 1) what investment universe is the index intending to measure?, 2) how are the return and risk characteristics of index-eligible securities measured?, and 3) how are security-level returns and risk characteristics weighted and aggregated to the index level?

What investment universe is the index trying to measure?

The answer here defines the universe of securities that an investor considers to be part of their choice set. This can be explicitly defined in an investor's portfolio guidelines, but may also include a broader risk budget to out-of-index securities not specified by investment guidelines.

From that defined universe, the benchmark must define index-eligible securities with objective, rules-based and transparent eligibility criteria that represent and measure the desired asset class.

How are the risk and return characteristics of eligible securities measured?

Once an investment/index universe is defined, these securities must be measured from both a return (pricing, coupon and principal payments) and risk (duration, convexity and spread) perspective.

How are security-level returns and risk characteristics weighted and aggregated to the index level?

With these security-level risk and return characteristics measured, they must then be aggregated to a summary or index level. How frequently the indices are rebalanced and how the relative weights of index-eligible securities are determined are key considerations to arrive at a final index construction.

The principal objective of this document is to guide index users through each of these steps of the index design process to better understand existing index rules, methodologies, and conventions for flagship Barclays indices and their evolution.

Barclays Benchmark Index Governance

An objective and transparent set of index rules requires an element of governance and stewardship to ensure that the index family remains relevant, usable and prudent over time. The Barclays Benchmark Index Governance Committee (BIGC) is independently tasked with the monitoring and maintenance of all benchmark indices.

Interpretation and Changes to Existing Benchmark Rules

The BIGC oversees the appropriateness of existing benchmark rules and is responsible for governing index rules in a transparent, fair and prudent manner. As such, the BIGC is responsible for the interpretation of existing index rules and conducting periodic reviews of existing index eligibility criteria, conventions and processes.

Interpretation of Existing Rules

The governance committee retains decision-making authority on how published rules are interpreted and when a formal review is warranted. In evaluating governance questions, Barclays may make a direct decision on a matter or seek additional stakeholder feedback through channels such as a formal index review, or through the annual index review process, which includes the Barclays Index Advisory Council (IAC), before making a decision.

Reviews of Index Rules, Conventions and Processes

Formal reviews of benchmark index rules, conventions and processes are designed to incorporate external feedback from various index stakeholders when considering possible benchmark index changes. Conducted at least once a year primarily through the IAC, formal reviews may also be held on an ad hoc basis if feedback is required by the BIGC to make a decision in a more timely fashion on urgent matters, or for more narrowly used indices. While potential benchmark changes are discussed through this process, all final decisions on benchmark index rules are made by the BIGC after the review period has ended.

New Product Review

The BIGC is responsible for reviewing and approving new standard benchmark families prior to product launch. New product reviews include, but are not limited to, the following: discussions on product design, operational matters and implementation, governance considerations, and regulatory considerations.

Benchmark Terminations

The BIGC is responsible for terminating benchmarks that may no longer be used, have been replaced by a successor benchmark, are designed in a manner that is no longer appropriate, and/or are no longer operationally supported. Its assessment of terminations considers the effect on all stakeholders.

Management of Benchmark Errors and Restatements

When benchmark errors occur, the governance committee has the ultimate responsibility for conducting due diligence, diagnosing errors, and assessing the effect on the indices and on clients. The BIGC then decides whether a restatement should be made and, if so, how it should be communicated.

BENCHMARK INDEX ELIGIBILITY RULES

Barclays benchmark indices are constructed to measure the risk and return characteristics of the global fixed income markets in an objective manner. Though the eligibility criteria of specific indices will vary, all benchmarks adhere to prudent index construction standards and guidelines.

Most importantly, Barclays benchmarks are rules-based, objective and transparent. Index inclusion of individual securities and the application of published index rules are determined by clearly defined, published eligibility criteria.

Index rules are continually monitored and reviewed by Barclays through a formal governance process that seeks stakeholder feedback to ensure they remain relevant and representative of asset class changes in an evolving market.

Common Fixed Income Index Eligibility Criteria

A common core set of security-level attributes are used across most fixed income indices when determining index eligibility

The central design of any fixed income index starts with an evaluation of security attributes to determine whether a bond will be index eligible as of the rebalancing date. While the threshold for inclusion varies from index to index, most benchmarks evaluate a core set of common attributes.

This chapter explains the most commonly used bond index eligibility criteria and how they are applied to a variety of Barclays benchmark fixed income index families including:

- **Currency** denomination of a bond's principal and interest payments.
- **Sector** classification of the bond issuer, recognizing the wide range of issuer types in the fixed income market including corporate, government and securitized borrowers.
- **Credit quality** of a bond as measured by the ratings agencies, Moody's, Standard and Poor's, and Fitch. This is important for index users with investment guidelines that make a clear distinction between investment grade (rated Baa and higher) and high yield (rated Ba and lower) securities.
- **Amount outstanding** of a bond, with larger bonds generally more widely held by investors and viewed as more liquid.
- **Time to maturity** of a bond's principal repayment.
- **Country** of risk of the issuing entity, especially in cases where an investor may make a distinction between developed and emerging markets in their portfolios.
- **Market of issue/placement type** of a security reflecting whether a bond is (or will soon be) publicly registered, exempt from registration or privately placed. This also indicates whether a bond is being marketed and sold to local investors only, non-local investors or globally offered in multiple markets.
- **Taxability** of a security's cash flows and principal payments from an issuer's and investor's perspective. From the issuer perspective, distinctions are made when cash payments are made by a borrower on a pre-tax basis (debt) vs. after-tax basis (equity dividend). From the investor perspective, bonds that offer tax-exempt proceeds (particularly US municipal securities) are generally bought by a different investor base than taxable bonds.
- **Subordination** of a security, which identifies where an investor's claim is within the borrower's capital structure, distinguishing between bonds that have senior claims and those that have subordinated claims in a credit event.

Other attributes that are used to determine index inclusion include whether a bond contains explicit **optionality** on the earlier repayment of principal (callable, puttable, etc.) and the **coupon type** used to determine interest payments (fixed- vs. floating-rate).

As fixed income markets continue to evolve, new types of bond features and structures are brought to market. When evaluating new security types for the purposes of index eligibility, Barclays takes a number of factors into account, including, but not limited to, existing index rules, eligibility precedents of similar types of debt and the views of clients and internal credit research teams. Often, inclusion is discussed as part of the formal index governance process.

For questions regarding the eligibility of particular instrument types or other index rules clarifications not addressed in this chapter, please contact the Barclays index group.

Barclays “Index Flags”

“Index flags” consolidate a number of common eligibility criteria into a single attribute

For many flagship Barclays indices, a composite “index flag” is calculated and published on a daily basis, which identifies whether a security meets the eligibility criteria of a particular index with a single attribute.¹

Index flags are valuable for a number of reasons. First, they simplify the identification of index-eligible securities within a large data set and enable an index user to design more granular or customized indices in a streamlined fashion. Most published sub-indices use an existing index flag for a particular benchmark family and then apply additional constraints to narrow or segment the investment universe further.

Second, bond-level index flags allow investors to easily identify crossover exposure within other benchmark index families because they are not mutually exclusive. For example, an investor seeking to identify the portion of the Global Aggregate Index that is also eligible for the EM Local Currency Government Index can do this using index flags, rather than replicating a long set of eligibility criteria to filter the universes.

Finally, index flags enable timely benchmark turnover analysis by giving daily projections of expected index composition as of the next rebalancing date. This is done by simultaneously identifying whether a security is eligible for an index as of a particular date and whether it was eligible as of the last index rebalancing. From this information, an index user can identify leavers, joiners and continuing issues for a benchmark index. Details on the mechanics of index flags can be found in the section “Benchmark Index Rebalancing.”

By family, benchmarks that have index flags available at the security level include:

- **Aggregate:** US, Pan-European, Asian-Pacific, Global, Canadian, China, Japanese
- **Corporate:** 144A, Eurodollar, Euroyen, Capital Securities, Contingent Capital
- **High Yield:** US HY, Pan-European HY, HY Floating-Rate Note, HY Bank Loans
- **Treasury:** Global Treasury, US Treasury Floating-Rate
- **Emerging Markets:** EM Local Currency Government Universal, EM USD Aggregate, EM Hard Currency Aggregate, EM Pan-European Aggregate
- **Inflation-Linked:** Global Inflation-Linked
- **Securitized:** US CMBS, Floating-Rate ABS, Hybrid ARM, Agency CMBS
- **Convertibles:** US, EMEA, APAC
- **Municipals:** Municipal, Taxable Municipal, Municipal HY

¹ Though they encompass many of the core attributes discussed in this chapter through a single data field, there may be other index eligibility criteria embedded in a derived index flag value.

CURRENCY

The currency of a bond's interest and principal cash flows is a primary attribute used by investors to segment the global fixed income market. They may seek returns in their native currency or be willing to take additional foreign exchange risk as a source of return. Barclays offers broad-based indices denominated in a single currency, such as the US Aggregate (USD) and Euro Aggregate (EUR) Indices, as well as multi-currency benchmarks, such as the Global Aggregate and EM Local Currency Government Indices. Returns on multi-currency indices are calculated on both an unhedged and a currency hedged basis in a number of reporting currencies. Additionally, returns for single-currency indices are available in currencies other than that of the index.

For index purposes, the determination of a bond's currency is generally straightforward, as its prospectus and other publicly available sources will clearly state the currency denomination of principal and coupon payments. The primary index consideration is whether a particular local currency bond market should qualify for certain broad-based indices. Barclays evaluates local currency inclusion candidates for benchmarks such as the Global Aggregate and EM Local Currency Government through its governance process to ensure that inclusion candidates meet broader index rules and are sufficiently investable. Local currency debt markets may also be removed from existing indices if there is a significant impairment to the investability of the market.

A bond's currency is also important for identifying the appropriate reference curves to calculate security risk characteristics (durations, convexity, spreads, etc.).

Local Currency Market Inclusion

The eligibility of local currency debt markets in broad-based, multi-currency indices is reviewed annually by Barclays as part of formal governance procedures. Historical inclusion by market is listed in Figure 1.

Global Aggregate Index Market Inclusion

To be a candidate for inclusion in broad-based, investment grade indices, such as the Global Aggregate Index, a local currency debt market must exhibit several necessary (but not sufficient) characteristics:

- **Sovereign debt rating** (long term local currency) must be investment grade using the Barclays credit quality classification methodology (middle rating of Moody's, Fitch and S&P).
- The currency must be **freely tradable and convertible** and not exposed to exchange controls that are designed to encumber its buying and selling by foreign investors.
- There must be an **established and developed forward market or non-deliverable forward (NDF) market** for the local currency such that foreign market participants can hedge their exposures into core currencies.

Other aspects of local market investability (market size, settlement and clearing, capital controls and tax regimes, secondary market liquidity, accessibility for foreign investors, etc.) are considered when assessing a market's potential inclusion during the annual index governance process.

EM Local Currency Government Index Market Inclusion

Local market inclusion in flagship emerging markets local currency indices is also evaluated on an annual basis and requires an established forward or NDF market for hedging for offshore investors. The initial criterion for inclusion in this index family is whether a country is classified as an emerging market under Barclays' EM definition.

Local currency debt market eligibility in broad-based indices is reviewed annually by Barclays as part of its formal governance process

New market inclusion is also based on a minimum market size requirement of USD5bn of index-eligible debt. Other EM-specific evaluations of investability, including capital controls and local market accessibility for offshore investors, are considered.

Because the accessibility of local EM debt is variable and often depends on whether an investor has an onshore presence, markets commonly characterised as difficult to gain exposure to² are not included in the flagship EM Local Currency Government Index, but instead are eligible for the broader EM Local Currency Government Universal Index. The Chinese, Croatian, Egyptian, Indian and Taiwanese government bond markets are tracked but included only in the EM Local Government Universal Index, Barclays' broadest measure of EM local debt.³

EM Local Currency Bonds that Settle Globally

Globally settled bonds that pay principal and accrue interest in local currency, but settle in USD are classified as local currency bonds and qualify for local currency benchmarks. These securities offer exposure to local currency government debt (both sovereign credit and local FX) and are less likely to be subjected to local taxation than locally settled bonds. These bonds became eligible for the EM Local Currency Government Index on March 1, 2011.

World Government Inflation-Linked Bond Index (WGILB) Market Inclusion

The WGILB is designed to include only those markets and securities in which a global government linker fund is likely and able to invest. New currency markets are assessed as part of the annual governance process; to be considered, any new market must first satisfy the credit rating threshold of A3/A- for G7 and euro area countries and Aa3/Aa- otherwise (using the Barclays credit quality methodology).

Having fulfilled the qualitative assessment as part of the annual governance process, an eligible market must then fulfil the minimum market size criterion. New eligible markets must meet a minimum market size, based on uninflated amount outstanding, of USD4bn using WM Company 4pm spot exchange rates as of the last business day of each quarter. If an eligible market meets the minimum market size, it will be added to the WGILB at the end of the following quarter.

The quarterly market size review applies only to developed markets that have initiated a new linker program or revived an inactive one. For markets defined as developed according to the Barclays index definition and that satisfy all other WGILB criteria, market size is assessed on an annual basis, concurrently with the annual governance process. Once added to the WGILB, the threshold for each market is lowered to USD2bn to prevent unnecessary turnover due to short-term fluctuations, particularly in foreign exchange movements.

The most recent WGILB additions, New Zealand (NZD) and Denmark (DKK), were announced as having eligible currencies for the WGILB following the 2012 annual governance process. Subsequently, New Zealand satisfied the market size criterion at end of Q313 and NZD-denominated inflation-linked bonds were subsequently included at year-end 2013. Denmark satisfied the market size criterion at year-end 2013 and a DKK-denominated inflation-linked government bond was subsequently included at the end of Q114.

² This is generally due to the presence of capital controls, quotas or other institutional constraints.

³ Croatia and Egypt exited the flagship EM Local Currency Government Index in April 2014.

FIGURE 1
Index Inclusion by Currency

Currency	Global Aggregate Inclusion	WGILB Inclusion	EM Local Currency Government Inclusion
US dollar (USD)	January 1, 1990	January 1, 1997	-
Canadian dollar (CAD)	January 1, 1990	January 1, 1997	-
Mexican peso (MXN)	January 1, 2005	-	July 1, 2008
Chilean peso (CLP)	January 1, 2005	-	July 1, 2008
Argentine peso (ARS)	-	-	July 1, 2008
Brazilian real (BRL)	-	-	July 1, 2008
Colombian peso (COP)	-	-	July 1, 2008
Peruvian sol (PEN)	-	-	July 1, 2008
European euro (EUR)	January 1, 1990	October 1, 1998 (France) October 1, 2003 (Italy)** April 1, 2006 (Germany)	-
British pound (GBP)	January 1, 1990	January 1, 1997	-
Danish krone (DKK)	January 1, 1990	April 1, 2014	-
Norwegian krone (NOK)	January 1, 1990	-	-
Swedish krona (SEK)	January 1, 1990	January 1, 1997	-
Swiss franc (CHF)	January 1, 2010	-	-
Polish zloty (PLN)	January 1, 2005	-	July 1, 2008
South African rand (ZAR)	January 1, 2005	-	July 1, 2008
Israeli shekel (ILS)	January 1, 2012	-	July 1, 2008
Czech koruna (CZK)	January 1, 2005	-	July 1, 2008
Hungarian forint (HUF)	January 1, 2005 (added) November 1, 2013 (dropped)	-	July 1, 2008
Croatian kuna (HRK)	-	-	July 1, 2008*
Egyptian pound (EGP)	-	-	July 1, 2008*
Turkish lira (TRY)	April 1, 2014	-	July 1, 2008
Russian ruble (RUB)	April 1, 2014	-	July 1, 2008
Nigerian naira (NGN)	-	-	April 1, 2013
Romanian leu (RON)	-	-	April 1, 2013
Japanese yen (JPY)	January 1, 1990	May 1, 2005	-
Australian dollar (AUD)	January 1, 1990	January 1, 1997	-
New Zealand dollar (NZD)	January 1, 1990	January 1, 2014	-
Hong Kong dollar (HKD)	September 1, 2004	-	-
Singapore dollar (SGD)	January 1, 2002	-	-
South Korean won (KRW)	January 1, 2002	-	July 1, 2008
Malaysian ringgit (MYR)	January 1, 2006	-	July 1, 2008
Thai baht (THB)	January 1, 2002 (added) March 1, 2007 (removed) July 1, 2008 (added)	-	July 1, 2008
Indonesian rupiah (IDR)	-	-	July 1, 2008
Philippine peso (PHP)	-	-	July 1, 2008
Chinese renminbi (CNY)	-	-	July 1, 2008*
Indian rupee (INR)	-	-	July 1, 2008*
Offshore Chinese renminbi (CNH)	-	-	April 1, 2013*
Taiwan dollar (TWD)	January 1, 2006 (added) January 1, 2012 (removed)	-	April 1, 2013*

Note: *Eligible for the Barclays Emerging Markets Local Currency Government Universal Index only. ** Italy was removed from the WGILB on August 1, 2012 and Spain does not qualify as a result of the credit rating rule for the WGILB Indices. Eurozone ascension currencies that were historically index eligible before adopting the EUR include the Slovak koruna (SKK) and the Slovenian tolar (SIT). Source: Barclays Research

SECTOR

Sector classifications categorize bonds by industry, government affiliation or some other grouping of ultimate issuer risk and are the basis for many key decisions in the portfolio management process (benchmark selection, asset allocation, security selection, risk budgeting, etc). Granular by design, Barclays sector classifications are hierarchal and allow for comparisons across sectors and within a specific peer group of issuers with similar risk characteristics.

The fixed income asset class presents layers of complexity far greater than those in commonly used equity classification schemes because of the diversity of issuer and security types. In addition to corporate issuers and central government borrowers, a broad universe of government-related entities (supranationals, local governments, government agencies) and securitized structures with bankruptcy remote issuers or ring-fenced assets must be classified appropriately.

Barclays Global Sector Classification Scheme

The Barclays global classification scheme uses four pillars to classify bonds by issuer type

The Barclays global sector classification scheme is a widely accepted standard for investors benchmarked to the flagship Barclays aggregate bond indices or a sector-based sub-component of these indices. It is designed to reflect the large universe of corporate, government, government-related and securitized bonds that comprise the global fixed income investment choice set. In addition to corporate bonds, this universe also includes central government sovereign/treasury bonds, government-related or quasi-sovereign bonds, and securitized bonds backed by a pool of assets rather than the unsecured credit of an issuer.⁴

The Barclays sector classification scheme has been modified over the years to recognize the evolution of certain industries and security types where the existing classification scheme was not representative of relevant peer groups. Additionally, increased granularity has been added for sectors that have grown and where meaningful distinctions have become warranted. As such, paramount design objectives for the global classification scheme include providing a framework to classify issuers that is both enduring and allows for meaningful peer group comparisons.⁵

Index-eligible bonds are divided into one of four broad categories: treasury, government-related, corporate and securitized. Within each broad sector, there are up to three additional layers depending on the depth and heterogeneity of issuers within the market. The Barclays global sector classification scheme can be found in Figure 2.

⁴ The sector classification scheme is designed to classify issuer types. It does not make distinctions based on country of risk (such as emerging vs. developed market) or security type (taxable vs. tax-exempt municipals).

⁵ One key consideration in the definition of sector and sub-sector peer groups is size. Additional granularity can always be offered to isolate issuers with similar risk characteristics, but for index purposes it is important that a particular sector or sub-sector is not too sparsely populated to facilitate relevant comparisons.

FIGURE 2

Barclays Global Sector Classification Scheme

Class 1	Class 2	Class 3	Class 4
Treasury			
Government-Related	Agency	Government Guarantee	
		Owned No Guarantee	
		Government Sponsored	
	Local Authority		
	Sovereign		
	Supranational		
Corporate	Industrial	Basic Industry	Chemicals, Metals & Mining, Paper
		Capital Goods	Aerospace & Defense, Building Materials, Diversified Manufacturing, Construction Machinery, Packaging, Environmental
		Communications	Cable and Satellite (called Media Cable prior to July 2014), Media and Entertainment (called Media-Non-Cable prior to July 2014), Wireless, Wirelines
		Consumer Cyclical	Auto, Leisure (called Entertainment prior to July 2014), Gaming, Home Construction, Lodging, Retailers, Restaurants, Services (c)
		Consumer Non-Cyclical	Consumer Products, Food & Beverage, Healthcare, Pharmaceuticals, Supermarkets, Tobacco
		Energy	Independent, Integrated, Oil Field Services, Refining, Midstream (added in July 2014)
		Technology	
		Transportation	Airlines, Railroads, Services
		Other Industrial	
	Utility	Electric	
		Natural Gas (a)	
		Other Utility	
	Financial Institutions	Banking	
		Brokerage, Asset Managers, Exchanges	(called Brokerage prior to July 2014)
		Finance Companies (b)	
		Insurance	Life, P&C, Health Insurance
		REITS	Apartment, Office, Retail, Healthcare, Other (d)
		Other Financial	
	MBS Pass-Through	Agency Fixed-Rate	GNMA 30y, GNMA 15y, Conventional 30y, Conventional 20y, Conventional 15y
		Hybrid ARMs	3/1, 5/1, 7/1, 10/1
	ABS	Credit Card	
		Auto	
		Student Loans	
		Residential Mortgages	
		Whole Business	
		Stranded Cost Utility	
		ABS Other	
	CMBS	Agency CMBS (d)	
		Non-Agency CMBS	
Securitized	Covered	Mortgage Collateralized	Pfandbriefe, Jumbo Pfandbriefe, Non-Pfandbriefe
		Public Sector Collateralized	Pfandbriefe, Jumbo Pfandbriefe, Non-Pfandbriefe
		Hybrid Collateralized	
		Other	Pfandbriefe, Non-Pfandbriefe

a) Distributors and Pipelines were Class 4 sub-sectors prior to July 2014.

b) Non-Captive Consumer and Non-Captive Diversified were Class 4 sub-sectors prior to July 2014. Captive Finance sub-sector retired in 2003.

c) Textiles was a Class 4 sub-sector prior to July 2014.

d) Class 3 granularity added in July 2014.

Source: Barclays Research

Sector Hierarchy and Definitions for Taxable Indices

The following section details the classifications used at the first, second, third and fourth levels within the Barclays indices, where applicable.

Treasury (Class 1)

The treasury sector includes debt issued by central governments in its native currency

The treasury sector includes native currency debt issued by central governments. These bonds are backed by the full faith and credit of a central government and represent one of the largest, most liquid segments of the global bond market. There are no sub-classifications under treasury, though index users will typically use additional segmentations by country or currency when evaluating this sector. Both nominal and inflation-linked native currency government debt is classified within the treasury sector.

Government-Related (Class 1)

A minimum 50% ownership rule is used to classify issuers as government agencies

The government-related sector groups all issuers with government affiliations in a single category. It has four sub-sectors: agency, sovereign, supranational and local authority. In the case of agencies (Class 2), there is further granularity at the Class 3 level.

- **Agencies (Class 2):** This broad category is designed to capture all issuers that are owned, sponsored or whose payments are guaranteed by a government. The three sub-classifications are:
 - **Government Guaranteed (Class 3):** Issues that carry direct guarantees of timely payment of interest and principal from central governments, local governments or other government owned entities. Government ownership is not a factor, although most entities will be government owned.
 - **Government Owned No Guarantee (Class 3):** Issuers that are 50% or more owned by central governments,⁶ but issue debt that carries no guarantee of timely repayment. This includes direct ownership by central and local governments, as well as indirect ownership through other government owned entities. This sector also includes state-owned entities that operate under special public sector laws. Entities that are less than 50% government owned are classified in the appropriate corporate bucket, unless the entity fits the definition of government sponsored.
 - **Government Sponsored (Class 3):** Entities that are less than 50% owned by central governments and that have no guarantee, but carry out government policies and benefit from “closeness” to the central government. Evidence of closeness includes government charters, government-nominated board members, government subsidies for carrying out “social” policies, provisions for lines of credit and government policies executed at sub-market rates with accompanying economic support from the government.
- **Sovereign (Class 2):** The sovereign sector contains debt issued directly by central governments, but denominated in a currency other than the governments’ native one. Due to the issuer’s inherent foreign currency risk, investors often classify these bonds separately from native currency treasury debt.
- **Local Authority (Class 2):** In addition to directly issued local authority debt, this sector also contains debt issued by entities 50% or more owned, but not necessarily guaranteed, by one or more local authorities. In the US market, taxable municipal bonds, including Build America Bonds (BABs), fall into this category. Entities less than 50% owned by a local authority will be classified within the appropriate corporate bucket.

⁶ The 50% ownership threshold provides a clear and objective delineation between government-related and corporate issuers. The rule promotes consistency in implementation and is based on measurable ownership information, which is generally publicly available.

- **Supranational (Class 2):** This sector covers international organizations whose stakeholders extend beyond a specific nation.

Corporate (Class 1)

The corporate classification and accompanying hierarchy is the most detailed component of the Barclays sector classification scheme. It is a global scheme that has been developed and refined over the years to categorize issuers across geographic markets based on their primary lines of business and the revenue streams and operations that are used to service their debt. Classifications are frequently reviewed by the Barclays index group in response to market events, changes in an issuer's ownership structure, mergers and acquisitions, divestitures, or changes in a primary line of business. New classifications may be added on an as-needed basis if a large segment of the market exhibits a well-defined risk profile that is not categorized in the existing scheme, though these types of changes are uncommon.

While some fixed income sectors may appear comparable to equity sectors, they are not interchangeable and are often different in definition, composition and placement within a broader hierarchy. Barclays' bond classifications are specific to the global debt market and consist of peer group definitions that reflect the specific market profile of the corporate bond market, which includes publicly traded issues, as well as debt issued by privately held companies that may have different issuance patterns.

The corporate sector is categorized into three broad categories at the second level of the Barclays classification scheme: industrial, financial institutions and utilities. Further classifications at the third and fourth levels offer additional granularity for cross-sector and peer group comparisons. The corporate Class 3 and Class 4 sub-sectors are:

- **Industrials (Class 2)**
 - **Basic Industry (Class 3):** Class 4 sub-sectors include Chemicals, Metals & Mining and Paper.
 - **Capital Good (Class 3):** Class 4 sub-sectors include Aerospace/Defense, Building Materials, Diversified Manufacturing, Construction Machinery, Packaging and Environmental.
 - **Communications (Class 3):** Class 4 sub-sectors include Cable and Satellite (called Media-Cable prior to July 2014), Media and Entertainment (called Media Non-Cable prior to July 2014), Wireless and Wirelines.
 - **Consumer Cyclical (Class 3):** Class 4 sub-sectors include Automotive, Leisure (called Entertainment prior to July 2014), Gaming, Home Construction, Lodging, Retailers, Restaurants and Cyclical Services.⁷
 - **Consumer Non-Cyclical (Class 3):** Class 4 sub-sectors include Consumer Products, Food/Beverage, Healthcare, Pharmaceuticals, Supermarkets and Tobacco.
 - **Energy (Class 3):** Class 4 sub-sectors include Independent, Integrated, Oil Field Services, Refining and Midstream (added in July 2014).
 - **Technology (Class 3)**
 - **Transportation (Class 3):** Class 4 sub-sectors include Airlines, Railroad and Transportation Services.
 - **Other Industrial (Class 3)**

⁷ Textiles was retired in 2014.

- **Utilities (Class 2)**
 - Electric (Class 3)
 - Natural Gas (Class 3)⁸
 - Other Utility (Class 3)
- **Financial Institutions (Class 2)**
 - Banking (Class 3)
 - Brokerage, Asset Managers and Exchanges (Class 3)⁹
 - Finance Companies (Class 3)¹⁰
 - Insurance (Class 3): Class 4 sub-sectors include Life, P&C and Health Insurance.
 - REITS (Class 3):¹¹ Class 4 sub-sectors include Apartment, Office, Retail, Healthcare and Other (all Class 4 sub-sectors added in July 2014).
 - Other Finance (Class 3)

Securitized (Class 1)

The securitized sector is designed to capture fixed income instruments whose payments are backed or directly derived from a pool of assets that is protected or ring-fenced from the credit of a particular issuer (either by bankruptcy remote special purpose vehicle or bond covenant). Underlying collateral for securitized bonds can include residential mortgages, commercial mortgages, public sector loans, auto loans or credit card payments.¹² There are four main sub-components of the securitized sector: MBS Pass-Through, ABS, CMBS and Covered.

- **MBS Pass-Through (Class 2):** Fixed income structures that pool residential mortgage loans with similar characteristics into a mortgage backed security and then allocate principal and interest payments of underlying loans to bond holders. This sector includes agency and non-agency issuers, but only agency issuers (FNMA, FHLMC and GNMA) are eligible for Barclays indices.
 - **Agency Fixed-Rate (Class 3):** Sub-sectors include GNMA 30 Year, GNMA 15 Year, Conventional 30 Year, Conventional 20 Year, Conventional 15 Year and MBS balloons (no longer index eligible).
 - **Agency Hybrid ARM (Class 3):** A hybrid adjustable rate mortgage (ARM) is a mortgage in which the homeowner pays a fixed interest rate for a fixed period (typically 3, 5, 7 or 10 years) and a floating-rate after that, combining the features of fixed- and adjustable-rate mortgage securities. Barclays indices only track agency issued hybrid ARM pass-throughs. Within this sector are four Class 4 sub-sectors for each of the major programs: 3/1, 5/1, 7/1 and 10/1.

⁸ In July 2014, Class 4 sub-sectors for Distributors and Pipelines were retired.

⁹ Prior to 2014, this sector was solely named Brokerage. Many issuers within this sector moved from brokerage to banking in 2008 when many broker-dealers reorganized as bank holding companies.

¹⁰ In October 2003, the sector “captive finance” was removed from the index classification schema. All securities in it were reclassified to reflect the sector of the parent company. Captive finance companies are subsidiaries whose purpose is to provide financing to customers buying the parent company’s product. They are usually wholly owned by the parent company. Although there are numerous examples, the best known occur in the automotive industry. General Motors has General Motors Acceptance Corporation (GMAC), Daimler Chrysler has Chrysler Financial and the Ford Motor Company has Ford Motor Credit Company (FMCC). In July 2014, remaining Non-Captive Consumer and Non-Captive Diversified sub-sectors were retired and collapsed into the single Class 3 Finance Companies category.

¹¹ Industrial issuers that have reorganized or are structured as REITS for tax purposes are classified within their respective industrial peer group.

¹² Instruments such as CMOs that package other bonds into a new security are not index-eligible.

- **Non-Agency (Class 3):** This classification captures non-agency mortgage pass-throughs in the US and mortgage pass-throughs denominated in non-USD currencies.
- **ABS (Class 2):** Within ABS, there are Class 3 sub-sectors for the following collateral types, though not all are represented in Barclays fixed- or floating-rate indices: auto loan, credit card, stranded cost utilities, home equity loan (no longer index eligible), manufactured housing (no longer index eligible), student loan, whole business and residential mortgages.
- **CMBS (Class 2):** CMBS are backed by commercial real estate loans or multi-family properties. Effective July 2014, sub-sectors differentiate between agency CMBS and non-agency CMBS. Other index classifications are used in this market (CMBS 2.0, ERISA-eligible, etc.) to segment the asset class further, but they are not part of the core classification scheme.
- **Covered (Class 2):** Covered bonds are recourse debt instruments that are secured by a ring-fenced pool of assets on an issuer's balance sheet (commercial real estate, residential mortgages, public sector loans or other assets). That investors have recourse to the originator is the defining difference between covered bonds and ABS.¹³ Securities that are issued under the Pfandbriefe Act in Germany and similar bonds in other jurisdictions (non-Pfandbriefe) are classified as covered bonds under this definition.
 - **Mortgage Collateralized (Class 3):** Bonds collateralized by residential and commercial real estate. Class 4 sub-sectors include Pfandbriefe, Jumbo Pfandbriefe and Non-Pfandbriefe. Danish MBS are classified as Non-Pfandbriefe.
 - **Public Sector Collateralized (Class 3):** Bonds collateralised by public sector loans. Class 4 sub-sectors include Pfandbriefe, Jumbo Pfandbriefe and Non-Pfandbriefe public sector loans.
 - **Hybrid Collateralized (Class 3):** Bonds collateralized by a combination of public sector loans, mortgages and/or other assets.¹⁴
 - **Other Covered (Class 3):** Bonds collateralized by single asset classes other than real estate or public sector loans. Two class 4 sub-sectors distinguish between Pfandbriefe and Non-Pfandbriefe.

Sector Assignment and Reclassifications

Barclays looks at a several factors when assigning a classification or reviewing a current classification

Barclays looks at a number of factors when assigning a sector classification or reviewing a current classification. These include an issuer's business lines and sources of revenues, as well as an evaluation of comparable companies with similar risk profiles or organizational structures. Sector classification can change due to various factors:

- **Corporate Actions:** In the case of corporate actions, such as a merger, acquisition or spin-off, the classification of an acquired company may change to be consistent with its new parent. For example, in January 2013, Abbott Laboratories spun off its pharmaceutical business into a separate entity, AbbVie. The Abbott Laboratories bonds were reclassified from Consumer Non-Cyclical > Pharmaceuticals to Consumer Non-Cyclical > Healthcare to reflect the business line of the remaining entity after the separation.¹⁵

¹³ The category includes "structured covered bonds," for which securitization techniques have been used to enhance the rating of the covered bonds, but the issuing entity is usually not bankruptcy remote. Structured covered issues are not governed by national covered bond legislation and regulation, while covered bonds are, where such guidelines exist. These bonds fall under "Other Covered" at the Class 3 level.

¹⁴ There are no hybrid Pfandbriefe, so there are no Class 4 sub-sectors.

¹⁵ *Sector Reclassification of Abbott Laboratories Debt in Barclays Indices.*

- **Change in Government Ownership:** A move between corporate and government-related may result from a decrease or increase in a government's ownership stake.¹⁶ In March 2013, for example, the ownership stake of the Japanese government in Japan Tobacco Inc. decreased from 52.5% to 36.7% after a Japan Tobacco Inc. share repurchase and secondary offering. As a result, the sector for JAPTOB bonds in the Barclays indices was updated from Government-Related > Agencies to Industrial > Consumer Non-Cyclical > Tobacco. While membership in broad-based Asian-Pacific Aggregate and Global Aggregate Indices was not affected, the JAPTOB bonds did become eligible for corporate sub-indices of the broad-based aggregate benchmarks.¹⁷
- **Evolution of Business Lines:** If the business lines of a corporate entity shift, it could be reclassified to reflect its new peer group. In January 2013, Ally Financial Inc issues were reclassified to reflect the firm's increased operations as a traditional bank holding company and migration away from a legacy finance company structure. The classification for bonds within the Barclays indices was updated from Financial Institutions > Finance Companies to Financial Institutions > Banking.¹⁸

Issuers with diverse business lines can present a challenge when cases can be made for multiple classifications. Whether assigning a classification to a new issuer or reviewing classifications of existing ones, Barclays evaluates all publicly available information on a given entity and consults with credit research teams within Barclays to assign the most appropriate classification, conforming to published index rules. In cases of a true gray area, a decision may be escalated to the Barclays Benchmark Index Governance Committee (BIGC).

Evolution of the Barclays Classification Scheme

As discussed above, bonds are divided into four main sectors at the Class 1 level in the Barclays classification scheme. Prior to January 2005, a three-pillar scheme was used, classifying bonds into government,¹⁹ credit and securitized sectors at the first level. One of the primary reasons for the sector changes made in 2005 was to make the scheme global in nature and not reflective of the perspective of a single region. Consequently, the notion of "foreign" in existing classifications (used in the foreign local agencies and foreign local government sectors) was removed and the bonds were reclassified within the new government-related sector. The change eliminated classification differences arising when government, government agencies and local authorities issue bonds in their native (domestic) and non-native (foreign) currencies.

The government-related sector introduced in 2005 was designed to categorize issuer-level risk in a more descriptive manner by grouping all issuers with government affiliations separately from treasury or corporate issuers. Moreover, the three sub-classifications within the agencies sector (government guarantee, government owned no guarantee and government sponsored) more accurately segregated agency issuers based on their government relationships. Figure 3 provides the relationship between the classification scheme before and after the change.

¹⁶ Over the years, government-owned entities have been candidates for full or partial privatization. These processes can often be time consuming, reflecting their often-political nature and the difficulties in evaluating the companies as standalone entities. Taking into account such factors, privatization candidates are moved to the appropriate corporate sector only when their share sales take place, not when they are first announced.

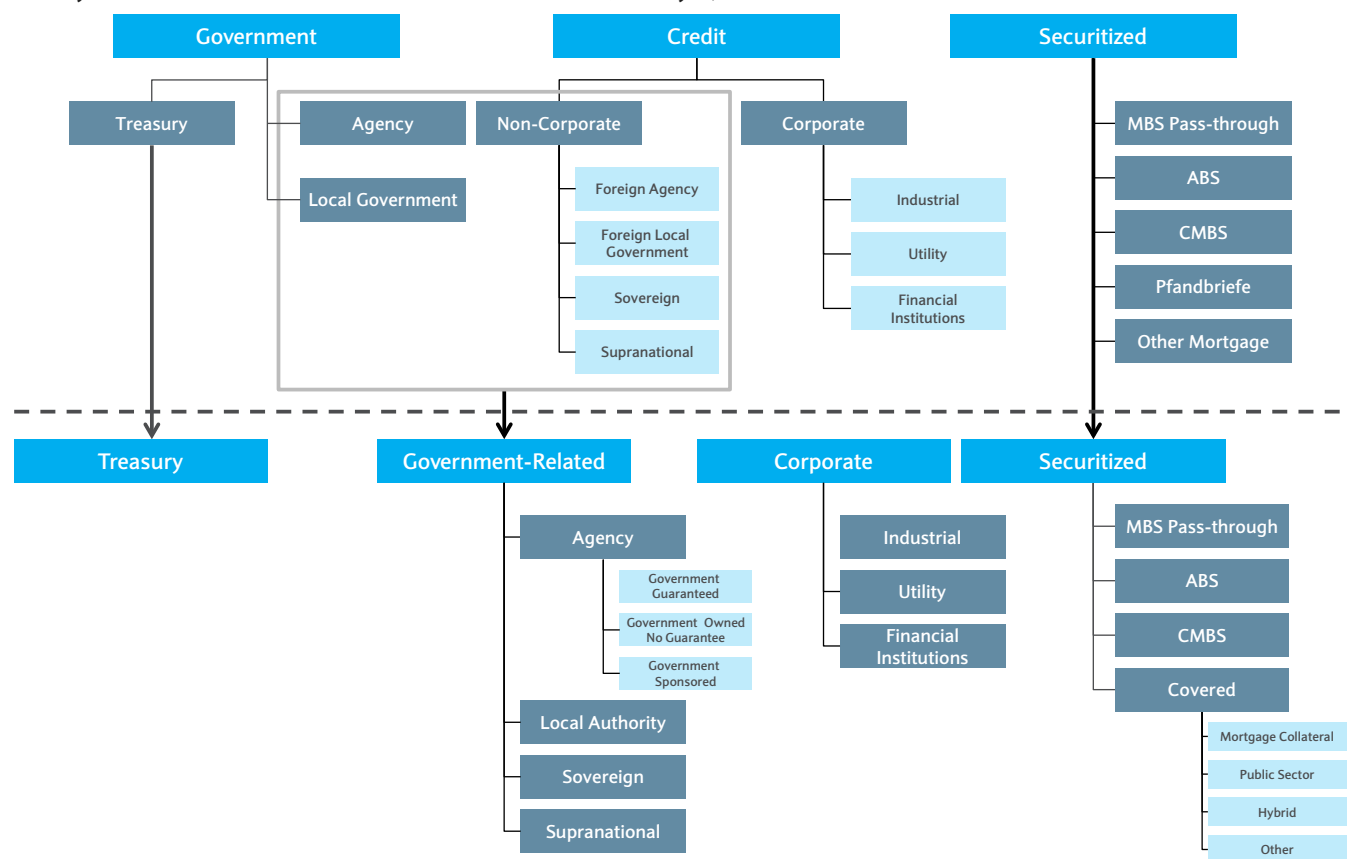
¹⁷ *Sector Reclassification of JAPTOB Debt in Barclays Indices.*

¹⁸ *Sector Reclassification of Ally Financial Inc Debt in Barclays Indices.*

¹⁹ While the three-pillar scheme has been retired, many benchmark indices are still based off the "government" definition of native-currency agency bonds and treasuries. Legacy Barclays (Series-B) indices, including Barclays Government Inflation-Linked and Barclays Government (Series-B) Indices, define "government" as including only treasury bonds (local currency debt issued by central governments).

FIGURE 3

Barclays Sector Classification Scheme: Before and After January 1, 2005



Source: Barclays Research

The most recent changes, effective July 2014, include the creation of several new sectors at the Class 3 and Class 4 level, renaming of certain existing sectors and retirement of others.

Municipal Index Classifications

Due to the unique nature of the asset class, Barclays uses a classification scheme that is unique to the risk factors associated with the municipal market for related indices.

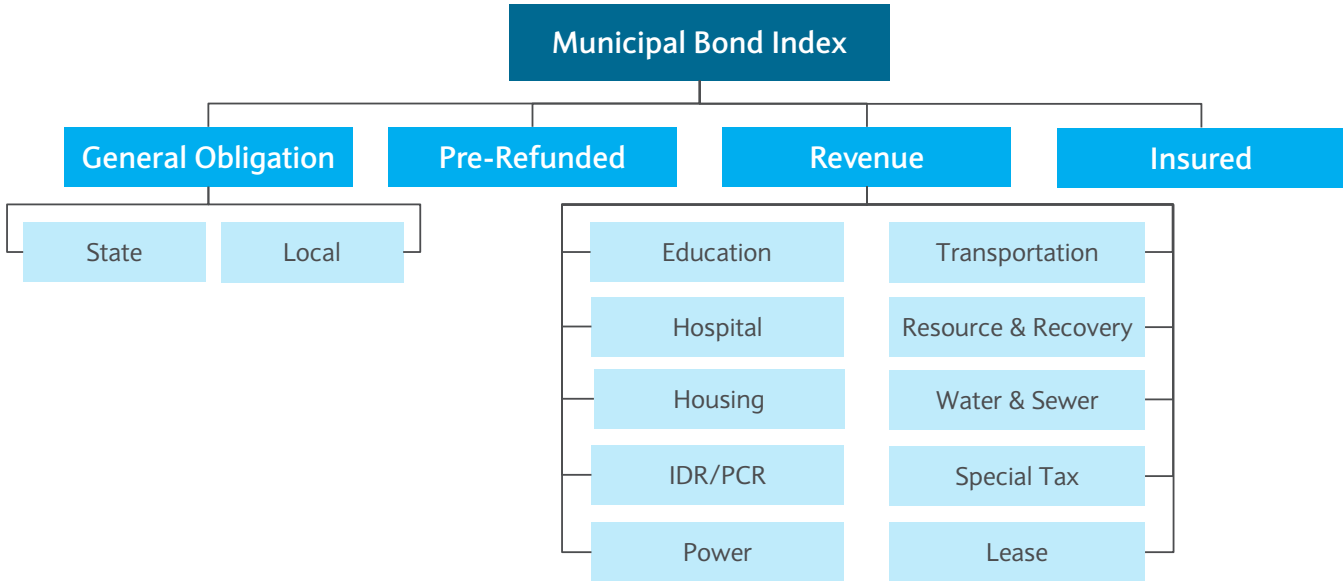
Municipal Index Classifications

For the tax-exempt municipal market, bonds in the Barclays Municipal Bond Index are categorized into the following sector types:

1. **Pre-Refunded:** Bonds backed by special US Treasury issuance or other high quality bonds; this supersedes all other sector designations.
2. **Insured:** Bonds enhanced by monoline insurers that have a rating of Aa3 or higher are classified as insured.
3. **General Obligation (GO):** Bonds that have not been pre-refunded, are not insured and are backed by the credit of the issuing entity, not a directed revenue stream or project.
4. **Revenue:** Bonds that have not been pre-refunded and are not insured that are backed by revenue generating projects as a funding source.

Bonds in the Municipal Index are further classified into ten sub-sectors for revenue bonds (education, industrial, hospital, housing, power, resource recovery, transportation, special tax, lease revenue and water & sewer) and two sub-sectors for general obligation bonds (state general obligation and local general obligation). The scheme is detailed in Figure 4.

FIGURE 4
Municipal Index Classification Scheme



Source: Barclays Research

CREDIT QUALITY

The credit rating of a security is a key classification in the fixed income market, with a clear distinction between investment grade (Baa3/BBB- or higher) and high yield (Ba1/BB+ or lower) debt. Investment grade and high yield portfolios are often managed separately (though portfolio guidelines may allow a certain degree of crossover), which requires a clear rules-based delineation for index purposes.

An added layer of complexity exists in the assignment of credit quality because the rating agencies used in index classifications (Moody's, Standard & Poor's and Fitch) may assign a different rating to the same security. Barclays uses multiple ratings sources to classify securities appropriately, including bond-level ratings from the different agencies, issuer ratings, and foreign or local currency sovereign debt ratings.

Barclays Index Rating

Barclays uses the middle rating of Moody's, S&P and Fitch to determine a security's credit classification

Barclays uses the middle rating of Moody's, S&P and Fitch²⁰ to determine a security's credit classification or "index rating".²¹ This essentially works as a "two-out-of-three" rule because a bond requires at least two of the three agencies to rate a bond as investment grade to quality for investment grade indices (or two agencies to rate as high yield to quality for Barclays high yield indices).

If only two agencies rate a security, the most conservative (lowest) rating is used. If only one rates a security, that single rating is used. Situations where no security level ratings are available are discussed later in this section.

Below are three examples using specific issues as of June 30, 2013:

1. Newfield Exploration Co., 5.750% Coupon, Maturing January 30, 2022

Moody's Rating: Ba1

S&P Rating: BBB-

Fitch Rating: BB+

Barclays Index Rating: Ba1/BB+

Despite S&P's investment grade rating of BBB-, this issue is still classified as high yield for index purposes since Moody's and Fitch have it rated as high yield.

2. Alcoa Inc., 5.9% Coupon, Maturing February 1, 2027

Moody's Rating: Ba1

S&P Rating: BBB-

Fitch Rating: BBB-

Barclays Index Rating: Baa3/BBB-

This issue would have an index rating of Baa3/BBB- because the Moody's rating (lowest) and either the Fitch or S&P rating (highest) would be dropped.

²⁰ Barclays does not currently supplement the ratings of Moody's, Fitch and S&P with that of other ratings agencies for specific asset classes or sub-sets of the global fixed income markets. However, the use of additional ratings sources is reviewed with index users on a periodic basis through the annual governance process.

²¹ Though S&P and Fitch ratings are used in determining an index rating, Moody's nomenclature is used for all bonds.

3. Astrazeneca Plc, Coupon 5.9%, Maturing September 15, 2017

Moody's Rating: A2

S&P Rating: AA-

Fitch Rating: AA-

Barclays Index Rating: Aa3/AA-

This issue would have an index classification of Aa3/AA-, as the Moody's rating (lowest) and either the Fitch or S&P rating (highest) would be dropped.

Evolution of Barclays Index Rating Methodology

Barclays has revised the rules used for credit quality classification over the years to incorporate additional information about issuers/issues that would 1) enhance the usability and design of the indices, 2) prevent sudden and unwanted turnover due to ratings changes, and 3) offer multiple views on issuer credit worthiness, especially in cases where there may be differences in opinion.²²

Of the three agencies used, Fitch ratings were most recently incorporated into the index rules on credit quality in July 2005. Prior to 2005, the index rating was assigned by taking the lower or more conservative of S&P and Moody's ratings. The addition of Fitch afforded a more consensus opinion, in addition to promoting longer-term index rating stability. The advantage of this method, as opposed to a most conservative rule, is that at least two agencies need to agree on a rating to prompt an index rating change.²³

The original method to classify bonds by credit quality within the indices applied a 50% split of a security's index weight based on Moody's and S&P ratings for investment grade indices when both ratings were available. However, this approach proved sub-optimal in cases of split-rated issues (bonds rated investment grade by one agency and non-investment grade by the other agency), where only half of the security's weight was included in the investment grade index. As a result, on August 1, 1988, the method was revised to use Moody's as the primary rating agency for index classification, with S&P as secondary source where Moody's did not rate an issue.

This clear, easily followed rule remained for a time, but investor interest for a more inclusive approach that did not rely on a single arbiter of credit quality prompted a change in 2003.²⁴ On October 1, 2003, rules for credit quality classification evolved to incorporate S&P more broadly into the classification and use the more conservative or lower rating for index inclusion purposes.²⁵ Index user interest in a more inclusive set of criteria and the desire to mitigate further the reliance on a single outlier agency prompted the addition of Fitch ratings in 2005 and the transition to the use of the middle rating.

²² The three ratings agencies used are widely accepted and followed by index users in their own credit evaluations and offer wide coverage of the global fixed income markets.

²³ Prior to January 1, 2011, Series-B inflation-linked and government bond indices used the lower of the Moody's and S&P ratings only. The middle of the three ratings of Moody's, S&P and Fitch is now used for all Barclays indices.

²⁴ Index user interest in the use of additional ratings agencies gained considerable momentum after credit market volatility in 2002.

²⁵ Upon implementation of this change, the movement of securities out of investment grade and into high yield indices was minimal, with 28 securities (USD6.6bn by market value) dropping out of the US Aggregate Index and entering the US HY Index.

Credit quality may be assigned using an expected rating, issuer rating or sovereign rating when bond-level ratings are unavailable

Classifications When Bond-Level Ratings Are Unavailable

In certain cases, bond-level ratings for index-eligible securities may not be available, while other assessments of credit quality, such as expected ratings or issuer-level ratings, are. The following rules are used to assign credit quality in such situations. They may be applied for short-term purposes where the absence of a rating may be temporary or in longer-term cases where a rating agency only offers issuer-level ratings, not bond-level ratings.

Use of Expected Ratings

When the credit rating assigned by a rating agency is referred to as “expected”, it generally indicates that a full rating has been assigned based on the agency’s expectations of receiving final documentation from the issuer. Once the final documentation is received and reflects the agency’s expectations, the expected rating is converted to a final rating. Expected ratings at issuance may be used to ensure timely index inclusion or to classify split-rated issuers properly. For example, if a bond has one confirmed high yield rating and one confirmed investment grade rating, a third unconfirmed rating may be used to prevent unnecessary index turnover between high yield and investment grade indices once the third rating is confirmed.

Issuer Ratings

For unrated senior securities from issuers with other index-eligible bonds, Barclays may apply the issuer rating that exists on any existing senior bond. For unrated subordinated securities, Barclays may apply the issuer subordinated rating. In cases where there is no subordinated rating, subordinated bonds will be excluded from Barclays indices. In both cases, the middle issuer rating will be displayed at the security level as the “index rating”, while the ratings for each agency will be displayed as NR. Issuer ratings are not used in cases where there are confirmed bond-level ratings from at least one agency.

Sovereign Ratings

Sovereign ratings are assigned by the rating agencies as a measure of the capacity and commitment of central governments to repay their outstanding debt obligations. Local currency treasury and hard currency sovereign issues are classified using the middle sovereign²⁶ rating from Moody’s, Fitch and S&P for all outstanding bonds even if bond-level ratings are available.²⁷ The middle sovereign rating is applied uniformly as the “index rating” at the bond level across all treasury bonds, even if bond-level ratings show as NR for one or more agencies. This rule is also applied in cases where issuers that are backed by a central government have ratings for some, but not all securities at the bond level. To prevent split ratings for such issuers, the sovereign rating may be applied as the index rating to all bonds from that issuer.

Ratings for Pfandbriefe

German Pfandbriefe are assigned ratings that are one full rating category above the issuer’s unsecured debt rating.

Average Quality at the Index Level

A linear numeric system is used to average the bond-level index ratings. Each index rating is assigned a numeric value from 2 to 24, and the constituents’ numeric ratings are market value weighted to arrive at the aggregate average quality for the index.

²⁶ The long-term local currency sovereign rating is used for treasury issues; the long-term foreign currency sovereign rating is used for sovereign issues.

²⁷ For example, Japan’s sovereign rating is assigned to all Japanese government, government-guaranteed Japanese agency and local government securities denominated in JPY. Similarly, all US MBS pass-throughs are assigned the US government rating for all agencies, even though the MBS pools themselves are not explicitly rated.

FIGURE 5

Barclays Numeric Value of Quality Ratings

Numeric Value	Index Rating	Moody Rating	S&P Rating	Fitch Rating
2	AAA	AAA	AAA+	AAA+
3	Aa1	Aa1	AA+	AA+
4	Aa2	Aa2	AA	AA
5	Aa3	Aa3	AA-	AA-
6	A1	A1	A+	A+
7	A2	A2	A	A
8	A3	A3	A-	A-
9	Baa1	Baa1	BBB+	BBB+
10	Baa2	Baa2	BBB	BBB
11	Baa3	Baa3	BBB-	BBB-
12	Ba1	Ba1	BB+	BB+
13	Ba2	Ba2	BB	BB
14	Ba3	Ba3	BB-	BB-
15	B1	B1	B+	B+
16	B2	B2	B	B
17	B3	B3	B-	B-
18	Caa1	Caa1	CCC+	CCC+
19	Caa2	Caa2	CCC	CCC
20	Caa3	Caa3	CCC-	CCC-
21	Ca	Ca	Ca	Ca
22	C	C	C	C
23	D	D	D	D
24	NR	NR	NR	NR

Note: AAA+ used to exist as a distinct rating with a numeric value of 1 to distinguish between US government-backed bonds and other explicit AAA rated securities. This designation was retired in 2005. Source: Barclays Research

Defaulted Securities

For Barclays index purposes, a security is considered to be in default if it has missed a scheduled interest or principal payment, has an index rating of “D” based on Barclays credit quality methodology or is trading flat. Defaulted bonds from corporate issuers are not eligible for Barclays indices, such as the US High Yield Index. Once a corporate bond is identified as in default from an index standpoint, its accrued interest is set to zero, reversing out any accrual posted since the last coupon payment, and it will have a negative coupon return. The bond continues to be priced in the returns universe until month-end, at which time it will exit the index for the following month. When securities default, index users will see all analytics, such as duration and spread, set to zero.

In the case of missed payments on treasury and sovereign debt issued by central governments, debt is often restructured through a revision to the debt terms agreed upon by the government and bond holders. Due to the increased probability that sovereign debt will come out of default through restructuring or an exchange, Barclays allows defaulted sovereign bonds to remain eligible for indices, such as the EM USD Aggregate Index.

AMOUNT OUTSTANDING

The amount outstanding or par value of a bond determines not only the notional balance on which an issuer pays interest, but the amount of principal to be repaid by an issuer at the end of a bond's term. Par amount outstanding is seen as a measure of relative liquidity and as a proxy of the float available for investors to purchase, with larger bonds viewed as more accessible than smaller ones. For purposes of inclusion, Barclays indices have a minimum outstanding rule that is applied on a security-level basis. This is sometimes referred to as a minimum "liquidity" rule.

The minimum amount outstanding size for the Global Aggregate Index and EM Local Currency Government Index are the same. Different minimums are used for the US Aggregate, High Yield, Inflation-Linked, EM Hard Currency and Municipal Index families.

Minimum market size at the country level is also a consideration for flagship inflation-linked (WGILB) and EM local currency indices, but not a consideration for other broad-based indices, such as the US Aggregate or Global Aggregate Indices. Additionally, no minimum issuer size is applied to corporate or government-related issuers in standard benchmark indices.²⁸

Local Currency Minimums

Local currency minimums are based on market-specific issuance and benchmark issue sizes, and a comparison of thresholds across markets to ensure similar size standards

Global Aggregate and EM Local Currency Minimum Issue Sizes

Effective April 2013, Barclays indices use fixed minimum issue sizes for each local currency bond market.²⁹ For each currency included in the Global Aggregate and EM Local Currency Government Index families, local currency minimums are established based on a number of factors, including market-specific issuance patterns and benchmark issuance sizes, and a comparison of existing minimum thresholds across markets to ensure similar size standards are applied. The local currency minimums are reviewed on an annual basis through Barclays' formal governance process to ensure an accurate representation of each market. Figure 6 lists minimum amounts outstanding for the Barclays indices.

Rules for Indices with Higher Minimum Issue Sizes

Higher liquidity versions of the Global Aggregate or EM Local Currency Government Indices use adjusted local currency minimums for each currency that are scaled up proportionally to the same desired percentage increase. This scaling factor is determined by dividing the new desired minimum for a specific currency by its current Global Aggregate minimum, which is then applied to all currencies eligible for the benchmark.

For example, setting a USD or EUR minimum issue size of 500mn represents a 2/3 increase over their Global Aggregate minimum issue size of 300mn. This higher liquidity threshold is then applied proportionally to all other Global Aggregate currency minimums, reflecting the same percentage increase from 300mn to 500mn. The adjusted JPY minimum in this example would be increased to JPY58.3bn from its current JPY35bn.

Investors who prefer market-specific local currency minimums that are not scaled proportionally across the entire benchmark may do so in a customized index.

²⁸ Prior to April 2013, hard currency emerging markets corporate bond issuers were subject to a USD1bn minimum issuer size constraint. Issuer size constraints are also used in certain Very Liquid Indices (VLI), which are customized versions of high yield benchmarks.

²⁹ Prior to April 2013, local currency minimums were set for non-G4 currencies by converting each currency into either USD, EUR or JPY, based on region, using exchanges rates as of the last day of November. The annual process set a fixed minimum par amount outstanding for each bond in its local currency that would remain in effect for the upcoming year starting on January 1. The fixed local currency minimums would then be reset the following November. The switch to local currency minimums eliminated annual turnover caused by annual resets of G4 pegs and set new appropriate thresholds for markets where benchmark issuance was lower or higher than current G4 equivalents.

FIGURE 6

Fixed Local Currency Minimums for Barclays Indices

Region		Currency	Global Aggregate/Global Treasury/EM Local Currency Minimum (000s)	Inflation-Linked Minimum (000s)	High Yield Corporate Minimum (000s)
Americas	Global Aggregate Eligible	USD	300,000*	500,000	150,000
		CAD	300,000	600,000	-
		MXN	10,000,000	300,000 (UDI)	-
		CLP	100,000,000	1,000 (UF)	-
	EM Local Currency Eligible	ARS	1,000,000	750,000 (CER)	-
		BRL	1,000,000	400,000	-
		COP	1,000,000,000	1,000,000 (UVR)	-
		PEN	1,000,000	-	-
EMEA	Global Aggregate Eligible	EUR	300,000	500,000	100,000
		GBP	200,000	300,000	500,000
		DKK	2,000,000	5,000,000	-
		NOK	2,000,000	-	500,000
		SEK	2,500,000	4,000,000	1,000,000
		CHF	300,000	-	100,000
		PLN	2,000,000	500,000	-
		ZAR	2,000,000	400,000	-
		ILS	2,000,000	1,500,000	-
		CZK	10,000,000	-	-
		RUB	20,000,000	-	-
		TRY	2,000,000	500,000	-
	EM Local Currency Eligible	HRK	3,000,000	-	-
		EGP	3,000,000	-	-
		HUF	200,000,000	-	-
		NGN	100,000,000	-	-
		RON	1,000,000	-	-
Asia	Global Aggregate Eligible	JPY	35,000,000	50,000,000	-
		AUD	300,000	700,000	-
		NZD	500,000	1,000,000	-
		HKD	2,000,000	-	-
		SGD	500,000	-	-
		KRW	500,000,000	500,000,000	-
		MYR	2,000,000	-	-
		THB	10,000,000	20,000,000	-
	EM Local Currency Eligible	IDR	2,000,000,000	-	-
		PHP	20,000,000	-	-
		CNY	10,000,000	-	-
		INR	25,000,000	-	-
		CNH	1,000,000	-	-
		TWD	15,000,000	-	-

Note: *The minimum for MBS fixed-rate and hybrid ARM generics is USD1bn as of April 2014. Source: Barclays Research

Inflation-Linked Indices

The minimum issue size for inflation-linked government bonds in developed markets is higher than their nominal counterparts in the Global Treasury Universal Index and slightly lower for emerging markets (Figure 6). For most developed markets, actual issue sizes of index-eligible government debt are substantially higher than the index minimums.

US Aggregate Minimum Issue Sizes

US Aggregate minimum issue sizes have evolved to reflect the growth and size of the USD-denominated bond market and benchmark issuance sizes (Figure 7).

- The US Aggregate Index has a minimum issue size of USD250mn for government, credit and covered bonds.
- For MBS securities, the minimum generic size in the US Aggregate is USD1bn as of April 2014 (previously, the minimum matched the overall minimum of the US Aggregate).
- For ABS and CMBS securities, the original deal size minimum is USD500mn and the eligible tranche size minimum is USD25mn. CMBS securities also must be part of a deal that has at least USD300mn currently outstanding.³⁰

The Global Aggregate and US Aggregate Indices have slightly different minimum liquidity rules

Crossover eligibility for the Global Aggregate Index requires USD300mn bond size, and as a result only a sub-set of the US Aggregate is eligible for the broader multi-currency index. Government and credit bonds with USD250-300mn outstanding are only US Aggregate eligible, as well as any ABS or CMBS tranche below USD300mn. All fixed-rate MBS securities eligible for the US Aggregate are also eligible for the Global Aggregate since both have a USD1bn minimum for MBS generics. Hybrid ARM MBS are not eligible for the Global Aggregate.

FIGURE 7
Evolution of US Aggregate Minimum Issue Size Rule (in USD)

Date	Change to US Aggregate Minimum Issue Size
January 1973	Inception of US Government and US Corporate Indices with 1mn minimum.
January 1986	Inception of US Aggregate Index with 1mn minimum.
April 1988	Minimum raised from 1mn to 25mn.
January 1990	Minimum raised from 25mn to 100mn for government bonds only.
January 1992	Non-government minimum raised from 25mn to 50mn.
January 1994	Non-government minimum raised from 50mn to 100mn.
July 1999	Minimum raised from 100mn to 150mn for all sectors.
October 2003	Minimum raised from 150mn to 200mn.
July 2004	Minimum raised from 200mn to 250mn.
April 2014	MBS minimum raised from 250mn to 1bn, non-MBS remains at 250mn.

Source: Barclays Research

Other Barclays Flagship Indices

High Yield Indices

Benchmark issue sizes for the high yield market are generally lower than investment grade issuance and the minimums for these benchmarks reflect that.

- For the US High Yield Corporate Index, the minimum issue size is USD150mn.
- For the Pan-European High Yield Index, the minimum issue sizes for each eligible currency are EUR100mn, GBP50mn, CHF100mn, SEK1bn and NOK500mn.³¹

³⁰ Barclays also offers broader CMBS indices that have no minimum tranche size rule and apply only original and current deal size constraints.

³¹ Prior to 2014, the Pan-European HY minimums were set as one-third of Global Aggregate minimums for each eligible currency.

EM Hard Currency Indices

For the EM Hard Currency Aggregate Index, higher minimum issue sizes are used: USD500mn, EUR500mn and GBP500mn. These are applied to the EM Hard Currency Aggregate family only.³²

Municipal Indices

The tax-exempt US municipal market has substantially lower issuance sizes than the taxable bond market. The minimum issue size for the flagship Barclays US Municipal Index is USD7mn and bonds must be issued as part of a transaction of at least USD75mn. For the High Yield Municipal Index, the minimum issue size is USD3mn and bonds must be issued as part of a transaction of at least USD20mn.

Minimum Market Size

For Barclays EM Local Currency Government and World Government Inflation-Linked Indices, eligible local currency markets are also subject to minimum market size requirements for index inclusion based on the gross amount outstanding of index-eligible debt (greater than 1-year, above the minimum issue size, etc.).

- To be considered for inclusion in the EM Local Currency Government Index, a market must have at least USD5bn equivalent in nominal, fixed-rate local currency debt that meets the minimum issue size at the time of the annual review. Additional reviews of market investability and accessibility are conducted, making this rule a necessary but not sufficient condition for inclusion.
- To be considered for inclusion in the World Government Inflation-Linked Bond Index, a market must be in excess of USD4bn equivalent as of the quarterly review date (end of quarter). Markets and eligible bonds must also meet all other index inclusion criteria to be added. The threshold for existing markets is lowered USD2bn to prevent unnecessary turnover due to short-term fluctuations in exchange rates or issuance. The existing market minimum is assessed on a quarterly basis.

Float Adjustments to Amount Outstanding

US Treasuries

Federal Reserve purchases and sales of nominal and inflation-linked US Treasuries in open market operations are adjusted in the Barclays flagship US Aggregate, Global Treasury and Series-L US TIPS Indices using data made publicly available on the Federal Reserve Bank of New York website.³³

Adjustments to each security's amount outstanding are made on a monthly basis in the statistics universe for government purchases and sales for the Federal Reserve SOMA account conducted in the previous month. The adjustments are reflected in the returns universe in the following month.³⁴ When US Treasury nominal or inflation-linked bonds are issued or reopened, the initial par amount outstanding that enters the statistics universe is reduced for any issuance bought by the Federal Reserve at auction.³⁵

Additional market size minimums are used for EM Local Currency Government and WGILB Indices

Federal Reserve purchases and sales of nominal and inflation-linked US Treasuries are reflected in flagship indices

³² Bonds with lower issue sizes with an EM country of risk may still qualify for other Global Aggregate sub-components such as the US Aggregate, Eurodollar or 144A Indices.

³³ <http://www.newyorkfed.org/markets/pomo/display/index.cfm?fuseaction=showSearchForm>.

³⁴ Prior to May 2009, when the US Treasury increased the scale and scope of purchases in the open market for SOMA accounts, float adjustments were made on a quarterly basis using the Treasury Quarterly Bulletin, which is published with a 3-month lag.

³⁵ Series-B inflation-linked indices do not adjust the notional amount outstanding of US TIPS for SOMA holdings. The US TIPS component of the Series-B WGILB Index uses the full amount outstanding to determine index weights and does not adjust for Federal Reserve or government holdings. Therefore, the amount outstanding of a TIPS in the Series-L US TIPS Index may be less than the amount outstanding of the same bond in the WGILB Index if any part of the issue was purchased by the Federal Reserve.

Float Adjustments for Other Markets

Barclays offers a series of Float-Adjusted Indices that adjust the par amount outstanding for central government holdings of other asset classes. The US Aggregate Float-Adjusted Index adjusts for US Federal Reserve holdings of US MBS pass-throughs and US agency bonds, in addition to Treasuries. The Float-Adjusted Pan-European Aggregate adjusts the amount outstanding of Gilts for Bank of England purchases and the Float-Adjusted Asian-Pacific Aggregate Index adjusts JGB par amount outstanding for Bank of Japan purchases.

Other Amount Outstanding Eligibility Rules

Called Securities

Securities that are fully called exit the index at their call price, and the entire par amount outstanding enters the returns universe as cash. In the case of partial calls, an adjustment to the amount outstanding is made to reflect the current debt outstanding, and the bond remains in the index so long as all index inclusion rules, including the minimum amount outstanding, are met.

Sinkable Bonds

For securities with a sinking fund feature, a paydown return will be calculated for months in which a sinking payment is made, and the outstanding amount for the bond will be adjusted accordingly.³⁶

Agency MBS Prepayments

As principal is paid down, US MBS pass-through generics show a decrease in par amount outstanding, which is reflected on the 16th business day of each month within the indices. A paydown return is calculated for MBS generics on the first business day of each month using the prior month's paydown data and then updated on the 16th business day to reflect actual prepayments. Though a paydown return is estimated at the beginning of the month and then revised later, adjustments to amount outstanding are made only once per month, on the 16th business day. Changes to amount outstanding will generally not cause generics to exit the index, as paydowns are often offset by new monthly production and generics rarely fall below the index minimum liquidity. Pan-European and Asian-Pacific mortgages eligible for Barclays indices do not use the same US MBS generic cohort paydown convention for estimating prepayments.

Pay-in-Kind Securities

Payment-in-Kind (PIK) securities pay interest in the form of additional bonds.³⁷ The amount outstanding for a PIK bond will be increased by the amount of the additional bonds distributed to investors by the issuer, and a coupon return will be recognized in the month of payment. Coupon does not accrue for these bonds in other months.

³⁶ Excluded from Barclays indices are sinkable local currency Russian OFZ bonds that were index-eligible prior to April 2014, but removed from Barclays indices due to liquidity reasons.

³⁷ Toggle notes are a derivative of PIK bonds that have an embedded option that allows the issuer to pay the coupon in cash or in additional securities. Both toggle notes and PIK bonds are eligible for Barclays indices. Bonds that are partial PIK and partial cash pay are excluded.

MATURITY

Most flagship Barclays indices have a minimum time to maturity, or average life for securitized bonds, of one year

Most flagship Barclays Aggregate, High Yield, Inflation-Linked and Emerging Markets indices have a minimum time to maturity of one year, though other indices are available that may include bonds with a maturity less than one year. Within securitized indices, an average life or weighted average maturity is calculated for each security and used for the maturity minimum. For sub-indices, Barclays will generally use the lower bound when setting a maturity range. For example, a 1-5 year index will generally include bonds with a maturity of 1 up to, but not including, 5 years as of the index rebalancing date.

Index Eligibility and Classification by Maturity

Barclays uses time to final maturity to determine index inclusion and classify bonds by their remaining term. Most flagship Barclays Aggregate, High Yield, Inflation-Linked and Emerging Markets Indices have a minimum time to maturity³⁸ of one year, though other indices are available that include bonds with less than one year to maturity. There is no limit on final maturity as long as the bond has a stated final maturity. Bonds with 50- and 100-year maturities may be included in flagship indices, but fixed-rate perpetuals are not eligible.

- For most government, corporate and covered securities, maturity is calculated on a daily basis as the difference between the stated final maturity date and the current index settlement date of a bond.
- ABS and CMBS securities must have a remaining average life of at least one year, while MBS must have a weighted average maturity (WAM) of at least one year.³⁹
- Fixed-to-floating rate perpetuals and fixed-to-variable bonds are included in the indices until one year prior to their conversion to floating-rate or coupon reset. Their maturity date within the indices for purposes of maturity calculation is set to the conversion date. Fixed-rate perpetuals that have a fixed rate for the life of the bond are not index-eligible.

For widely used benchmark indices, the Barclays index flag will automatically be updated on the first day of the month for securities dropping out of the statistics universe due to their falling below the 1-year minimum at some point during the month (based on their stated maturity date). This allows the statistics universe forecast to be as accurate as possible during the month by excluding bonds that may have not yet dropped below one year on the first day of the month, rather than waiting until the exact day the bond will drop below 1 year to maturity.⁴⁰

Barclays Sub-Indices by Maturity

For sub-indices by maturity, Barclays will generally use the lower bound when setting a maturity range. For example, a 1-5 year index will generally include bonds with a maturity of 1 up to but not including 5 years on the index rebalancing date.

Barclays defines “intermediate” indices as consisting of securities with remaining maturities between 1 year and up to, but not including, 10 years. “Long” indices consist of securities with 10 or more years to maturity. Generally, indices referred to as “short” contain bonds with less than 1 year to maturity.

Sub-indices by maturity are inclusive of lower bounds

³⁸ Actual value of time to maturity is calculated based on the day count convention of each bond.

³⁹ MBS analytics are calculated assuming same-day settlement.

⁴⁰ This dynamic will not occur for maturity-based sub-indices, where a lower or upper bound is something other than 1 year. Index flags are calculated on broad flagship benchmarks only.

COUNTRY

Country designation in Barclays indices represents country of risk

Even with established criteria, country classification can present challenges and can change over time

When evaluating portfolio risk, fixed income investors will often look at the country or geographic region of an issuer's risk as a separate consideration from the currency of the bond's principal and interest payments. This determination is used by investors when looking at macro allocations, risk budgets and concentrations across markets, as well as when evaluating the relative value of non-government bonds over comparable government bonds within the same market. In particular, country classification is important for investors who make formal distinctions between developed and emerging markets in their portfolios.

Country Classification

Barclays indices use a "country of risk" approach to determine country classifications. For government, government-related and corporate bond issuers that are operating, domiciled or concentrated within a single market, country classification is a generally a straightforward exercise. For corporates or other issuers with geographically diverse operations, complex ownership structures, a presence in multiple locations⁴¹ or other risk exposures that span multiple markets, country classifications are more challenging. The primary criteria for classifying country of risk are:

- Where a bond's guarantee comes from if the issuer is backed by a government or parent corporate entity.
- Where the largest source of revenue, operations or cash flows is generated by the issuer.
- Where an issuer is headquartered or its centralized decision-making occurs.⁴²

Additional criteria may be used in the evaluation of a bond's country of risk, including, but not limited to:

- Where the issuer is incorporated, legally domiciled⁴³ and regulated.
- Where an issuer's stock is listed and traded.
- Where existing issuers within the index that are similarly structured or organized are classified.

Initial Issuer Country Assignment and Review

For certain large and complex issuers, cases can be made for a number of different country classifications using the criteria outlined above. Barclays recognizes that there are complexities in these cases and will make a final determination that may include feedback from credit research analysts within Barclays, where appropriate, to determine an index classification. Even with established criteria, classification can present certain challenges and country classifications can change over time, due to various factors. A few examples of recent country reassignments that illustrate some of these complexities include:

⁴¹ Not all bonds under a ticker will have the same country of risk. Barclays allows for wholly owned subsidiaries to have a different country of risk than the parent company. For example, Credit Suisse USA Inc. is a wholly owned subsidiary of Credit Suisse AG. The former carries a US country of risk, while the latter carries a Swiss country of risk based on where the subsidiary operates in relation to the parent entity.

⁴² This is a fundamental consideration for multi-national corporations and entities that have operations spanning multiple regions (eg, metals and mining companies).

⁴³ In many cases, the country of risk and country of legal domicile can be one and the same. In other cases, however, the two may be different based on the issuer's operations, relationship with parent companies, subsidiaries, or legal profile. For example, the issuer's country of risk can match the country of the issuer's parent instead of its legal domicile when the bond is issued by a subsidiary that is guaranteed by the parent. In other cases, the country of a non-guaranteed subsidiary or other offshore structure may depend on where the economic risk is coming from, rather than the country of the subsidiary's legal domicile or parent.

- Petroleos Mexicanos (PEMEX), the Mexican state-owned petroleum company, issued three securities guaranteed by the Export-Import Bank of the United States in June 2012. To reflect properly the guarantee these bonds hold from a US government agency, their country of risk was updated from Mexico to the United States. As result, the bonds fell out of the US Credit Index and moved to the US Government Index, which includes US agencies and US Treasuries. Inclusion in the flagship US Aggregate was not affected; however, the bonds no longer qualified for the EM USD Aggregate Index since their country of risk was no longer classified as an emerging market. The credit rating was also updated from the PEMEX issuer rating to the US government rating.⁴⁴
- In March 2013, Nexen, a publicly traded Canadian energy company, was acquired by the Chinese state-owned entity CNOOC Ltd, with CNOOC guaranteeing Nexen's outstanding debt. As a result of the acquisition and CNOOC guarantee, the country of risk for the Nexen bonds was changed from Canada to China. Additionally, the sector of index-eligible Nexen bonds was updated from Industrial > Energy to Government-Related > Agencies and the ticker was updated from NXYCN to CNOOC. As a result, four Nexen issues became eligible for the USD EM Aggregate Index. Eligibility within the US Aggregate and US Credit Indices was not affected.⁴⁵
- In September 2012, the country of risk for NII Capital Corporation was updated to Brazil in Barclays benchmark indices to reflect more accurately the company's operational exposure, revenue sources and LATAM credit risk. Due to this change, three bonds exited the US High Yield Index and entered the EM USD Aggregate Index.⁴⁶

Index users may challenge a particular issuer's country of risk and request a review if they feel an alternative country assignment may be more appropriate for a given bond or issuer. Barclays looks to maintain an open dialogue with index users on country of risk classifications within the indices, given the effect such delineations can have on portfolio allocations and management.

Barclays Emerging Markets Country List

An annually reviewed fixed list of emerging market countries is used to define country eligibility in flagship EM hard currency, local currency and inflation-linked benchmarks

In addition to being a requirement for inclusion in Barclays dedicated EM indices, an emerging markets country designation also affects inclusion in high yield indices, which exclude issuers with an EM country of risk as a rule. Broad-based investment grade indices, such as the US Aggregate, do not have a country of risk criterion and have crossover eligibility with the EM indices provided a security meets the rules of both.

In 2013, Barclays moved to an annually reviewed fixed list of emerging market countries to define country eligibility in flagship EM hard currency, local currency and inflation-linked benchmarks.⁴⁷ Criteria for inclusion in the EM country list include:

- World Bank income group classifications of *low/middle income* OR International Monetary Fund (IMF) classification as a *non-advanced* country.
- Additional factors that bond investors use to classify emerging markets, such as investability concerns, the presence of capital controls and/or geographic considerations. As of December 2013, 4 additional markets are included in the Barclays EM country list: Czech Republic, Israel, South Korea and Taiwan.

Figures 8-10 show the Barclays EM country inclusion list by region.

⁴⁴ *Reclassification of US Export-Import Bank Guaranteed PEMEX Debt in Barclays Indices.*

⁴⁵ *Sector Reclassification and Ticker Update for NXYCN Debt in Barclays Indices.*

⁴⁶ *Country of Risk Reclassification of NII Capital Corporation Debt in Barclays Indices.*

⁴⁷ Prior to April 2013, countries were considered an emerging market if they had a long term foreign currency sovereign rating of Baa1 or less, based on the middle rating of Moody's, S&P and Fitch. Under this definition, eurozone countries were excluded as a rule; Barclays current EM definition does not include this explicit exclusion for eurozone countries.

Offshore entities

Only government-related issues from offshore entities are considered to be emerging markets. Corporates are not EM-eligible but do qualify for Barclays high yield indices, provided they meet all other index rules. Countries considered offshore entities as part of this rule are Seychelles, Cayman Islands, Bermuda, Bahamas, Aruba, Antigua and Barbuda, St. Kitts and Nevis, Saint Martin France, and Saint Pierre and Miquelon.

FIGURE 8

Asia EM Country Inclusion List

Sub Region	Current Coverage	Country	3 rd Party Classifications		Sov Ratings		Barclays Index Inclusion				
			World Bank Income Group	IMF Classification	Foreign	Local	EM Hard Ccy	EM Sov	EM Local Govt	EM Local Govt Univ	EM Linker
East Asia & Pacific	Index-Eligible Debt	China	Middle Upper	Non- Advanced	Aa3	Aa3	√				√
		Indonesia	Middle Lower	Non- Advanced	Baa3	Baa3	√	√	√	√	
		Malaysia	Middle Upper	Non- Advanced	A3	A2	√	√	√	√	
		Mongolia	Middle Lower	Non- Advanced	B1	B1	√	√			
		Philippines	Middle Lower	Non- Advanced	Baa3	Baa3	√	√	√	√	
		South Korea	High	Advanced	Aa3	Aa3	√	√	√	√	√
		Thailand	Middle Upper	Non- Advanced	Baa1	A3	√		√	√	
		Vietnam	Middle Lower	Non- Advanced	B1	B1	√	√			
	No Index-Eligible Debt	American Samoa	Middle Upper	Non- Advanced	NR	NR					
		Brunei	High	Non- Advanced	NR	NR					
		Cambodia	Low	Non- Advanced	B2	B2					
		Fiji	Middle Upper	Non- Advanced	B2	B2					
		French Polynesia	High	Non- Advanced	NR	NR					
		Guam	High	Non- Advanced	NR	NR					
		Kiribati	Middle Lower	Non- Advanced	NR	NR					
		Lao PDR	Middle Lower	Non- Advanced	NR	NR					
		Macao SAR, China	High	Non- Advanced	Aa3	Aa3					
		Marshall Islands	Middle Upper	Non- Advanced	NR	NR					
		Micronesia	Middle Lower	Non- Advanced	NR	NR					
		Myanmar	Low	Non- Advanced	NR	NR					
		New Caledonia	High	Non- Advanced	NR	NR					
		North Korea	Low	Non-Advanced	NR	NR					
		N. Mariana Islands	High	Non- Advanced	NR	NR					
		Palau	Middle Upper	Non- Advanced	NR	NR					
		Pap. New Guinea	Middle Lower	Non- Advanced	B1	B1					
		Samoa	Middle Lower	Non- Advanced	NR	NR					
		Solomon Islands	Middle Lower	Non- Advanced	NR	NR					
		Timor-Leste	Middle Lower	Non- Advanced	NR	NR					
		Tonga	Middle Upper	Non- Advanced	NR	NR					
		Tuvalu	Middle Upper	Non- Advanced	NR	NR					
		Vanuatu	Middle Lower	Non- Advanced	NR	NR					
South Asia	Index-Eligible Debt	India	Middle Lower	Non- Advanced	Baa3	Baa3	√				√
		Pakistan	Middle Lower	Non- Advanced	Caa1	Caa1	√	√			
		Sri Lanka	Middle Lower	Non- Advanced	B1	B1	√	√			
		Taiwan	High	Non- Advanced	Aa3	Aa3	√				√
	No Index-Eligible Debt	Afghanistan	Low	Non- Advanced	NR	NR					
		Bangladesh	Low	Non- Advanced	Ba3	Ba3					
		Bhutan	Middle Lower	Non- Advanced	NR	NR					
		Maldives	Middle Upper	Non- Advanced	NR	NR					
		Nepal	Low	Non- Advanced	NR	NR					

Data as of 2013 year-end. Source: World Bank, IMF, Bloomberg, Barclays Research

FIGURE 9

EMEA EM Country Inclusion List

			3 rd Party Classifications		Sovereign Ratings		Barclays Index Inclusion				
Sub Region	Current Coverage	Country	World Bank Income Group	IMF Classification	Foreign	Local	EM HC Agg	EM HC Sov	EM Local Govt	EM Local Govt Univ	EM Linker
Europe & Central Asia	Index-Eligible Debt	Armenia	Middle Lower	Non- Advanced	Ba3	Ba3	✓	✓			
		Azerbaijan	Middle Upper	Middle Upper	Baa3	Baa3	✓				
		Belarus	Middle Upper	Middle Upper	B3	B3	✓	✓			
		Bulgaria	Middle Upper	Non- Advanced	Baa2	Baa2	✓	✓			
		Croatia	High	Non- Advanced	Ba1	Ba1	✓	✓	✓	✓	
		Czech Republic	High	Advanced	A1	Aa3	✓	✓	✓	✓	
		Georgia	Middle Lower	Non- Advanced	Ba3	Ba3	✓	✓			
		Hungary	Middle Upper	Non- Advanced	Ba1	Ba2	✓	✓	✓	✓	
		Kazakhstan	Middle Upper	Non- Advanced	Baa1	Baa1	✓				
		Latvia	High	Non- Advanced	Baa1	Baa1	✓	✓			
		Lithuania	High	Non- Advanced	Baa1	Baa1	✓	✓			
		Poland	High	Non- Advanced	A3	A2	✓	✓	✓	✓	✓
		Romania	Middle Upper	Non- Advanced	Baa3	Baa3	✓	✓	✓	✓	
		Russia	High	Non- Advanced	Baa2	BAA1	✓	✓	✓	✓	
		Serbia	Middle Upper	Non- Advanced	Ba3	Ba3	✓	✓			
		Turkey	Middle Upper	Non- Advanced	Baa3	Baa2	✓	✓	✓	✓	✓
		Ukraine	Middle Lower	Non- Advanced	B3	B3	✓	✓			
	No Index-Eligible Debt	Albania	Middle Upper	Non- Advanced	B2	B2					
		Bosnia and Hrz	Middle Upper	Non- Advanced	B3	B3					
		Kosovo	Middle Lower	Non- Advanced	NR	NR					
		Kyrgyz Republic	Low	Non- Advanced	NR	NR					
		Macedonia, FYR	Middle Upper	Non- Advanced	Ba3	Ba3					
		Moldova	Middle Lower	Non- Advanced	B3	B3					
		Montenegro	Middle Upper	Non- Advanced	Ba3	Ba3					
		Tajikistan	Low	Non- Advanced	NR	NR					
		Turkmenistan	Middle Upper	Non- Advanced	NR	NR					
		Uzbekistan	Middle Lower	Non- Advanced	NR	NR					
Middle East & North Africa	Index-Eligible Debt	Bahrain	High	Non- Advanced	Baa2	Baa2	✓	✓			
		Egypt	Middle Lower	Non- Advanced	B3	B3	✓	✓	✓	✓	
		Iraq	Middle Upper	Non- Advanced	NR	NR	✓	✓			
		Israel	High	Advanced	A1	A1	✓	✓	✓	✓	✓
		Jordan	Middle Upper	Non- Advanced	B1	B1	✓	✓			
		Kuwait	High	Non- Advanced	Aa2	Aa2	✓				
		Lebanon	Middle Upper	Non- Advanced	B2	B2	✓	✓			
		Morocco	Middle Lower	Non- Advanced	Baa3	Baa3	✓	✓			
		Qatar	High	Non- Advanced	Aa2	Aa2	✓	✓			
		Saudi Arabia	High	Non- Advanced	Aa3	Aa3	✓				
		UAE	High	Non- Advanced	Aa2	Aaz2	✓	✓			
	No Index-Eligible Debt	Algeria	Middle Upper	Non- Advanced	NR	NR					
		Djibouti	Middle Lower	Non- Advanced	NR	NR					
		Iran	Middle Upper	Non- Advanced	NR	NR					
		Libya	Middle Upper	Non- Advanced	NR	NR					
		Oman	High	Non- Advanced	A2	A2					
		Syrian	Middle Lower	Non- Advanced	NR	NR					
		Tunisia	Middle Upper	Non- Advanced	Ba3	Ba3					
		West Bank Gaza	Middle Lower	Non- Advanced	NR	NR					
		Yemen, Rep.	Middle Lower	Non- Advanced	NR	NR					

Data as of 2013 year-end. Source: World Bank, IMF, Bloomberg, Barclays Research

EMEA EM Country Inclusion List (continued)

Sub Region	Current Coverage	Country	3 rd Party Classifications		Sovereign Ratings		Barclays Index Inclusion				
			World Bank Income Group	IMF Classification	Foreign	Local	EM HC Agg	EM HC Sov	EM Local Govt	EM Local Govt Univ	EM Linker
Sub Saharan Africa	Index-Eligible Debt	Angola	Middle Upper	Non- Advanced	Ba3	Ba3	√	√			
		Côte d'Ivoire	Middle Lower	Non- Advanced	NR	NR	√	√			
		Gabon	Middle Upper	Non- Advanced	Ba3	Ba3	√	√			
		Ghana	Middle Lower	Non- Advanced	B2	B2	√	√			
		Mozambique	Low	Non- Advanced	B1	B1	√	√			
		Namibia	Middle Upper	Non- Advanced	Baa3	Baa3	√	√			
		Nigeria	Middle Lower	Non- Advanced	Ba3	Ba3	√	√	√	√	
		Senegal	Middle Lower	Non- Advanced	B1	B1	√	√			
		South Africa	Middle Upper	Non- Advanced	Baa2	Baa1	√	√	√	√	√
		Zambia	Middle Lower	Non- Advanced	B1	B1	√	√			
	No Index-Eligible Debt	Benin	Low	Non- Advanced	NR	NR					
		Botswana	Middle Upper	Non- Advanced	A3	A3					
		Burkina Faso	Low	Non- Advanced	B2	B2					
		Burundi	Low	Non- Advanced	NR	NR					
		Cameroon	Middle Lower	Non- Advanced	B2	B2					
		Cape Verde	Middle Lower	Non- Advanced	B2	B2					
		Central African Rep	Low	Non- Advanced	NR	NR					
		Chad	Low	Non- Advanced	NR	NR					
		Comoros	Low	Non- Advanced	NR	NR					
		Congo, Dem. Rep.	Low	Non- Advanced	B3	B3					
		Congo, Rep.	Middle Lower	Non- Advanced	B1	B1					
		Equatorial Guinea	High	Non- Advanced	NR	NR					
		Eritrea	Low	Non- Advanced	NR	NR					
		Ethiopia	Low	Non- Advanced	NR	NR					
		Gambia, The	Low	Non- Advanced	NR	NR					
		Guinea	Low	Non- Advanced	NR	NR					
		Guinea-Bissau	Low	Non- Advanced	NR	NR					
		Kenya	Low	Non- Advanced	B1	B1					
		Lesotho	Middle Lower	Non- Advanced	Ba3	Ba2					
		Liberia	Low	Non- Advanced	NR	NR					
		Madagascar	Low	Non- Advanced	NR	NR					
		Malawi	Low	Non- Advanced	NR	NR					
		Mali	Low	Non- Advanced	NR	NR					
		Mauritania	Middle Lower	Non- Advanced	NR	NR					
		Mauritius	Middle Upper	Non- Advanced	Baa1	Baa1					
		Niger	Low	Non- Advanced	NR	NR					
		Rwanda	Low	Non- Advanced	B	B2					
		São Tomé and Príncipe	Middle Lower	Non- Advanced	NR	NR					
		Seychelles	Middle Upper	Non- Advanced	B	B1					
		Sierra Leone	Low	Non- Advanced	NR	NR					
		Somalia	Low	Non- Advanced	NR	NR					
		South Sudan	Low	Non- Advanced	NR	NR					
		Sudan	Middle Lower	Non- Advanced	NR	NR					
		Swaziland	Middle Lower	Non- Advanced	NR	NR					
		Tanzania	Low	Non- Advanced	NR	NR					
		Togo	Low	Non- Advanced	NR	NR					
		Uganda	Low	Non- Advanced	B1	B1					
		Zimbabwe	Low	Non- Advanced	NR	NR					

Data as of 2013 year-end. Source: World Bank, IMF, Bloomberg, Barclays Research

FIGURE 10

Latin America EM Country Inclusion

			3 rd Party Classifications		Sovereign Ratings		Barclays Index Inclusion				
Sub Region	Current Coverage	Country	World Bank Income Group	IMF Classification	Foreign	Local	EM HC Agg	EM HC Sov	EM Local Govt	EM Local Govt Univ	EM Linker
South America	Index-Eligible Debt	Argentina	Middle Upper	Non- Advanced	Caa1	B3	✓	✓			✓
		Bolivia	Middle Lower	Non- Advanced	Ba3	Ba3	✓	✓			
		Brazil	Middle Upper	Non- Advanced	Baa2	Baa2	✓	✓	✓	✓	✓
		Chile	High	Non- Advanced	Aa3	Aa3	✓	✓	✓	✓	✓
		Colombia	Middle Upper	Non- Advanced	Baa2	Baa1	✓	✓	✓	✓	✓
		Ecuador	Middle Upper	Non- Advanced	B2	B2	✓	✓			
		Uruguay	High	Non- Advanced	Baa3	Baa3	✓	✓			
		Paraguay	Middle Lower	Non- Advanced	Ba3	Ba3	✓	✓			
		Peru	Middle Upper	Non- Advanced	Baa1	A3	✓	✓	✓	✓	
		Venezuela, RB	Middle Upper	Non- Advanced	B3	B3	✓	✓			
	No Index-Eligible Debt	Barbados	High	Non-Advanced	Ba3	Ba1					
		Guyana	Middle Lower	Non- Advanced	NR	NR					
		Suriname	Middle Upper	Non-Advanced	Ba3	Ba3					
Central America & Caribbean	Index-Eligible Debt	Belize	Middle Upper	Non- Advanced	Caa2	Caa2	✓	✓			
		Bermuda	High	Non- Advanced	Aa3	Aa3	✓	✓			
		Costa Rica	Middle Upper	Non- Advanced	Ba1	Ba1	✓	✓			
		Dominican Rep	Middle Upper	Non- Advanced	B1	B1	✓	✓			
		El Salvador	Middle Lower	Non- Advanced	Ba3	Ba3	✓	✓			
		Guatemala	Middle Lower	Non- Advanced	Ba1	Ba1	✓	✓			
		Honduras	Middle Lower	Non- Advanced	B2	B2	✓	✓			
		Jamaica	Middle Upper	Non- Advanced	Caa2	Caa2	✓	✓			
		Mexico	Middle Upper	Non- Advanced	Baa1	A3	✓	✓	✓	✓	✓
		Panama	Middle Upper	Non- Advanced	Baa2	Baa2	✓	✓			
		Trinidad and Tobago	High	Non- Advanced	Baa1	Baa1	✓	✓			
	No Index-Eligible Debt	Antigua and Barbuda	High	Non- Advanced	NR	NR					
		Aruba	High	Non- Advanced	Baa2	Baa2					
		Bahamas	High	Non- Advanced	Baa2	Baa2					
		Cayman Islands	High	Non- Advanced	Aa3	NR					
		Cuba	Middle Upper	Non- Advanced	Caa1	NR					
		Curaçao	High	Non- Advanced	NR	NR					
		Dominica	Middle Upper	Non- Advanced	B1	B1					
		Grenada	Middle Upper	Non- Advanced	NR	NR					
		Haiti	Low	Non- Advanced	NR	NR					
		Nicaragua	Middle Lower	Non- Advanced	B3	B3					
		Puerto Rico	High	Non- Advanced	NR	NR					
		St. Kitts and Nevis	High	Non- Advanced	NR	NR					
		St. Lucia	Middle Upper	Non- Advanced	NR	NR					
		St. Martin	High	Non- Advanced	NR	NR					
		St. Vincent	Middle Upper	Non- Advanced	B2	B2					
		Turks and Caicos	High	Non- Advanced	NR	NR					
		Virgin Islands (US)	High	Non- Advanced	NR	NR					

Source: Data as of 2013 year-end. Source: World Bank, IMF, Bloomberg, Barclays Research

MARKET OF ISSUE

Market of issue is used to identify whether a security is offered to domestic investors only, to foreign investors only or globally to both. Placement type identifies whether a bond is publicly registered (or exempt from such registration) and available broadly to institutional investors or privately placed to a narrower set of qualified institutional investors. Both attributes are used to identify securities that may be restricted or unavailable to certain investors and, therefore, ineligible for benchmark inclusion.

For certain investors, privately placed securities are prohibited investments due to explicit governance and fiduciary constraints⁴⁸ that limit exposure to less liquid securities. Compared with private placements, publicly registered securities (and those exempt from registration) require a higher level of disclosure, demand additional reporting requirements, and subject the issuer to laws of the local jurisdictions in which they are registered to sell a bond. This transparency will often broaden the appeal of registered securities to a wider set of investors, including those unable to own private placements. However, depending on the issuers' borrowing needs, they may still choose to target investors outside of their local market or issue private placements. Private placements are excluded from most flagship Aggregate indices such as the US Aggregate and Euro Aggregate, but are measured in standalone indices such as the US 144A Index, which is a subset of the US Universal and Global Aggregate Index.

Market of Issue Criteria

For domestic single-currency benchmarks, such as the US Aggregate, market of issue is used to exclude securities that are offered only to foreign investors. Multi-currency indices, such as the Global Aggregate, which are agnostic to the domicile of the investor, will often be more inclusive of securities that may be offered outside of a domestic market.

US Indices

The US Aggregate Index does not include privately placed securities or bonds that are marketed or offered only to non-US investors (eurodollar placements). Therefore, the US Aggregate includes:

- Securities that have a public registration statement filed with the Securities and Exchange Commission and are subject to SEC reporting requirements.⁴⁹
- Debt that is exempt from registration with the SEC.⁵⁰
- Bonds issued under SEC Rule 144A with registration rights to convert into a public issue.

The US Aggregate includes global bonds that are available in domestic and non-domestic markets. Bonds that are available to non-US investors, including global bonds that may be US Aggregate eligible and Eurodollar bonds marketed exclusively to non-US investors, are tracked in a separate Eurodollar Index.⁵¹

US Rule 144A provides an exemption from SEC registration for the resale of previously privately placed securities. Securities resold under US Rule 144A are restricted and can

⁴⁸ For example, US investors with fiduciary duties governed by ERISA are generally restricted from owning private placements in their portfolios.

⁴⁹ If an issue is registered with the SEC and the issuer later deregisters the bond, it will not affect index eligibility.

⁵⁰ For example, bank debt issued under Rule 3(a)(2) is exempt from registration with the SEC.

⁵¹ To be included in the EM USD Aggregate Index and US Universal Index, Eurodollar-only securities were previously subject to a 41-day seasoning rule, which corresponds to the regulatory waiting period between issuance and when US investors can enter the Eurodollar market. As of July 1, 2013, the seasoning rule was removed as an inclusion criterion of the EM USD Aggregate Index, but continues to be applied to the US Universal Index, a core plus benchmark used primarily by US-based investors.

A security with Reg-S and Rule 144A tranches is treated as one security in par value to prevent double-counting

generally be sold only to Qualified Institutional Buyers (QIBs). Barclays indices make a distinction between bonds issued under US Rule 144A based on whether the issuer has the right to register the bond in the future with the SEC. Private placement credit bonds issued under US Rule 144A that do not have registration rights are tracked in a separate US 144A Index, which includes bonds with and without registration rights.

Bonds with 144A and Regulation-S Tranches

Regulation-S under the US Securities Act of 1933 governs the offering and sale of USD-denominated bonds outside the United States. Securities are often brought to market with one tranche that adheres to Regulation-S for non-US investors and one that adheres to US Rule 144A for US investors. A security with both SEC Regulation-S (Reg-S) and SEC Rule 144A tranches is treated as one security in par value to prevent double-counting within the Barclays indices. The tranche included in the index is used to represent the issue and comprises the combined amount outstanding of the 144A and Reg-S tranches.

For non-emerging markets issuers, the 144A tranche is selected to represent an issue with both 144A and Regulation-S tranches. For emerging markets issuers, which tranche is selected depends on whether the issuer has the option to register the bond with the SEC under US Rule 144A:

- If a bond is issued with a 144A and Reg-S tranche and the 144A tranche **has registration rights**, Barclays will use the 144A tranche as long as the bond is eligible for one of the investment grade indices (US Aggregate, Eurodollar or 144A Index). In cases where a bond is eligible for the hard currency emerging markets indices only (eg, high yield or non-rated bonds), Barclays will use the Reg-S tranche.
- If a bond is issued with a 144A and Reg-S tranche and the 144A tranche **does not have registration rights**, the Reg-S tranche is used for index purposes.

If a bond enters the indices as non-EM and then later becomes eligible for an EM index, the tranche used for index purposes will not change.⁵² Broader benchmarks, such as the US Universal and Global Aggregate Indices, do not make the same distinction for market of issue since they assume that the investor is either an unconstrained core plus user (US Universal) or a global investor (Global Aggregate) who would regularly invest in these markets. Therefore, USD-denominated bonds in the 144A and Eurodollar Indices that are not already in the US Aggregate will be eligible for these broader benchmarks.

Exchanges

Securities that are originated under US Rule 144A with registration rights and later registered with the SEC are treated as the same security for index purposes. Once the registered identifier becomes available, it is used in the index. Typically, index users will use a bond's ticker, coupon and maturity date to link the 144A identifier with the new SEC-registered identifier. The only change they will notice is an update to the identifier and Placement Type; it will not look as though the 144A bond exited the index and the SEC-registered bond entered it.

Other Regional Aggregate Indices

Rules on public versus private placements apply to other non-US aggregate benchmarks as well. Debt that is offered publicly to domestic investors or globally marketed is aggregate index eligible, but there is no equivalent distinction for US Rule 144A bonds with registration rights within Pan-European or Asian-Pacific indices.

⁵² For example, 144A Chile bonds that were added to the indices before Chile was added to the Barclays EM country list in April 2013 continue to use the 144A tranche for index purposes.

Bonds that are marketed primarily to retail investors, even if an institution could buy them, are excluded from Barclays aggregate indices. Screening for an exclusion of retail bonds and private placements is an ongoing process that looks at a variety of factors. The first phase of the process is to assess all new bonds that appear eligible for the indices. All bonds are given a score, based on several factors, including but not limited to:

- Minimum piece or increment
- Number of available price quotes from broker/dealers
- Number of lead managers
- Whether the coupon and issue size are conventional or plain vanilla.⁵³

If a bond is given a score that is indicative of a retail bond, the issuer is contacted to verify the nature of the bond. If no confirmation is received from the issuer and the bond does not meet the requisite score, it is excluded from the index. If new evidence to the contrary comes to light following the bond's initial exclusion, it may subsequently be added.

⁵³ Retail bonds are often issued with a very specific coupon and/or issue sizes that are typically not round numbers.

TAXABILITY

Barclays index eligibility rules consider a bond's taxability from both an issuer and an investor perspective.

From an issuer perspective, taxability of coupon/dividend payments is used to distinguish between debt and equity and, therefore, whether a security will qualify for Barclays fixed income indices. Interest payments must be made on a pre-tax basis by the issuer for a security to be fixed income index eligible. Payments made on an after-tax basis are considered dividends and the instruments are classified as preferred equity and, therefore, not benchmark index eligible.

From an investor perspective, Barclays distinguishes between tax-exempt securities (notably the US municipal market) and bonds that are taxable for the end investor. To be eligible for flagship indices, such as the US Aggregate or Global Aggregate Indices, interest payments must be fully taxable to the investor. The US municipal bond market is tracked in a standalone family of indices.

For flagship indices, Barclays does not calculate index returns on a net basis, and published levels are gross of any applicable taxes (capital gains, withholding, stamp, capital controls, etc.) to the end investor. Tax liabilities are an investor-specific determination, especially in cases where cross-country tax treaties, onshore versus offshore investor access and other considerations vary from fund to fund and from firm to firm.⁵⁴

Taxability of Debt versus Equity

From an issuer perspective, interest payments must be made on a gross basis for a security to be fixed income index eligible. Payments made on a net basis are considered dividends and the instruments are classified as preferred equity and, therefore, not eligible for fixed income indices. This distinction arises mainly for hybrid capital securities that have both debt- and equity-like characteristics. This rule, therefore, excludes preferred shares that pay a fixed coupon without a final maturity, dividends-received deduction (DRD) securities and qualified dividend income (QDI) securities from the indices.

Taxable versus Tax-Exempt Bonds

Because most US municipal securities are tax-exempt, issuers can borrow at lower rates while offering investors a tax-equivalent return that may be comparable to a higher coupon taxable bond. This tax exemption is something that segments the potential investor base, as not all investors may receive the same tax benefits from this market. Therefore, Barclays indices make a clear distinction between tax-exempt municipals in standalone municipal indices and other taxable bonds in its flagship indices.

Not all US municipal debt is tax-exempt, and the exclusion of tax-exempt municipals is not an issuer-based exclusion. Taxable municipal bonds have been eligible for the US Aggregate Index since 2003. These securities are classified within the local authority sector and qualify for the US Credit Index.

Build America Bonds (BAB)

Taxable municipal securities issued under the Build America Bond program are one type of taxable security eligible for the US Aggregate Index as long as the issuer opts to receive a direct subsidy payment from the federal government reimbursing a portion of the interest costs. In this case, Build America Bonds are fully taxable to the investor and treated like other US Aggregate eligible taxable municipals with respect to inclusion and sector classification. BABs issued with the tax credit going to the investor are not index eligible.

⁵⁴ Net of taxes may be calculated on a customized basis, but net indices account only for withholding taxes.

Barclays does not make any tax assumptions or adjustments when calculating flagship index returns

Calculation of Index Returns

While the discussion of end-investor tax liabilities has focused on US municipals, global investors are often subject to taxation in multiple jurisdictions depending on the applicable tax laws in each market and whether the end investor is domestic or foreign. For all indices (including Municipal Indices), Barclays does not make any tax assumptions or adjustments (withholding taxes on interest income, capital gains taxes, stamp taxes, etc.) since these are unique to individual investors based on variety of factors, including where the investor has local market operations or reciprocal tax treaties with their home market. Though flagship index returns are calculated gross of taxes, Barclays has published net of tax index returns in bespoke indices upon client request.

SUBORDINATION

In the case of default, the capital structure of an issuer's outstanding debt determines the order in which creditors are paid back. Holders of debt secured by specified or ring-fenced assets are generally paid back first, followed by senior unsecured bondholders. Subordinated securities, which rank below secured and senior bonds, generally have a different risk profile than that of securities with more senior claims on an issuer's assets; this additional risk is reflected in a security's price. Naturally, investors often look at where a bond falls within an issuer's capital structure when making investment decisions, with the most important distinctions between senior debt and subordinated debt, including hybrid capital.

Subordinated Debt

Subordinated bonds typically carry lower credit ratings and offer a higher spreads than higher ranked bonds in the capital structure to compensate investors for the additional risk they carry. Within the benchmark indices, Barclays distinguishes between subordinated bonds or debentures and capital securities. Subordinated bonds that are not considered capital securities by Barclays are assigned values of Subordinated, Subordinated Debentures, Junior Subordinated Debentures or Senior Subordinated Debentures in the subordination type attribute. Capital securities, on the other hand, are identified with a subordination type of either Tier 1, Upper Tier 2, Lower Tier 2 or Capital Credit.

Capital Securities

For index purposes, capital securities are deeply subordinated instruments that qualify as regulatory capital or receive quasi-equity credit from the rating agencies

For index purposes, capital securities are deeply subordinated fixed income securities that qualify for treatment as regulatory capital by regulators or receive quasi-equity credit from the rating agencies. Barclays publishes a Global Capital Securities Index to track the market for these bonds, which also qualify for Barclays flagship aggregate and high yield indices, depending on their credit quality. While also considered capital securities, bonds identified as contingent capital are excluded as a rule from Barclays aggregate and high yield indices, but tracked in a standalone Global Contingent Capital Index.

Types of hybrid capital instruments included in capital securities indices include:

- **Tier 1 (T1):** bonds that are deeply subordinated securities, senior only to equity, and have coupon deferral features (both optional and mandatory) without incurring a default event. Common characteristics of traditional Tier 1 instruments generally include:
 - Perpetual, but callable.
 - No contractual obligation to pay dividends or interest to Tier 1 bondholders, with the deferral of a coupon usually being at the option of the issuer.
 - Deferred coupons are non-cumulative.
 - Tier 1 should be able to absorb losses before, or instead of, general creditors.
- **Upper Tier 2 (UT2):** UT2 securities are long-dated or perpetual callable bonds with interest deferral features that allow the issuer, at its own option, to defer payment under specific circumstances, such as falling below capital adequacy requirements. Interest payments on Upper Tier 2 securities are cumulative (eg, payments have to be made up at a later date) and interest on interest is normally payable in the event of deferral. .

- **Lower Tier 2 (LT2):** dated securities whose coupons are not deferrable without triggering a default. Lower Tier 2 bonds have a minimum maturity of five years and often have interest step-ups and calls five years prior to maturity.
- **Capital Credit (CCRD):** hybrid capital securities issued by various types of non-bank entities are classified as capital credit. Issues are primarily from US or European insurance companies,⁵⁵ with structures among non-bank issuers varying greatly. Security claims tend to be on parity with junior subordinated debt or preferred shares and are long-dated or perpetual. Typically, these securities include some form of coupon deferral.

Barclays launched a standalone benchmark in May 2014 to track the market for contingent capital securities

Contingent Capital Securities

A recent form of hybrid capital structure known as contingent capital has emerged under Basel III to be more loss absorbing before a credit or default event. Due to their equity-like nature or their potential for writedowns that do not maintain the issuer's capital structure, traditional debt investors tend to view these bonds as unsuitable for broad-based investment grade and high yield indices. Since they are not eligible for flagship aggregate or high yield benchmarks, Barclays launched the Global Contingent Capital Index, which is a multi-currency standalone benchmark, in May 2014 to track this market.⁵⁶

For index purposes, contingent capital securities are defined as hybrid capital instruments with explicit equity conversion or writedown (full or partial) loss absorption mechanisms that are based on an issuer's regulatory capital ratios or other solvency/balance sheet-based triggers. Subordinated hybrid capital bonds that are broadly subject to non-viability writedowns under applicable local regulations are classified as CoCos under Barclay's definition only if an explicit trigger is also in place. In the absence of an explicit trigger, these bonds are classified as non-CoCo capital securities and are eligible for Barclays aggregate and high yield benchmarks, provided they meet the respective rules of those indices.

Contingent convertible capital securities that convert into equity based not only on regulatory capital ratio or viability triggers, but also on other traditional conversion criteria, such as specified stock or bond price triggers, may be eligible for Barclays Convertible Indices, based on these additional characteristics, provided they meet other inclusion criteria.

Senior Debt

Of an issuer's outstanding bonds, senior unsecured debt is considered lower risk than subordinated debt. Although senior debt holders must be repaid before other unsecured creditors in a bankruptcy event, the securities are backed only by the credit of the issuer and its ability to service the debt.

Senior unsecured credit bonds are assigned a subordination type of Debentures, Notes, Senior, Senior Debentures or Senior Notes within Barclays indices.⁵⁷ Investors looking for a customized benchmark that includes senior unsecured debt only will generally construct their index using the aforementioned values of the subordination type data attribute.

Secured Bonds

In the event of a default, holders of secured debt, which is backed by dedicated collateral that can be sold to repay bondholders, rank highest among an issuer's creditors, followed by senior unsecured debt holders. Figure 8 lists subordination classifications for secured credit bonds within Barclays indices.

⁵⁵ Insurance companies usually issue capital securities to get regulatory capital treatment, while industrial and utility companies do so to get quasi-equity credit from the rating agencies.

⁵⁶ Contingent Capital bonds that are converted to equity or have been written down (either partially or fully) exit the index at the time of the trigger.

⁵⁷ Subordination type is a relevant attribute for credit bonds only. Although securitized bonds are assigned a "senior" value, this attribute is not meant to represent where a specific tranche ranks within a given securitized deal.

FIGURE 11

Subordination Classifications of Secured Credit Bonds in Barclays Indices

Subordination Type	Index Code	Description
First Mortgage Bond	1STMTG	A security with the first mortgage on the issuer's property serving as the bond's collateral. Comprised primarily of Electric issuers.
Second Mortgage Bond	2NDMTG	A bond backed by a mortgage, with the first mortgage bonds taking priority over the second.
Collateral Lease Obligation	COLLEAS	A secured utility bond backed by the leases on the hard assets of a utility.
Enhanced Equipment Trust Certificates	EETC	A type of pass-through security commonly used in aircraft finance in the US. In the transaction, a trust certificate is sold to investors to finance the purchase of an aircraft by a trust, which then leases the aircraft to the airline, and the trustee passes payment through the trust to the investors. Holders of certificates have first claim on those assets.
First General and Refunding Mortgage Bonds	GENREF	A bond secured by a first general mortgage or a refunding mortgage (a mortgage loan that is refinanced with another loan).

Source: Barclays Research

BENCHMARK INDEX REBALANCING RULES

Most Barclays benchmark indices are rebalanced monthly, offering intra-month stability in index composition.⁵⁸ Securities that meet all published index inclusion rules and eligibility criteria at the beginning of a given month will remain in the index for purposes of return calculations until the following month-end, when index composition is next reset.

Unlike the rebalancing of equity indices, which occurs less often, the monthly rebalancing of Barclays indices better suits the more frequent issuance and the more dynamic borrowing needs of fixed income issuers.

This section will describe the mechanics of the monthly rebalance process.

Benchmark Returns and Statistics Universe

Two universes of securities are maintained for each Barclays index: a fixed “Returns Universe” and a dynamic “Statistics Universe”

For each Barclays index, two universes of securities are maintained: one that is held constant throughout the month from the previous index rebalancing date and one that changes daily to reflect the latest composition of the market since the last rebalancing. The former, the **Returns Universe** (also referred to as the “backwards” universe), is a static set of securities that is determined at the beginning of each month and is not reset until the beginning of the next month. This fixed universe is used to calculate daily and monthly index returns and is the basket of bonds against which index users are officially measured against. The returns universe is not adjusted for securities that become ineligible for inclusion during the month (eg, due to ratings downgrades, called bonds, securities falling below one year to maturity) or for issues that are newly eligible (eg, ratings changes, new issuance). Because the returns universe is held constant throughout the month, fund managers avoid having to hit a moving target.

The **Statistics Universe** is a dynamic set of bonds that changes daily to reflect the latest set of index-eligible securities. As an up-to-date projection of the next month’s returns universe, the statistics universe assists active managers by providing them with the necessary insight to modify their portfolios ahead of any index changes and assists passive managers by preparing them for any executions needed ahead of monthly rebalancing. Indicative changes to securities are reflected daily in both the statistics and returns universe of the index and may cause bonds to enter or fall out of the statistics universe, but will affect the composition of the returns universe only at month-end. Figure 1 illustrates how several transactions are treated in the returns and statistics universes over the course of a month.

⁵⁸ Certain tradable bond indices may rebalance less frequently, on either a semi-annual or an annual basis. In addition, alternative weight benchmarks such as GDP weighted indices and Fiscal Strength Weighted indices have country-level weights or scores that are updated annually, but still rebalance monthly to reflect changes in the eligible security universe.

FIGURE 1

Returns and Statistics Universe Dynamics: Sample Movements

1. XYZ Company 4.5% of 3/15/2021 is a developed market bond with USD500mn amount outstanding that meets all criteria for the US Corporate Investment Grade Index as of May 31. On June 4, the bond is downgraded to Ba1 from Baa3.
 - This bond will continue to contribute to returns for the duration of June, even though it is now rated below investment grade.
 - The bond will drop from the statistics universe after the downgrade because it is below investment grade and will not be eligible for the benchmark when it is next rebalanced at month-end. This bond will therefore be excluded from index-level analytics aggregations that are published on the projected statistics universe.
 - The downgraded bond will enter the US Corporate High Yield Index statistics universe once it drops from the US Corporate Investment Grade Index.
2. ABC Company 2.875% of 1/15/2019 meets all index criteria when it is issued on June 15.
 - This bond will not contribute to returns reported for the month of June.
 - The bond will enter the statistics universe for June (assuming all security reference information and pricing are available).
3. US Treasury 1.875% of 6/30/2020 was issued months ago and has several years to maturity on September 15.
 - This bond will be included in both the returns and statistics universe for September.
4. RST Company 3.750% of 6/30/2014 meets all criteria for the US Corporate Investment Grade Index on May 31, 2013.
 - This bond will contribute to the returns universe until June month-end.
 - Because the maturity is known with certainty, the bond will fall out of the statistics universe on the first day of June.
 - All benchmarks with a 1 year minimum to maturity will automatically exclude bonds that are expected to drop below 1 year with certainty during the month as of the first business day to provide as early a forecast of index composition as possible.
5. LMN Company 6.750% of 8/15/2014 is called on April 15.
 - This bond contributes to returns for April. The ending price is the call price.
 - This bond will drop out of the statistics universe as of the call date.

Source: Barclays Research

Barclays Index Flags

“Index Flags” combine all eligibility criteria into a single indicative value

Barclays index inclusion rules cover a variety of eligibility criteria. For flagship indices, composite “Index Flags” have been created to combine all eligibility criteria into a single indicative value that allows index users to identify a security’s eligibility status on any given day.⁵⁹ Index flags will have one of four values that identify whether a security should be included in the returns or statistics universe of a given benchmark:

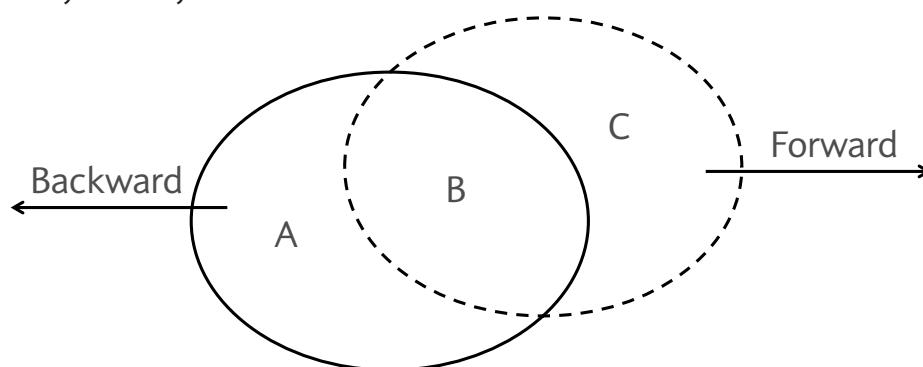
- **BOTH_IND:** An index flag value of BOTH_IND identifies a security as having been index eligible at the beginning of the month and as of the current date. It is therefore a contributor to both the returns and statistics universes of a given flagship index (Area B within Figure 2).
- **FORWARD:** An index flag value of FORWARD identifies a security as having not been index eligible at the beginning of the month but eligible as of the current intra-month date. The bond is therefore a contributor only to the statistics universe of a given flagship index and will contribute to index returns only after the next index rebalancing (Area C within Figure 2). Bonds with a FORWARD flag may include new issues or existing issues that newly qualify for a specific index. For example, an existing bond that is downgraded below investment grade may have the FORWARD index flag for a high yield benchmark if it meets all other index inclusion rules after the ratings change and a BACKWARDS flag for the investment grade index it is departing.
- **BACKWARDS:** An index flag value of BACKWARDS identifies a security as having been index eligible at the beginning of the month but now not eligible as of the current intra-month date. It will exit the index and is therefore a contributor only to the returns universe of a given flagship index (Area A within Figure 2).
- **NOT_IND:** An index flag value of NOT_IND identifies a security as having not been index eligible at the beginning of the month and as of the current date because it does not satisfy all of the required index eligibility criteria.

Index flags are a direct input to the creation of published sub-indices by sector, maturity, credit quality, etc.

Index flags are available only for broad-based indices and are a direct input to the creation of published sub-indices by sector, maturity, credit quality, etc. When defining narrower sub-sets of flagship indices, bonds may enter or exit the returns or statistics universe without a change in the index flag, which only identifies eligibility at the broad index level. Consider, for example, a security that begins the month with a maturity just over 10 years that drops below 10 years to maturity during the month. It will move from the statistics universe of a Long sub-index, which contains bonds with at least 10 years to maturity, to an Intermediate sub-index, which contains bonds with 1-10 years to maturity, of that benchmark because of the maturity rule, but the index flag will remain BOTH_IND.

⁵⁹ Index flags are available only on Series-L benchmarks. Series-B benchmarks publish constituents on the equivalent of a returns universe only, but a separate Forward Index Report (FIR) is available for major indices, such as the WGILB Index, to offer a projection of index composition as of the next index rebalancing.

FIGURE 2
Barclays Index Dynamics



Returns (Backwards) Universe (A+B)

Static universe of index-eligible bonds set at beginning of month to avoid having to hit a moving target.

Includes bonds that lose eligibility during the month (A) because they were called, downgraded/upgraded; fell below one year to maturity or the minimum liquidity.

Bonds that lose eligibility do not leave the returns universe until month-end.

Used to report index performance (returns).

Statistics (Forward) Universe (B+C)

Dynamic universe that changes daily and reflects index-eligible bonds at that time.

Includes bonds that become index eligible during the month (C), such as new issues and bonds that were upgraded/downgraded into an index.

Used for rebalancing since statistics universe becomes returns universe at month-end.

Used to report index statistics (duration, market value, OAS, etc.).

Source: Barclays Research

Index Rebalancing Dynamics

Turnover measures the index composition shift using the market value of securities entering and exiting an index

Index Turnover

Index turnover is an estimate of gross index composition shift measured by the market value of securities entering and exiting an index (as a percentage of the index's beginning market value). Expected monthly turnover occurs from the regular issuance and borrowing patterns of index-eligible issuers as bonds exit and enter an index. When index rules changes are implemented, there may also be one-time turnover as securities enter an index or formerly index-eligible bonds are dropped under the new guidelines. The statistics universe of any benchmark reflects the net effect of any additions and drops on index composition on a daily basis and forecasts what the index composition would be if the index were reset at that specific date.

Understanding the sources of turnover entails understanding an index's specific rules for eligibility. With objective rules in place, a bond will either be index-eligible or not eligible at the time of a monthly rebalance. Any issue whose eligibility status has changed since the previous month-end will contribute to turnover by either exiting or entering the index. These issues can be divided into two classes: "drops" and "adds".⁶⁰

Drops (Issues Exiting an Index)

Issues that are no longer index-eligible can be referred to as "drops" when quantifying index turnover. An issue is dropped from an index under two circumstances: 1) it no longer meets the rules for inclusion, or 2) its security status has changed (called or exchanged) and it no longer exists in its current form.

⁶⁰ For more narrowly defined sub-indices, turnover can occur when securities cross over from one bucket to another, even if there is no turnover within the broader benchmark. For example, a bond whose time to maturity drops below 10 years to maturity would not contribute to the turnover of a broad-based index, but would be considered both an add (to sub 10 year maturity indices) and a drop (to 10+ year maturity indices) to other narrower maturity based sub-indices.

All Barclays indices have formal rules on amount outstanding minimums, time to maturity and credit rating, which together are the most common sources of rules-based drops. The other main reason for an issue to exit an index is that its status has changed and the security no longer exists in its current CUSIP or ISIN. In cases where a security enters an index and is later identified as a retail bond or privately placed security, it will be dropped from the index in light of the new information.

Additions (Issues Entering an Index)

Most issues that enter the Barclays indices are newly issued instruments. Other additions include issues that have been upgraded to investment grade from high yield, or vice versa, and bonds with a change to indicative data, such as country of risk or sector. Despite these other sources of turnover, new issuance accounts for most of the index additions to broad-based benchmark indices.

For the US Aggregate Index, new monthly production of MBS pools will not have their own unique identifier unless a given MBS generic⁶¹ is entering the index for the first time after meeting the USD1bn minimum threshold. Since the index uses generic identifiers based on program, coupon and vintage in its construction, new pool issuance will be reflected as an increase in par amount outstanding of existing MBS generics.

New securities can also enter the indices based on rules changes. These additions create a one-time increase in index turnover when they enter the index. Examples of recent additions include countries that were added to the emerging markets indices in April 2013, and inclusion of RUB- and TRY-denominated debt in the Global Aggregate and Global Treasury Indices in April 2014.

Gross Index Turnover

The combined sum of bonds leaving and joining the index equals gross index turnover, defined in the formula below as MVDrops and MVAdditions. Since the index composition and beginning market values used in the denominator change monthly, monthly turnover percentages are summed to estimate an annual index turnover.

Monthly Turnover

$$\text{TURNOVER}_{\text{Monthly}} = \text{MV}_{\text{Beginning}} \text{Drops} + \text{MV}_{\text{Ending}} \text{Additions}$$

$$\% \text{ TURNOVER}_{\text{Monthly}} = (\text{MV}_{\text{Beg}} \text{Drops} + \text{MV}_{\text{Ending}} \text{Additions}) / \text{MV}_{\text{Beginning}} \text{Index}^{62}$$

Annual Turnover

$$\text{TURNOVER}_{\text{Annual}} = \text{Sum of Monthly Drops} + \text{Sum of Monthly Additions}$$

$$\% \text{ TURNOVER}_{\text{Annual}} = \text{Sum of Monthly Drops \%} + \text{Sum of Monthly Additions \%}$$

Index Turnover Analysis

Users of POINT and the enhanced index website can run an index turnover report (which includes security level detail) under the Index Dynamics tab for Barclays indices. This report provides turnover estimates (including a breakout of the sources of turnover) for a specified period of time, as well as changes in par amount outstanding for an index. For the turnover estimates, US MBS prepayments and new production will be listed as changes in amount outstanding, rather than a drop or add from the index. Consequently, MBS turnover will be reflected only in net terms (new production increases amount outstanding, while paydowns

⁶¹ The Barclays US Agency MBS Index is constructed by grouping individual MBS pools with the same program, coupon and vintage into a “generic” aggregate with its own unique eight-character “generic CUSIP”. Each “generic”, as they are typically referred to within the context of Barclays indices, is a proxy for all of the outstanding pools for a given program, coupon and origination year. The identifiers for MBS generics are not street CUSIPs or identifiers, but rather proprietary constructs of Barclays MBS index methodology.

⁶² POINT uses ending market value as its denominator for percentage calculations.

decrease amount outstanding) and show lower turnover than the index experienced for a given period. If an index turnover report is run over a period longer than one month, it will only compare changes from the beginning and ending universes.

Treatment of Cash

The timing and treatment of cash in Barclays indices is an important consideration for index users who are managing against the indices actively or passively, since it affects decisions concerning intra-month cash reinvestment and month-end rebalancing within their portfolios.

Effect of Cash on the Returns Universe

Cash that has accrued within the returns universe intra-month earns no reinvestment return

Cash that has accrued within the returns universe intra-month earns no reinvestment return.⁶³ The events that cause cash to enter the index (coupon and principal payments) are accounted for in monthly total returns calculations as coupon or paydown return, but the cash itself does not generate its own partial month return for the period it resides in the returns universe. Because the indices are constructed as a rules-based basket of bonds and not treated as a portfolio, accumulated cash is stripped out of the index at month-end and effectively reinvested pro rata across the entire index for cumulative returns purposes.⁶⁴

When calculating cumulative returns over periods longer than one month, index cash (as captured in coupon and paydown return) is implicitly reinvested back into the returns universe to calculate an accurate since inception total return that reflects compounding.

For indices that rebalance less frequently, cash is still reinvested pro rata end of each month and cumulative returns over periods longer than one month still reflect monthly compounding.

Duration Extension

Duration extension quantifies the instant index duration change that occurs when index membership is reset each month-end

Duration extension quantifies the instant index duration change that occurs when index membership is reset each month-end. It accounts for monthly index turnover but also factors in the outflow of accumulated cash as the index is reset. The duration metric used for purposes of duration extension is option adjusted duration (OAD) for US indices and ISMA option adjusted duration⁶⁵ for non-US indices.

Returns Universe Duration vs. Statistics Universe Duration

For both the returns and statistics universe, an index-level duration figure is published as an aggregation of bond-level durations of each universe's index-eligible securities. Differences between these two index-level metrics reflects projected changes to index composition (turnover reflected in the statistics universe) and the amount of cash earned by the index from coupon and principal (accumulated in the returns universe).

Because the statistics universe duration is not adjusted for cash, each bond is weighted by its current market value to derive the index-level statistics universe duration. The bonds contributing to the statistics duration may change daily as they enter and exit the projected index. Additionally, the contribution of each bond to index-level duration may change as calls, taps and new issuance (specifically in the case of MBS generics) are reflected in each bond's amount outstanding. Price movements also affect a bond's contribution to index-level duration.

⁶³ Starting on January 1, 2011, Series-B indices total return calculations were made consistent with Series-L total return calculations in terms of cash treatment. From July 1, 2006, through December 31, 2010, income from coupon (and principal payments in the case of amortizing bonds) was held as cash and accrued on a monthly re-investment rate until the next rebalancing date, when it was re-invested in the index. Prior to July 1, 2006, income from coupon payments was reinvested in the index as soon as it was received.

⁶⁴ For Series-B indices, the mechanics are slightly different, though cumulative return calculations are effectively identical. Cash that has been earned by the index intra-month also earns no reinvestment return, but the cumulative cash balance at the security level is recorded as Cash Held for return calculations, which are done by tracking the index market value over time. This cash held balance is reset annually.

⁶⁵ ISMA (International Securities Market Association) duration measures the price sensitivity to changes in ISMA yield, which assumes annual coupon payments. Semi-annual coupons are assumed for US yield and duration calculations.

Returns universe duration is calculated the same way as statistics duration, but is adjusted downward for the amount of cash each security has accumulated at a zero duration. The adjustment is done using the market value for each bond within the returns universe (RU Market Value), which contains two components:

1. RU Security Market Value: The market value of the underlying security.
2. RU Cash Market Value: The amount of accumulated cash.

To adjust a security's contribution to index-level duration for cash, its RU Security Market Value is divided by the total RU Market Value of all the bonds in the returns universe to arrive at the index-level figure. The scaling in weighting will always be less than or equal to 100%, depending on whether a security has earned any cash during the month. If no cash has been earned, the cash scaling factor will be one and the security's contribution to returns duration and statistics duration will be the same.

Duration Extension Methodology

At the close of the last business day of each month, the Barclays indices are reset and bonds formally enter and exit the index, while cash that has accumulated in the returns universe during the month is removed. At this moment, the statistics universe has become the next month's returns universe and the realized duration extension is simply the difference in the end-of-month returns and statistics durations. At month-end, the extension is known with certainty and easily derived by comparing the duration of the two published universes.

There is usually a lengthening of an index's duration each month due to cash and bonds that are being dropped from the index often having lower durations than the bonds that remain in or enter an index. Occasionally, there is a duration shortening when the opposite is true (bonds and cash exiting the index have higher durations than the residual index). In either case, passive managers must therefore react to this change and lengthen (shorten) their duration exposure accordingly each month to remain duration neutral.

Accessing Duration Extension Estimates

Actual duration extensions can be easily obtained by taking the difference between the returns universe and statistics universe duration of an index at month-end. Prior to month-end, Barclays publishes periodic index duration extension estimates using forecasted turnover and cash estimates. These projections appear in the *Benchmark Index Duration Extension & Rebalancing Forecast* section of the Publications page on Barclays Live.

Other Index Rebalancing Mechanics

Settlement Assumptions

For index purposes, securities are assumed to settle on a T+1 calendar day basis,⁶⁶ except for US MBS pass-throughs (fixed-rate and hybrid ARMs) which are priced for Securities Industry and Financial Markets Association (SIFMA) forward settlement and then discounted back to same-day (T+0) settlement.

On the last business day of each month, the index settlement date is assumed to be the first calendar day of the following month even if the last business day is not the last calendar day of the month.⁶⁷ This allows for one full month of accrued interest to be calculated. The only exception is the US MBS Index, for which end-of-month index returns are calculated assuming that the trade date and the settlement date are the last calendar date of the month.

All securities are assumed to settle on a T+1 calendar day basis, except for US MBS

⁶⁶ Using a T+1 calendar day settlement assumption intra-month means that accrued interest as of a Friday business day will not include accrued interest for the weekend. Accrued for the weekend will be reflected on the first business day after the weekend.

⁶⁷ Cash is therefore recognized by the index on the last calendar day before the coupon record date. For example, if a coupon record date is the first of the month, cash will be recognized in the returns universe on the last day of the previous month under this settlement assumption. This is a common question from index users, in particular when a security coupon date is close to a month-end, but the settlement/payment date occurs in the ensuing month.

Series-B Index Settlement Assumptions

Series-B inflation-linked and nominal government bond indices assume local market settlement conventions and holiday calendars, which vary from market to market, ranging from T+1 business days to T+3 business days for certain linker markets. Because this index family uses different conventions, an index user may see a different accrued interest value or index ratio calculated for the same security in a Series-B versus a Series-L index.⁶⁸

Ex-Dividend Conventions

The ex-dividend date is the first date on which the holder of a bond is not entitled to receive the next interest payment. Securities in certain markets, such as the UK Gilt market, trade with ex-dividend dates, and the accrued interest of affected securities will reflect the appropriate conventions of a given market. Index users will see the accrued interest of a bond show as negative once it starts trading ex-dividend and the expected coupon payment discounted back to the current index settlement day in returns universe calculations.

Holiday Calendars

The Barclays indices employ a regional approach for index holiday schedules, as opposed to using a single holiday calendar for all indices or basing production on the calendars of each of the 39 currencies currently represented by the indices. The regional holiday calendar followed by each currency covered in the Barclays indices can be found in Figure 7. Single-currency indices are not produced if the calendar that currency follows is on holiday. Publication of multi-currency global and regional indices that include bonds following different holiday calendars is discussed in the following sections.

Publication of Global Indices

Multi-currency indices, such as the Global Aggregate Index, are generated every business day of the year except for New Year's Day, the only holiday shared by all regional calendars. During other regional holidays, global indices are still generated but use prices from the previous business day for markets on holiday. On July 4, for example, the US Aggregate Index is not produced because the US holiday calendar observes Independence Day. USD-denominated bonds in the Global Aggregate Index, which is still produced, show a price from the previous business day.

FIGURE 3
Regional Holiday Calendars Observed by Currency

Region	Currency	Holiday Calendar
Americas	USD, CAD, MXN, CLP, ARS, BRL, COP, PEN	United States
EMEA	EUR, DKK, NOK, SEK, CHF, PLN, ZAR, ILS, CZK, HUF, GBP, HRK, EGP, TRY, RUB, NGN, RON	United Kingdom
Asia-Pacific	JPY	Japan
	AUD, NZD	Australia
	HKD, TWD	Hong Kong
	KRW	Korea
	SGD, MYR, THB, IDR, PHP	Singapore
	CNY, CNH	China
	INR	India

Source: Barclays Research

The Barclays indices employ a regional approach for index holiday schedules

⁶⁸ This question often comes up when comparing US TIPS securities that trade on a T+1 business day basis. On a Friday or the last business day of the month, the settlement assumption may extend further than the next calendar day assumed by the T+1 calendar methodology.

Publication of Regional Indices

Regional, multi-currency indices that share more than one holiday calendar, such as the Asian-Pacific Aggregate Index, are generated as long as any market followed by one of the eligible currencies is open.⁶⁹ In these cases, the price from the previous business day for markets on holiday is used and total returns of the indices still include currency returns from updated FX rates and coupon return from accrued interest being generated. For example, if Singapore is observing a bank holiday, SGD-denominated bonds, as well as any currencies not on holiday but following the Singaporean calendar (MYR, THB, IDR and PHP), will still contribute to the Asia-Pacific Aggregate published for that day but with no price performance since their prices will be carried forward unchanged from the previous Singaporean business day.

In most cases, the EMEA region follows the UK holiday calendar. However, if the last business day of the month is a UK holiday, prices may be updated for non-GBP-denominated bonds if the European markets are open. In such cases, prices from the previous day are rolled over for GBP-denominated bonds observing the UK holiday for month-end.

Series-B Indices Holiday Schedule

Series-B indices are published every calendar day. On days in which a particular market is closed, prices and analytics from the previous business day are rolled forward on that day.

Timing of New Issues

Qualifying securities issued but not necessarily settled on or before the month-end rebalancing date will qualify for inclusion in the following month's index, provided the required security's reference information and pricing are readily availability.

Inclusion of When Issued US Treasuries

US Treasuries are added to the statistics universes of the US Aggregate and US Treasury Indices on the announcement date with an assumed coupon. The coupon is then updated on the auction date.

Inclusion of New Issues in Series-B Indices

New bonds and re-openings entering the index must have settled on or before the rebalancing date to be included.

Rebalancing Details for Other Indices

Certain bespoke, alternate weight and tradable indices rebalance at a set time each year.

Fiscal Strength and GDP Weighted Indices

For the Fiscal Strength Weighted Index family, country scores for the following year are published in early November, reflected in the November forward (statistics) universe and take effect as of the annual rebalancing date on December 1.

GDP weights are announced in early November, reflected in the December forward (statistics) universe and take effect as of the annual rebalancing date on January 1. Monthly rebalancing occurs for underlying bonds entering and exiting the specific country sub-indices used by these benchmarks.

EM Tradable Indices

Most EM tradable indices will rebalance on a semi-annual or an annual basis. These were explicit design features to minimize turnover in these benchmarks.

⁶⁹ On July 1, 2011, four additional Asian bond market calendars (Australia, Hong Kong, South Korea and Singapore) joined the Japanese calendar to determine the index publication schedule for the Asian-Pacific Aggregate Indices. Additionally, the publication schedule for Asian-Pacific currencies in the EM Local Currency Indices added three Asian bond market calendars (Hong Kong, South Korea and Singapore). The Asian-Pacific Aggregate and EM Local Currency Government Indices were previously published based on Japanese market holidays only, with the exception of China and India, which already used their own regional calendars.

BENCHMARK INDEX PRICING AND ANALYTICS

After identifying an eligible universe of securities using a rules-based set of inclusion criteria, an index provider must then accurately measure the daily return and risk characteristics of these bonds for benchmark index users. Security-level valuations are a core element of these daily measurements, and Barclays benchmark indices are priced using a range of direct and indirect sources of market color as inputs for evaluations and daily validation.

Analytics for index-eligible securities provide investors with the necessary tools to assess the riskiness of bonds within their investment choice set and make relative value decisions within their portfolios. With an under- or overweight to their benchmark in duration or spread, for example, an investor is also able to express views within their portfolio on the market environment (eg, rates will rise) or achieve specific objectives of their mandate (eg, minimize risk).

The following section provides an overview of Barclays pricing methodology and the key analytics calculated for securities in the fixed income benchmarks.

Benchmark Index Pricing

No single method is used to price every bond in the Barclays indices

No single method is used to price every bond in the Barclays indices. Certain securities are valued using sector- and/or region-specific market conventions and valuation frameworks. In pricing the benchmark indices, Barclays aims to mark each bond with an appropriate and observable level when available, whether directly quoted from a trading desk or exchange, derived from a pricing matrix or supplied by a third-party pricing vendor.⁷⁰ In addition to the source of an index price, other pricing considerations (quote side, settlement and timing) are important considerations for index users, as they often provide the basis for relating an index price with levels observed in the market.

This section offers a high-level overview of the pricing process and conventions used for Barclays benchmark indices. For additional details, including pricing procedures based on asset class and region, please see “Appendix 4: Pricing Methodology for the Barclays Indices.”

Sources for Index Prices and Inputs to Pricing

The source of inputs for index prices can vary by asset class and from index to index. Both market maker quotes and Barclays valuation models rely on a variety of observable inputs to derive a security’s daily price within the index. Some of these may be direct pricing quotes, while others may be used as indirect inputs to drive a pricing matrix or other valuation model when observable or transactional data are unavailable. The priority of inputs used to price a security may change from day to day, as certain features may be more direct drivers of valuation at a given time. Ultimately, the factors used are left to the judgment of the price contributor and the Barclays index pricing group.

Validation

The quality of index pricing is kept high by 1) using comparisons of a broad range of sources, including third-parties, Barclays index group internal valuation models, centralized trade reporting such as TRACE, and Barclays market makers and/or 2) employing a variety of statistical techniques applied on day-to-day movements and point-in-time levels using tolerance bands set at the issuer, sector, quality and maturity levels.

⁷⁰ Bond-level prices are made available to appropriately licensed users and only on those bonds that are included in a benchmark index. Users of Barclays POINT platform, which contains a much broader database of instruments and asset classes, may see prices for securities that are not index-eligible; however, these do not represent levels that have been validated by the Barclays index team. For more information regarding the pricing of non-index instruments, users should contact their POINT account coverage.

Possible outliers resulting from the verification process are resolved by the Barclays team dedicated to pricing validation. Index users may also challenge price levels, which are then reviewed by the pricing team. If a discrepancy arises, prices may be adjusted on a going forward basis using input from the primary pricing source and/or Barclays market makers.

Pricing Conventions

Within Barclays benchmark indices, pricing conventions may differ across asset classes, but these differences are documented within index methodology made available to users.

Quote Type

Index-eligible securities can be quoted several ways; however, each quote is translated to a “dollar price”

Index-eligible securities can be quoted in a number of ways depending on the asset class (nominal spreads over benchmark securities/Treasuries, spreads over swaps, dollar prices/direct price quotes, etc.). However, each quote is translated to a “dollar price” that represents the security’s value as a percentage of par.

With a few notable exceptions, the bonds in Barclays benchmark indices are quoted on the bid side.⁷¹ Bid pricing values a bond at the level where an investor would be able to sell it as of the index pricing date and is a convention used by many investors for fair value accounting and reporting. Third-party pricing sources generally provide bid side prices, though offer prices may be used to derive a bid side price.

Mid side pricing is used for all inflation-linked markets and EUR-, GBP-, and JPY-denominated nominal treasuries. This values securities halfway between the bid and offer price to reflect the fair value of a bond that is agnostic to whether it is being bought or sold. It is generally prudent for markets with liquidity extremes: highly liquid markets where bid-mid spreads are very narrow or highly illiquid ones, such as emerging markets linkers, where daily bid-mid spreads may be difficult to determine due to a lack of secondary market activity. Within the Barclays indices, EUR, GBP and JPY government bonds are quoted on the mid side, not only because they typically have very narrow bid-mid spreads, but also because this is the market convention.

Timing and Frequency

The time at which the price is taken for a particular bond is regionally based

The time at which the price is taken for a particular bond is regionally based. Generally, bonds are priced at 3pm New York time for US and Canadian markets and 4:15pm London time for Pan-European markets. For Asian-Pacific indices, prices are taken at different times, depending on the local market convention, and are subject to change based on a semi-annual review: 3pm for Japan; 3:30pm for Thailand and Taiwan; 4:30pm for Australia, South Korea and Malaysia; 4:45pm for Singapore; 4:50pm for China; and 5pm for New Zealand. When the markets close early for holidays, prices may be taken earlier in the day.

Index prices and valuation models are updated daily to reflect any changes in the inputs. Prices may change because of an update to the quote (an updated spread to a reference curve, for example) or a change to any of the underlying inputs used to derive a dollar price, such as swap curve movements.

Settlement Assumptions

For index purposes, securities are assumed to settle on the next calendar day (T+1), with the exception of US MBS pass-throughs, which are priced for Securities Industry and Financial Markets Association (SIFMA) forward settlement and then discounted back to same-day settlement (T+0), and Series-B indices, such as the World Government Inflation-Linked Bond Index, which use local market settlement conventions.

⁷¹ New investment grade EUR- and USD-denominated corporates are quoted on the offer side the first month they enter the index and are quoted on the bid side starting in the following month.

At month-end, settlement is assumed to be the first calendar day of the following month, even if the last business day is not the last day of the month. This procedure allows for one full month of accrued interest to be calculated. The only exception is the US MBS Index, for which end-of-month index returns are calculated assuming that the trade date and the settlement date are the last calendar date of the month.

Benchmark Index Analytics

Index users rely on a range of fixed income analytics calculated by Barclays to quantify various risk exposures (duration, convexity, volatility, etc.) and the corresponding sensitivity to those risks for a given security, sector or asset class. Comparing the analytics of a portfolio relative to its benchmark allows investors to measure the magnitude of particular risks embedded within their portfolios and how they relate to the broad market. While some analytics calculations are relatively straightforward and calculated in a similar manner across index providers, others rely on propriety models (such as an MBS prepayment model) developed and maintained by Barclays research and modelling teams.

The following section provides an overview of the major types of analytics available for the Barclays indices (duration, convexity, spread and yield) and a brief discussion of the types of model-driven, research-based metrics that have been developed in recent years. Calculations for many of these can be found in “Appendix 5: Glossary of Terms,” with research papers also available for many of the more complex, proprietary model-based ones.

Duration

While several variants of duration exist for fixed income securities, investors generally think of the duration as a measure of sensitivity of a bond’s price to interest rates (as represented by the change in price for a given change in yield). The duration of a portfolio relative to a benchmark can then be used to express an investor’s view on the interest rate environment.

Option Adjusted Duration (OAD) is the most widely used duration metric for Barclays indices

Barclays calculates a number of measures of duration for each security, including **Modified Duration**, **Macaulay Duration** and **Option Adjusted Duration (OAD)**.⁷² The most widely used duration metric, OAD, offers perhaps the best measure of price/yield sensitivity for bonds with embedded optionality, such as securitized bonds and callable government/corporate issues. OAD is calculated by shocking the par yield curve up and down by a fixed amount and measuring the resulting change in price.⁷³ For non-US indices, ISMA duration is often used in place of OAD. The major difference between these two measures is the assumption of an annual coupon, instead of the semi-annual coupon in ISMA yield calculations that are used in the OAD calculations.

In addition to OAD, Barclays calculates **key rate duration (KRDs)** at six points on the curve: 6m, 2y, 5y, 10y, 20y and 30y. The movements of the par yields at these points are assumed to capture the overall movement of the yield curve; therefore, the sum approximately equals the total OAD of the bond. By shifting only part of the yield curve while holding the rest of it fixed and repricing the bond at a constant OAS, we are able to measure the sensitivity of a bond to these different parts of the curve.

To incorporate the unique risk factors and conventions of certain fixed income markets, Barclays calculates asset class-specific durations (eg, real versus nominal duration for US TIPS) and incorporates certain conventions for other asset classes, such as mortgage duration. Please see the “Appendix 5: Glossary of Terms” for more details on these fields.

⁷² In 1989, OAD (also referred to as effective duration or modified adjusted duration) replaced Macaulay duration as the published index duration for the benchmark indices.

⁷³ Barclays uses a lognormal option model and the current price of the bond to calculate the option adjusted spread (OAS) of the bond.

Convexity

Similar to duration, convexity is a measure of a security's sensitivity to interest rates. However, where duration provides a linear approximation, convexity is a quadratic approximation that measures how duration changes with changes in yield. Investors are particularly concerned with convexity in environments where yield movements are large or for asset classes that are especially sensitive to interest rates, such as US MBS pass-throughs.

OAC measures the curvature of the change in price of a bond as rates move

Option Adjusted Convexity (OAC) is the second derivative of the price-yield function and measures the curvature of the change in the price of a bond as interest rates move (the rate of change of OAD for a given change in rates). While it is positive for conventional fixed-income bonds, it is generally negative for mortgage pass-throughs. The effect of negative convexity is to dampen price appreciation if interest rates fall and aggravate the price decline if they rise.⁷⁴

Spread

Investors often quote the riskiness of a fixed income instrument as a spread above the return of a reference asset (usually a government bond or curve, but can also be a swap curve). Naturally, for taking additional "spread risk", investors expect to be compensated with higher yield. Spread can be used to compare risk exposures across sectors or peer groups and to make relative value decisions for bond portfolios. Investors may also target a portfolio spread that is higher than the spread of their benchmark if their objective is outperformance. However, since a higher spread typically exposes the portfolio to liquidity and issuer default risks, the manager must be comfortable that such risks are sufficiently compensated by the higher carry return associated with higher portfolio spread. Passive managers, on the other hand, may seek to achieve a spread for their portfolio that is more in line with that of their benchmark.

The treasury curve used in OAS calculations corresponds to a bond's currency denomination

A number of spread analytics are available for the indices, including **Option Adjusted Spread (OAS)**, **L-OAS**, **Spread to Benchmark**, **Spread Duration** and **Duration Times Spread (DTS)**.⁷⁵ The most commonly used, OAS, is the constant spread that when added to all discount rates from the treasury curve on the binomial interest rate tree model (used by Barclays) will make the theoretical value of the future cash flows equal to the market price of the instrument. The treasury curve used will correspond to the currency denomination of a bond (eg, USD bonds will be calculated against a US Treasury curve, GBP-denominated bonds against a Gilt curve, JPY-denominated bonds against a JGB curve). Unlike OAS, Spread to Benchmark is not a model-driven analytic, but is instead a quoted figure above an assigned security or "bellwether". The security over which a bond's spread is quoted is typically an on-the-run treasury, but can also be an off-the-run treasury or non-treasury issue.

Yield

Yield can be calculated under a number of assumptions, including that an investor holds a bond to maturity, to its call date in the case of bonds with embedded optionality, etc. Barclays most widely used yield metrics are yield to worst and yield to maturity, though certain asset class-specific yield measures are also calculated.⁷⁶

⁷⁴ For example, even though MBS pass-throughs usually have higher yields than Treasuries, they many underperform Treasuries if rates move from the base case due to their inherent negative convexity.

⁷⁵ Other metrics on which Barclays often receives questions are the "blended spread" ones published on the hard currency USD-denominated EM index pages of Barclays Live. These incorporate the collateralization by the US Treasury of Brady Bonds, which were issued in the 1980s by struggling emerging markets governments and were partially collateralized by the US Treasury. All Brady Bonds have matured, making this metric no longer relevant.

⁷⁶ For example, Barclays calculates both a real and nominal yield for Series-L US TIPS. The yield on Municipal Indices is a yield to call if a bond is priced above its call price and a yield to maturity if a bond is priced below.

The yield to worst on a bond represents the lowest potential yield that an investor would receive on a bond with embedded optionality if the issuer does not default

Yield to maturity reflects the interest payments a bond holder is owed over the life of the bond, in addition to any gain or loss on price, depending on whether the bond is priced below or above par. The **yield to worst** on a bond represents the lowest potential yield that an investor would receive on a bond with embedded optionality if the issuer does not default. The yield to worst is calculated by making worst-case scenario assumptions on the issue by calculating the returns that would be received if provisions, including prepayment, call or sinking fund, are used by the issuer.

Yield calculations within the indices are based on an implied discount treasury curve. Barclays constructs this by taking all of the cash flows of the set of liquid treasuries that are used to build the treasury curve and then uses a spline-fitting technique to determine the best discount factors such that the set of discounted cash flows is equal to par.

Derived and Model-Driven Analytics

Analytics for amortizing assets (such as MBS and ABS) and inflation-linked securities may also use Barclays research models that estimate variables such as prepayment speeds, seasonality, and other variables that can affect duration and OAS. In addition to standard duration, convexity, and spread analytics, these models may also be used for asset class-specific analytics such as mortgage prepayment model projections measured by the Constant Prepayment Rate (CPR). Specific to agency US MBS pass-throughs, CPR estimates the portion of a mortgage backed pool that will be prepaid in the following year. It is used in the calculation of analytics for MBS generics, such as duration and OAS, and incorporates historical prepayments and forward-looking estimates. The latter are based on the prepayment model maintained by the Barclays mortgage research team, which incorporates macroeconomic views on the housing market, interest rates, etc.

Barclays indices also integrate other advanced analytics developed by the research and modelling teams to help better quantify bond- and index-level risk. Two such analytics are Liquidity Cost Scores (LCS)⁷⁷ and Corporate Default Probability (CDP).

LCS measures the cost of a round-trip trade for a bond

Liquidity Cost Scores (LCS) use trader bid-ask spread data to measure the cost (in basis points) of immediately executing a round-trip transaction for a standard institutional trade of bonds in Barclays indices. LCS are used in a variety of portfolio management applications: constructing portfolios with various target levels of liquidity to take views on changes in market liquidity, designing optimal execution strategies for portfolio transitions and designing custom credit benchmarks. **Corporate Default Probability (CDP)** is forward-looking default probability prediction generated by Barclays Portfolio Modelling group, which is used in the POINT Global Risk Model. This metric is calculated using both a structural and a reduced-form approach.

For further information on these analytics, please contact your regional index products or POINT team.

⁷⁷ For further details, see *Introducing LCS: Liquidity Cost Scores for US Credit Bonds*.

BENCHMARK INDEX RETURNS CALCULATIONS AND WEIGHTING

Benchmark index returns are calculated using security-level returns and weights that are reset at each index rebalancing.

The standard measure of bond return is a *total return*, which includes the local return from interest accrual/payments (*coupon return*), security price movements (*price return*) and scheduled and unscheduled payments of principal (*paydown return*). For foreign currency or multi-currency indices, a *currency return* (hedged or unhedged) is calculated for bonds denominated in a currency different than the base reporting currency of the index. Barclays also calculates *excess return* that investors use as a proxy for the duration-neutral return of a fixed income spread sector.

The standard methodology used to weight security-level returns within a benchmark is *market value weighting*: an objective representation of the investment choice set for a particular index. Under this approach, the weight of each index-eligible security is calculated at the beginning of each monthly reporting period based on its price, accrued interest and par amount outstanding. Other weighting schemes are also available such as capped/constrained weights, GDP weights, Fiscal Strength weights, and ESG weights.

Most Barclays bond indices are rebalanced on a monthly basis, resulting in aggregated index returns that are commonly reported on a month-to-date basis, using bond-level returns and weights. These month-to-date index returns can be used to derive daily, cumulative and periodic benchmark returns over shorter and longer reporting windows, as well as multiple rebalancing periods.

This section will offer an overview on security-level return and weight calculations used to arrive at benchmark-level returns. More detailed explanations of return calculations can be found in the appendices.

Bond Total Return Calculations

Published returns for Barclays benchmark indices measure the total return of a fixed income instrument, which includes capital appreciation and security price movements, interest payments and accruals, and principal repayments (scheduled or unscheduled) in the case of amortizing or sinkable bonds.⁷⁸ Calculating these returns requires daily bond prices, accrued interest calculations, and a record of the timing and amount of coupon and principal payments.⁷⁹ For multi-currency indices, such as the Global Aggregate Index, or single currency indices in which the base reporting currency is different than the currency of principal and coupon payments, an additional currency return (with an option to reflect hedging or not) will also be included in the total return calculation. Currency return requires a number of additional inputs including daily spot and forward FX rates and bond-level yields.

The components of a security's total return are discussed below.

⁷⁸ Components of total return for CMBS bonds can also include writedown return, which is related to the reduction in the outstanding class balance due to a loss of principal valued at the ending price of the bond, or prepayment penalty return, which is due to additional penalty premiums paid in connection with certain prepayments that are generally distributed as excess interest on the certificates. See "Appendix 1: Total Return Calculations" for further details.

⁷⁹ Though generally consistent with the calculation of other fixed income asset classes tracked by Barclays, the price, paydown and coupon return calculations for US mortgage backed pass-throughs differ slightly by incorporating a survival factor into the equation. For additional details, see *Managing Against the Barclays MBS Index: Prices and Returns*.

Monthly Price Return

The price return for a given period is derived from changes in security prices during the course of the reporting period (due to factors such as interest rate changes or spread movements) and is expressed as a percentage of the security's beginning of period market value. A clean price that does not include accrued interest is used in the price return calculation,⁸⁰ even for markets that are quoted on a dirty basis since changes in accrued interest are tracked separately as part of the coupon return.

$$\text{Price Return} = \frac{(\text{Price}_{\text{Ending}} - \text{Price}_{\text{Beginning}})}{(\text{Price}_{\text{Beginning}} + \text{AccruedInterest}_{\text{Beginning}})}$$

Barclays publishes a single price return number for its indices on Barclays Live, but does have additional return attribution data on the sources of price return available through POINT®. Additional splits of price return isolate components such as parallel curve shifts, curve reshaping and convexity, carry, volatility change and decay, and spread duration.

Monthly Coupon Return

The coupon return for a given period measures the interest income earned by a security, reflecting changes in accrued interest⁸¹ plus any interest paid during that period, divided by the dirty price of the security at the beginning of the period. Coupon return is calculated in the same manner for both fixed- and floating-rate securities.⁸²

$$\text{Coupon Return} = \frac{[(\text{AccruedInterest}_{\text{Ending}} - \text{AccruedInterest}_{\text{Beginning}}) + \text{Interest Payment}]}{(\text{Price}_{\text{Beginning}} + \text{AccruedInterest}_{\text{Beginning}})}$$

In the case of a default, the ending accrued interest value is set to zero, reversing out any accrual posted since the last coupon payment, and the security shows a negative coupon return. Barclays continues to price the security in the returns universe, and it continues to contribute to price return until month-end, at which time it is removed from the index.⁸³

Ex-Dividend Coupon Return

For securities that trade on an ex-dividend basis, coupon accrual resets prior to the actual payment date based on a predefined period of time, known as the “ex-dividend period”. The length of the ex-dividend period can vary from market to market, with some as long as 10 business days. The coupon return for bonds that trade ex-dividend is calculated in a manner similar to other securities. However, in place of an actual interest payment made in the return calculation, a coupon owed is used during the ex-dividend period prior to actual coupon payment date and is discounted back to the current index settlement date.

Monthly Paydown Return

Scheduled and unscheduled principal payments prior to a bond's maturity date are used to calculate security level paydown returns, which capture the gain or loss when a percentage of a security's par outstanding is redeemed and the security is trading at a price other than par.

⁸⁰ For inflation-linked securities, published price return will use inflated prices (Real Price * Index Ratio) and inflated accrued interest for price and coupon return calculations and will therefore include changes in inflation in the return calculations.

⁸¹ Accrued interest is calculated using a T+1 calendar day settlement assumption for all securities except US MBS pass-throughs, which assume same-day (T+0) settlement, and Series-B inflation-linked and nominal government bond indices, which assume local market settlement conventions. On the last business day of each month, index settlement date is assumed to be the first calendar day of the following month, even if the last business day is not the last calendar day of the month, to allow for a full month of accrued to be calculated.

⁸² Pay-in-Kind securities that pay interest in the form of additional bonds recognize a coupon return only in the month in which additional bonds are paid. Otherwise, interest does not accrue for these bonds, and coupon return is zero.

⁸³ Though defaulted corporates are not eligible for Barclays benchmarks, such as high yield and emerging markets indices, defaulted treasury and sovereign debt remain index-eligible.

$$\text{Paydown Return} = \text{principal_payment} * \frac{(100 - \text{Price}_{\text{Ending}} - \text{Accrued Interest}_{\text{Ending}})}{(\text{Price}_{\text{Beginning}} + \text{Accrued Interest}_{\text{Beginning}})}$$

Where:

principal_payment = actual principal payment expressed as a percentage of par divided by the par amount outstanding at the beginning of the period.

Principal payments enter the returns universe as cash when they are paid, but they do not earn an additional reinvestment return for the remainder of the month.

Paydown return is only calculated for amortizing or partially called bonds and is not calculated for securities that are fully called by the issuer. For fully called bonds, the entire amount outstanding redeemed enters the returns universe as cash at the call price; any difference in the beginning price and the called price is reflected in price return, rather than the paydown return.

Monthly Currency Return

A bond's currency return is derived from converting local returns to a base reporting currency different from the underlying currency of the security. If the underlying and reporting currencies are the same, currency return is zero. Barclays calculates hedged and unhedged currency returns for each reporting currency available for a given index.

Monthly Currency Return (Unhedged)

The unhedged currency return is calculated as the sum of the currency appreciation between the reporting currency and the currency denomination of a bond and the currency appreciation of the local return.

$$\text{Currency Return} = (1 + \text{Local Return})(\text{FX Appreciation})$$

Where:

$$\text{Local Return} = \text{Price Return} + \text{Coupon Return} + \text{Paydown Return}$$

$$\text{FX Appreciation} = \frac{(\text{FX}_{\text{Ending}} - \text{FX}_{\text{Beginning}})}{(\text{FX}_{\text{Beginning}})}$$

Monthly Currency Return (Hedged)

Hedged currency returns are designed to limit the FX exposure within an index. Since the indices rebalance monthly, the hedge put on is one month in length, and the hedged currency return is calculated as:

$$\text{Currency Return}_{\text{Hedged}} = \text{Expected Currency Return} + \text{Residual Currency Return}$$

The components for each can be found in Figure 1.

FIGURE 1
Components of Hedged Return

Hedged	Return Component	Calculation
Expected	Currency Return	Relative Forward Rate Differential * (1 + Expected Local Return)
	Relative Forward Rate Differential	(Forward Rate – Spot Rate) / Spot Rate
	Expected Local Return	(1 + Yield _{Beginning of Month} / 2)(1/6) - 1
Residual	Currency Return	(% Change in Spot) * (Local Return – Expected Return)
	Local Return	Price Return + Coupon Return + Paydown Return
	Exchange Rate	Base Currency / Local Currency
	Forward Rate	Spot Rate Beginning * (1 + One Month Base Depo) / (1 + One Month Local Depo)

Source: Barclays Research

Currency hedging applies to published returns only. Analytics such as duration do not have a hedged or an unhedged version in either single- or multi-currency indices.

For additional details on Barclays currency hedging methodology for both Series-L and Series-B indices, see “Appendix 2: Index Rules for Currency Hedging and Currency Returns”.

Bond Excess Return Calculations

Excess return is a metric used to quantify the duration-neutral return of a security by comparing the total return of a spread security to that of a “risk-free” treasury asset, represented by a treasury bond(s). The excess return published for flagship Barclays benchmarks, such as the US Aggregate and Euro Aggregate Indices, is an informational measure and not a tradable hedge to reduce the treasury duration exposure of the underlying cash index.⁸⁴

Excess return is calculated for Barclays indices using either a key rate duration matching approach or a duration-bucket approach, both of which are discussed below.⁸⁵

Key Rate Duration (KRD) Matching Approach

To calculate excess returns using KRDs, Barclays first constructs a set of six hypothetical par coupon treasuries corresponding exactly to the maturities of the six KRDs of a spread security at the beginning of the month. To the six hypothetical bonds, each priced exactly off the curve at zero OAS, a riskless one-month cash security is added. A combination of these seven instruments is then used to match the market value and KRD profile of the security at the beginning of the month. This combination constitutes the equivalent treasury position to which a security’s return is compared. The KRD-matched hypothetical treasuries are held constant throughout the month and are not rebalanced intra-month due to change in the KRD profile of the security to which it is being compared. At month-end, each of the hypothetical par coupon treasuries is re-priced at zero OAS off the end-of-month treasury return, and its total return for the month is calculated. The excess return for the security is then calculated as the difference between its total return and that of the equivalent treasury position.

Duration-Cell Approach

A duration-cell approach is used to calculate excess returns for non-US benchmark indices. Using this methodology, Barclays first buckets the universe of treasuries that correspond to a bond’s currency denomination⁸⁶ into half-year duration buckets starting at zero. Treasuries are bucketed based on their beginning-of-month duration value and will not change buckets intra-month. A market value weighted return is then calculated for each half-year duration bucket. The return for a given security’s duration-matched risk-free asset is interpolated from its duration at the beginning of the month and the duration and total return of the two adjacent treasury buckets. The excess return for the security is then calculated as the difference between its total return and the interpolated return.⁸⁷

A more detailed discussion on excess return can be found in “Appendix 3: Detailed Discussion of Excess Return Computations”.

⁸⁴ For users looking for such benchmark solutions, Barclays offers a family of Mirror Futures (MFI) and Duration-Hedged (DHI) Indices. A MFI is an index whose return reflects a funded set of Treasury futures, weighted to closely match the beginning of month option adjusted duration (OAD) profile of an underlying standard bond index. A DHI is a funded index whose return reflects the return on the underlying cash index, with its OAD exposure hedged (fully or partially) using its MFI. For further details, see *Barclays Mirror Futures & Duration Hedged Benchmark Indices*.

⁸⁵ Excess return is not published for Barclays Municipal Indices and displays with an “n/a” value on Barclays Live. Users of POINT can access an excess return for the Municipal Index that is over the IDC non-zero, non-callable AAA GO duration-neutral curve.

⁸⁶ For EUR-denominated securities, this basket is comprised of German bunds only. Prior to July 1, 2013, the basket also included French and Dutch treasuries.

⁸⁷ Published excess return is set to zero for all Aaa-rated EUR treasuries.

Index Weight Calculations

In addition to security-level returns, the second input required for index-level calculations is security-level weights, which are reset at each index rebalancing date and available with a variety of weighting options.

Market Value Weights

Central to the construction and calculation of Barclays flagship fixed income indices is a market value weighting design. The appeal of market value weighted indices lies in their unmanaged nature and objective representations of the broad investment choice set for a given asset class. Weighting a basket of securities by outstanding debt reflects liquidity and market capacity for the asset class, resulting in indices that are largely replicable by investors managing against them. Void of any optimization or investment strategy, market value weighted indices simply measure the returns and risk characteristics of outstanding debt that meets index eligibility criteria. In cases where investors do not prefer the allocation or risk exposures of the broad market, they can express individual market views as active investment decisions to deviate from the market value weighted benchmark.

Though complex given the sheer size of the fixed income asset class, market value weighted indices are still easily understood by a range of index users and are the logical starting point for passive investors seeking an objective measure of an asset class and active investors looking to formulate more complicated investment strategies to outperform the market. Objectivity, transparency, universality, market acceptance and asset class coverage are among the most common reasons investors tend to prefer a market value weighted design. Additionally, traditional market value weighted indices facilitate better comparisons of asset managers to one another if they are using the same benchmark.

The following section details the specific conventions used by Barclays indices in calculating index-level returns and statistics. Alternative index designs to market value weighting are also discussed.

Bond Level Market Value

For each bond in Barclays fixed income indices, market value is calculated each day based on the bond's current par amount outstanding, price and accrued interest as of the index settlement date:

$$\text{Market Value}_{\text{Bond}} = [\text{Price}_{\text{Bond}} + \text{Accrued Interest}_{\text{Bond}}] * \text{Par Amount Outstanding}_{\text{Bond}}$$

For multi-currency indices, a security's market value can be expressed in different reporting currencies. If the principal amount outstanding of a bond is denominated in a currency different than the index reporting currency, the amount outstanding would be converted using the spot exchange rate as of the index pricing date; price and accrued will not change with different reporting currencies as they are expressed as a percentage of par.

Day-over-day changes to market value can reflect various events such as corporate actions with adjustments to amount outstanding, yield movements with price fluctuations or an increase in interest payment due to a bond holder with changes in accrued interest.

Bond-Level Market Value Weights for Index Return Calculations

The market value of each bond within the returns universe of an index is set at the outset of each monthly index reporting period as of the previous month-end index rebalancing date. These "Beginning" market values are used to derive static security-level weights for index level return aggregation until the next index rebalancing.⁸⁸ The market value used for each

⁸⁸ For other analytics and statistics, dynamic market values as of each index calculation date are used and are reported for the projected statistics index composition.

bond is the same across all market value weighted indices and their related sub-indices by sector, maturity, currency, etc.

$$\text{Returns Universe Market Value \%} = \frac{\text{Security Market Value}_{\text{Beginning}}}{\sum \text{Security Market Value}_{\text{Beginning}}}$$

In alternative weight indices, such as those that limit issuer concentration or target specified sector allocations, each security's contribution to index-level return is still based on security-level market values at the beginning of the month. To satisfy the alternative weighting criteria, the amount outstanding for each bond is adjusted in a rules-based manner based on the specific weighting methodology. This adjusted amount outstanding is used to calculate index-level returns and is then held constant throughout the month for each bond in the returns universe.

Bond-Level Weights for Index Statistics Calculations

Index-level statistics published for the indices on Barclays Live, such as duration, yield and OAS, are weighted by the daily or "Ending" market value of each index-eligible bond in the statistics universe. Published sector allocation percentages for flagship indices are also based on the statistics universe using ending market value.⁸⁹

$$\text{Statistics Universe Market Value \%} = \frac{\text{Security Market Value}_{\text{Ending}}}{\sum \text{Security Market Value}_{\text{Ending}}}$$

In alternative weight indices, the amount outstanding for each bond in the statistics universe is rescaled each day, based on current price and accrued interest, to effectively rebalance overall market value exposures based on the specific alternative weighting scheme. As a result, index users will see the statistics universe of an index meet the market value targets of an alternative weighting scheme each day, even though returns universe weights may drift from their initial targets.

Alternative Weighting Options

Given the size and diversity of the fixed income investor base, some investors may prefer a departure from the standard market value weighting of Barclays flagship indices based on inclusion criteria or weighting methodology. The reasons for choosing an alternative index design are varied, but a common thread running through investors' rationale is that the index characteristics and risk profile of a market value weighted benchmark do not accurately represent their portfolio objective or risk tolerance.

Common index alternatives to flagship market value indices that are designed to achieve specific benchmark objectives are discussed below.

Target Allocations in Composite Indices

Index solutions for investors looking to match a specific investment policy allocation tend to be straightforward blends or composites of existing indices or sub-indices with weights matching their policy allocation. As long as the sub-components exist as standalone indices, almost any allocation-based index is possible. For example, if a fixed income manager's preferred allocation across credit rating within the Barclays US Corporate Index is 20% Baa-rated with the remainder of their benchmark rated A or better, a benchmark can be constructed to match that allocation.

Capped Indices

Alternative index designs available to investors looking to manage concentration risk generally consist of capped or diversified indices that apply strict exposure limits within the benchmark based on issuer weights, sector weights, country exposure, etc. For example,

⁸⁹ To avoid a circular reference, average price and coupon are weighted by end of period par value.

investors concerned with idiosyncratic risk, especially prevalent in high yield bond portfolios, may use an issuer capped index, which limits the exposure of any one issuer to a specified percentage of the overall benchmark based on market value.

Fundamentally Themed Indices

Investors concerned with concentration risk or those who believe it is counterintuitive to assign a higher weight to more indebted issuers may use an advanced index design that uses or incorporates fundamental factors (instead of outstanding debt) to determine index allocations. The Barclays GDP weighted indices employ such a strategy with GDP (a proxy of a country's ability to service its debt) used as the basis for country-level weights within a benchmark. Another weighting option is Barclays Fiscal Strength weighted methodology, which uses measures of financial solvency (debt as a percentage of GDP, deficit as a percentage of GDP), dependence on external financing (current account balance as a percentage of GDP), and governance to adjust market value weights at the country level. Barclays MSCI ESG weighted indices are another fundamentally themed alternative that use Environmental, Social, and Governance issuer ratings as a factor to adjust market value weights in an existing benchmark bond index.

Risk Weighted Indices

Risk weighted indices look at estimates of asset class returns, correlations, and volatilities as the basis of different security or sub-index allocations. These types of indices can represent different risk weighting themes such as risk parity, volatility budgeting, risk budgeting, and minimum volatility portfolio optimization.

Index Return Calculations and Aggregation

With security-level returns and weights, it is possible to calculate and publish aggregated index-level returns and risk analytics. Benchmark index returns are reported over various periods (daily, monthly, annual, etc.); yet monthly returns are the most commonly referenced since they correspond with the monthly rebalancing of index constituents.⁹⁰

Monthly Index Return Calculations

Bond level returns and weights are the inputs used to calculate published monthly index level returns. Local currency returns at the bond level will be consistent across Barclays indices, but total returns will vary from index to index based on the base reporting currency and whether the index is currency hedged or unhedged. Bond index weights are index-specific based on the universe of eligible bonds.

$$\text{Index Total Return}_{\text{MTD}} = \sum \text{Bond Return}_{\text{MTD}} * \text{Bond Weight}_{\text{Beginning}}$$

Cumulative and Periodic Total Return Calculations

Since Inception Total Return and Index Value

For each Barclays index, the cumulative total return since index inception is calculated and used to determine periodic returns over longer and/or intra-month time horizons. The **since inception total return (SITR)** is calculated at the index level and is a compounded return linking historical index cumulative monthly returns and the current month-to-date return. This approach assumes that the index is always fully invested in the new returns universe after each monthly rebalancing and that any accumulated cash from the previous month is reinvested pro rata into the new universe.

$$\text{Since Inception Total Return} = [(100 + \text{SITR}_{\text{Beginning}}) * (1 + \text{TotalReturn}_{\text{MTD}})] - 100$$

⁹⁰ Returns over a given interval are calculated from end-of-day to end-of-day. For example, the return for October 2013 is calculated from September 30, 2013 to October 31, 2013 and includes interest earned on October 31, 2013, but not interest earned on September 30, 2013.

From the since inception total return, an **index value** is calculated by adding 100 and is used to calculate total returns over any given time period where index values are available.

$$\text{Index Value} = \text{SITR} + 100$$

Daily Total Return Calculations

All daily returns (daily total return, daily price return, daily currency return, daily paydown return and daily coupon return) are calculated as the difference in the month-to-date return for the prior date and the month-to-date return for the current date, compounded for one day⁹¹:

$$\text{Daily Total Return} = \frac{(\text{MTD Total Return}_T - \text{MTD Total Return for Yesterday}_{T-1})}{[1 + (\text{MTD Total Return}_{T-1}/100)]}$$

Periodic Excess Return Calculations

Because excess returns are the arithmetic differences between the total return of the index and a duration-matched hypothetical risk-free security, compounding monthly excess returns is not an accurate way to display excess returns over time frames longer than one month. However, whereas excess return cannot be compounded, total return can. Barclays publishes both the total and excess return for each index monthly, so we are also able to calculate a total return of the implied duration-matched treasury portfolio of that index (the difference between the excess and total returns of the index).

Mathematically, the total return of the index and the implied treasury portfolio can then be compounded separately and compared, even as its composition is reset every month, yielding a valid periodic excess return derived from the arithmetic differences between the two.

Duration Hedged/Mirror Futures Index Return Calculations

Barclays offers two types of indices – Mirror Futures Indices (MFI) and Duration Hedged Indices (DHI) – for investors seeking to adjust the duration of their fixed income benchmarks while preserving the broad coverage and diversification of their existing fixed income investment set. These indices may be used to replace existing portfolio benchmarks, reference indices for various replication strategies, or measure interest rate duration-hedged (fully or partially) bond market returns.

- **Mirror Futures Index:** An index whose return reflects a funded set of Treasury futures contracts, weighted to match closely the beginning-of-the-month option-adjusted duration (OAD) profile of an underlying standard bond index. For example, the US Aggregate MFI will include five US Treasury futures contracts weighted to match the OAD profile and market value of the cash US Aggregate Index, plus a cash investment (a “funding component”) in US Treasury bills.
- **Duration Hedged Index:** A funded index whose return reflects the return on the underlying cash index, with its OAD exposure hedged (fully or partially) using its MFI. For example, the US Aggregate DHI is the US Aggregate less its MFI, plus the MFI’s funding component added back.

⁹¹ Prior to October 1, 2003, all daily return numbers were calculated as the arithmetic difference in return between the MTD Return over the one day period.

BENCHMARK INDEX NAMING CONVENTIONS

Official Barclays benchmark names contain several elements, which are outlined below. While most published indices adhere to these conventions, there may be exceptions due to legacy usage of standard indices or client-specific requirements for bespoke indices. If there are any questions on the acceptable usage of Barclays index names, please contact the Barclays index group for clarification.

Official Naming Conventions

Name of the Index Provider

Index names should reference Barclays.

Geography/Currency

Many indices within an index family are differentiated by currency or geography. For example, within the Aggregate Index family, we publish a US Aggregate Index, Pan-European Aggregate Index, Sterling Aggregate Index, etc. If a benchmark's composition is defined by currency or geography (including multi-currency macro or global indices, such as the Global Aggregate Index), the index name will contain those details in the formal name. Several common questions about index names are addressed in the following guidelines:

- USD-denominated indices should be listed as US (but U.S. is also acceptable in client documentation) and Pan-European and Asian-Pacific should be fully spelled out and hyphenated. If an index user is limited by space constraints in their documentation or display names, abbreviating Pan-European as Pan-Euro and Asian-Pacific as Asia-Pac is acceptable.
- If a formal index name contains a three-letter currency code, it must always be capitalized (USD, GBP, EUR, JPY, etc.).

Index Name/Family

This element represents the asset class, such as Aggregate, Government, Credit, Corporate, Inflation-Linked, Universal, High Yield, Emerging Markets, etc.

- If an index user is limited by space constraints in documentation or display names, it is acceptable to abbreviate Aggregate as Agg, Government/Credit as Gov/Credit and Government as Govt.
- Acceptable spellings of Securitized indices include both Securitized and Securitised.
- Government-Related should be hyphenated, but can be abbreviated as Gov-Related.

Sub-Index Definitions

If an index is published with more granular sub-indices, the official index name of each sub-index will contain descriptive elements reflecting these index rules. The most common sub-indices include variations by sector, credit quality, maturity range, duration bucket, country and currency. In most cases, the official index name can be easily modified to include sub-index information, but for formal clarification on the official index name of a specific sub-index, please contact the Barclays index team.

- Indices that have the word "Intermediate" in their name include bonds with a maturity/average life between 1-10 years, while "Long" indices include bonds with a maturity/average life of 10 years or greater. Intermediate and Long should follow the region/currency and precede the index name when formally referencing the index.

Examples include the US Intermediate Aggregate and US Long Government/Credit Indices. While several index names use Intermediate or Long in the official name, others use 1-10 year or 10+ year in the sub-index name.

- For credit quality-based sub-indices, index names for indices tend to use Moody's conventions. For investment grade indices that exclude Baa-rated securities, it is acceptable to refer to the sub-index as either "A or better", "A+" or "Excluding Baa".
- Sub-index names that are defined by an exclusionary rule may be abbreviated as "Ex" or "Ex-" in the formal index name. For example, the Global Aggregate Excluding USD Bond Index may be abbreviated as Global Aggregate Ex USD Bond Index. "Ex" may be capitalized or in lower case.
- If an index user is limited by space constraints in documentation or display names, it is acceptable to abbreviate High Yield (HY), Floating-Rate Note (FRN), Emerging Markets (EM), Mortgage Backed Securities (MBS), Inflation-Linked (IL, I/L or ILB), Asset Backed Securities (ABS), Commercial Mortgage Backed Securities (CMBS), Fiscal Strength Weighted (FSW), Liability Driven Investment (LDI), Treasury Bills (T-Bills), and Environmental, Social, and Governance (ESG).
- Tradable emerging markets indices may be referred to by their acronym. For example, the EM Tradable Inflation-Linked Bond Index may be referred to as EMTIL.
- For bond indices, the word "bond" is listed as part of the official index name. Acceptable usage allows this to be removed if other elements are properly presented and if there are space constraints on the display name.

These guidelines are by no means exhaustive and are meant to be reflective of the most common questions received by the Barclays index group. In addition, the same indices may be referred to differently through different data platforms due to the database constraints through those delivery channels.

APPENDIX 1: TOTAL RETURN CALCULATIONS

FIGURE 1

Components of Total Return Calculations

Where:

P_b = beginning price

P_e = ending price

$Outstand_b$ = balance outstanding at beginning of period

$Outstand_e$ = balance outstanding at end of period

MV_b = beginning market price ($P_b + A_b$)

A_b = beginning accrued interest

A_e = ending accrued interest

IntPayment: Interest payment during period

PrincPayment: Principal payment during period

For CMBS Bonds Only:

PrincWritedown: Principal lost during period

PrepayPrem: Prepayment premium

For All Security Types:

Price Return

The return derived from price changes due to movements in interest rates, volatility, credit events and other factors.

$$\text{Monthly price return} = (P_e - P_b) / MV_{bb}$$

Coupon Return

The return derived from the interest payment actually made on the certificate. In the case of an interest shortfall, the actual interest payment received will be less than the expected coupon payment.

$$\text{Monthly coupon return} = [(A_e - A_b) + \text{IntPayment}] / MV_b$$

Paydown Return

The return related to scheduled and unscheduled payments of principal.

$$\text{Monthly Paydown Return} = [(\text{PrincPayment} / \text{Outstand}_b) * (100 - P_e - A_e)] / MV_b$$

Currency Return (see Appendix 3 for more details)

The return derived from converting local returns to a base-reporting currency different from the underlying currency of the security. If the underlying and reporting currencies are the same, the currency return is zero. Currency returns can be hedged or unhedged.

$$\text{Monthly Currency Return (Unhedged)} = \% \text{ change in spot} * (1 + \text{local return})$$

- Local Return = price return + coupon return + paydown return

$$\text{Monthly Currency Return (Hedged)} = \text{Expected Currency}$$

$$\text{Return} + \text{Residual Currency Return}$$

- Expected Currency Return = Relative Forward Rate Differential * (1 + Expected Local Return)
- Relative Forward Rate Differential = (Forward Rate – Spot Rate) / Spot Rate
- Expected Local Return = $(1 + \text{Yield beginning} / 2)^{(1/6)} - 1$
- Residual Currency Return = (% change in spot) * (Local Return – Expected Return)
- Local Return = price return + coupon return + paydown return
- Exchange Rate = base currency / local currency
- Forward Rate = Spot rate beginning * (1 + One Month Base Depo) / (1 + One Month Local Depo)

Total Return

$$\text{Total Return} = \text{Price Return} + \text{Coupon Return} + \text{Paydown Return} + \text{Currency Return} + \text{Writedown Return (CMBS Only)} + \text{Prepayment Premium Return (CMBS Only)}$$

For CMBS Bonds Only:

Writedown Return

The return related to the reduction in the par outstanding due to a loss of principal. The principal loss is valued at the ending price of the bond.

$$\text{Monthly Writedown Return} = [(\text{PrincWritedown} / \text{Outstand}_b) * (P_e + A_e)] / MV_b$$

Prepayment Premium Return

The return due to additional penalty premiums paid in connection with certain prepayments. The premiums are generally distributed as excess interest on the certificates.

$$\text{Monthly Prepayment Premium Return} = [(\text{PrepayPrem} / \text{Outstand}_b) * 100] / MV_b$$

FIGURE 2

Market Value Security Weight Calculations

Where:

 P_b = beginning price A_b = beginning accrued interest Outstand_b = bond outstanding at beginning of period*

RU = Returns universe of a bond index

 MV_b = beginning market price ($P_b + A_b$) MarketValue_b = beginning of period market value = $MV_b * \text{Outstand}_b$

$$\text{Market Value Weight in \%} = \frac{\text{MarketValue}_b}{\sum_{RU} \text{MarketValue}_b} = \frac{(P_b + A_b) * \text{Outstand}_b}{\sum_{RU} (MV_b * \text{Outstand}_b)}$$

FIGURE 3

Index Return Calculations

$$\text{Index TotalReturn}_{\text{MTD}} = \sum (\text{Bond Weight} * \text{Bond TotalReturn}_{\text{MTD}})$$

$$\text{Index ExcessReturn}_{\text{MTD}} = \sum (\text{Bond Weight} * \text{Bond ExcessReturn}_{\text{MTD}})$$

Where:

Bond Weight = % security contribution to Returns Universe using market value weights or other Barclays index weighting schemes

Bond Return = security-level return (total, excess, etc.) since last index rebalancing.

FIGURE 4

Cumulative Index Returns (Periodic and Since Inception) and Index Values**Since Inception Total Return (SITR)**

Cumulative total return since inception indexed to zero

$$\text{SITR} = [(100 + \text{SITR}_{\text{BOM}}) * (1 + \text{TR}_{\text{MTD}})] - 100$$

Where:

 IV_b = beginning of period Index Value ($\text{SITR} + 100$) IV_e = end of period Index Value ($\text{SITR} + 100$)**Since Inception Price Return (SIPR)**

Cumulative price return since inception of the index

Periodic 3 Month

$$\text{Rolling 3-month total returns} = [(IV_e / IV_b) * 100] - 100$$

Since Inception Coupon Return

Cumulative coupon return without reinvestment, a linking of an index's MTD coupon return

Periodic 6 Month

$$\text{Rolling 6-month total returns} = [(IV_e / IV_b) * 100] - 100$$

Since Inception Other Return

Cumulative payoff and currency return, linking an index's MTD other return

Since Inception Coupon with Reinvestment

Cumulative coupon return with reinvestment

$$= \text{SITR} - \text{SIPR} - \text{Inception Other}$$

Index Value (IV)

Cumulative total return since inception indexed to 100.

$$IV = \text{SITR} + 100$$

Example of Periodic Return Calculations*Calculating a cumulative return over a specific time interval**Example: Global Aggregate Index for the calendar year 2012*

1. Divide the ending index value (December 31, 2012) by the beginning index value (December 31, 2011)
 $465.98/446.69 = 1.04318$
2. Multiply by 100
 $1.04318 * 100 = 104.32$
3. Subtract 100
 $104.32 - 100 = 4.32$

*Annualizing a return from a cumulative returns**Example: Global Agg five-year annualized return (December 31, 2012)*

1. Divide the end index value (December 31, 2012) by the beginning index value (December 31, 2007)
 $465.98/357.53 = 1.30308$
2. Take the nth root ($1/n$ power, n is the number of years) of the result
 $(1.30308)^{1/5} = 1.05437$
3. Subtract 1 and multiply by 100
 $(1.05437 - 1) * 100 = 5.44$

Total Return Calculations (Series-B Indices)

The calculation methodology outlined below applies to the Series-B indices, which includes flagship inflation-linked indices, such as the WGILB, EGILB and EMGILB, and the government bond family, such as the Euro, UK and US Government Bond Indices and the US and Euro Term Indices. While Series-B and Series-L indices use similar methodology for total return calculation, they differ in terms of settlement conventions. Series-B indices use standard local settlement and ex-dividend conventions for all calculations, whereas Series-L indices use T+1 settlement universally, except US MBS pass-throughs, which use a same day (T+0) settlement assumption.

The Series-B return indices are calculated daily, starting with a base value of 100 on the base date.

FIGURE 5

Notation Used in Index Formulae:

$P_{i,t}$ = cash clean settlement price of bond, i , at close of day, t . Pertains to the inflated price for linkers

$A_{i,t}$ = accrued interest for settlement of bond, i , for trading on day, t

$P_{i,b}$ = cash clean settlement price of bond, i , at close of day, b

$A_{i,b}$ = cash accrued interest for settlement of bond, i , for trading on day, b . Pertains to the inflated accrued amount for linkers

t = business day on which the index is being calculated

b = last business day of the previous month

CH_t = cash held on day, t , where $CH_t = CH_{t-1} + \sum_i (C_{i,t} * N_{i,t})$. Cash held is reset to zero on date, b

$N_{i,b}$ = amount outstanding of bond, i , on day, b . This is not inflation-adjusted, but the nominal face value

$C_{i,t}$ = coupon paid on bond, i , on day, t

$X_{i,t}$ = any ex-dividend coupon that will be received on bond, i

$Y_{i,t}$ = gross redemption yield on bond, i , at the close of day, t

$D_{i,t}$ = the duration of bond, i , at the close of day, t

$m_{i,t} = (P_{i,t} + A_{i,t} + X_{i,t}) * N_{i,b}$ = market value of bond, i , on day, t , in cash terms

The notation $\sum_i x_{i,t}$ is intended to show a summation occurring over bonds, i , that are eligible for the index on day, t

Hence, $\sum_i x_{i,b}$ would apply to the eligible list on day, b

FIGURE 6

Market Capitalisation

The total market capitalisation, M_t , of all the constituent bonds on day, t , is given by:

$$M_t = \sum_i m_{i,t},$$

FIGURE 7

Clean Price Index

The Clean Price Index (CPI_t) is defined as:

$$CPI_t = CPI_b * \frac{\sum_i (P_{i,t} * N_{i,b})}{\sum_i (P_{i,b} * N_{i,b})}$$

The CPI is calculated daily as shown above for all index-eligible bonds.

FIGURE 8

Gross Price Index

The Gross Price Index (GPI_t) is analogous to the clean price index and is defined as:

$$GPI_t = GPI_b * \frac{\sum_i ((P_{i,t} + A_{i,t} + X_{i,t}) * N_{i,b})}{\sum_i ((P_{i,b} + A_{i,b} + X_{i,b}) * N_{i,b})}$$

FIGURE 9

Total Return Index

The Total Return Index (TRI_t) is calculated as:

$$TRI_t = TRI_b * \frac{\sum_i ((P_{i,t} + A_{i,t} + X_{i,t}) * N_{i,b}) + CH_t}{\sum_i ((P_{i,b} + A_{i,b} + X_{i,b}) * N_{i,b})}$$

FIGURE 10

Daily Total Return

Daily total return between two days, $t-1$ and t , is calculated as:

$$\text{TotalReturn} = \frac{TRI_t}{TRI_{t-1}} - 1$$

APPENDIX 2: INDEX RULES FOR CURRENCY HEDGING AND CURRENCY RETURNS

Investors frequently ask how to hedge portfolio positions so as to best match index currency exposures. We discuss the currency aspects of index return calculations, with special emphasis on the procedure used in currency-hedged indices. The following section details rules for Series-L indices.

Unhedged Returns

Consider an investor who buys foreign currency at the beginning of the month and sells the position back into base currency at the end of the month. The realized capital gain from this investment in foreign currency is:

$$(1) \quad FX_{apprec} = \frac{FX_{end} - FX_{beg}}{FX_{beg}}$$

FX_{beg} and FX_{end} are the base currency values of one unit of the foreign currency at the beginning and the end of the return period, respectively.

Consider an investor who buys a bond denominated in a foreign currency at the beginning of the month and, at the end of the month, sells the bond and converts the foreign currency proceeds back into the base currency. The investor's (base-currency) realized return on investment is:

$$(2) \quad \begin{aligned} \text{Base Currency Total Return} &= (1 + \text{local return})(1 + FX_{apprec}) - 1 \\ &= \text{local return} + FX_{apprec} + (\text{local return})(FX_{apprec}) \end{aligned}$$

To keep analytics as intuitive and tractable as possible, Barclays decomposes index returns into additive components. Accordingly, currency return⁹² is defined as follows:

$$(3) \quad \text{currency return} = \text{base currency total return} - \text{local return}$$

where:

$$\text{local return} = \text{price return} + \text{coupon return} + \text{paydown return}$$

Currency return is the difference between base-currency return and local return. Substituting Equation (2) into Equation (3) provides:

$$(4) \quad \begin{aligned} \text{currency return} &= FX_{apprec} + (\text{local return})(FX_{apprec}) \\ &= (1 + \text{local return})(FX_{apprec}) \end{aligned}$$

The currency return on the bond is not equal to the capital gain on a pure currency investment. From Equation (1), the base currency capital gain on a pure currency investment is FX_{apprec} , while the bond's currency return is $FX_{apprec} + (\text{local return})(FX_{apprec})$. The bond's currency return contains an interaction component $(\text{local return})(FX_{apprec})$ that drives a wedge between the capital gain on a currency investment in the cash market and a bond's currency return.

Example: Unhedged Returns

Consider an index with the euro as the base currency that contains the USD-denominated PEMEX bond described in Figure 1. The local return on this bond in April 2013 was 3.50%. The total euro return on an unhedged position in this bond was 0.81%. From Equation (3), the index currency return for an unhedged position in this bond was 0.81% - 3.50%, which equals -2.69%.

⁹² Barclays sources FX spot and forward rates from WM Reuters. FX rates are taken at 4pm London time.

The currency return on this bond can also be calculated from Equation (4). In this case, the EUR/USD exchange rate was 1.2841 at the beginning of April and 1.3184 at the end of April. Thus, the value of one US dollar fell from 0.778756 euros at the start of April to 0.758495 euros at the end of April.⁹³

Here FXapprec is $(0.758495 - 0.778756)/0.778756$ or -2.60%. During April, the US dollar lost 2.60% of its value when measured in euros. From Equation (4), the currency return is $(1.0350)(-0.0260)$, which equals -2.69% and matches the previous currency return calculation.

The difference between the -2.60% euro return for investments in US dollar cash and the -2.69% currency return on the PEMEX bond is 9bp, which exactly equals the value of the interaction term: $(0.0350)(-0.026)$.

Finally, the base currency total return for the PEMEX bond can be calculated directly from Equation (2). In the current example, the product of $(1 + \text{local return})$ and $(1 + \text{FXapprec})$ is $(1.0350)(0.9740)$, which comes to 1.0081. Subtracting one provides the bond's 0.81% total return in euros.

FIGURE 1

Unhedged Index Return for April 2013: PEMEX 4.875% Coupon Maturing January 24, 2022

Price Return	3.14%	
Coupon Return	0.36%	
Paydown Return	0.0%	
Local Return	3.50%	
Currency Return	-2.69%	
Total Unhedged Return in EUR	0.81%	
EUR/USD Spot March 31, 2013	1.2841	
EUR/USD Spot April 30, 2013	1.3184	
FX _{beg}	0.778756	
FX _{end}	0.758495	
FXapprec	-2.60%	
Currency Return	-2.69%	$=(1.0350)(-0.026)$
Total Return (Unhedged) in EUR	0.81%	$=(1.0350)(1 - 0.0260) - 1$

Source: Barclays Research

Sample Implementation: Unhedged Returns

Figure 2 provides the set of actual transactions that an investor could use to generate the unhedged index return for the PEMEX bond in April 2013. The only potential discrepancy between the investor's realized euro return from these transactions and the index euro return is the investor's inability to ensure that trades are executed exactly at index prices.

To replicate the index return, the investor uses 86.759 euros to buy 111.407 dollars at the spot FX rate at the close of business on March 31. The US dollar proceeds are used simultaneously to purchase the PEMEX bond. At the close of business on April 30, the investor sells the PEMEX bond and, in return, receives 115.314 dollars, which is simultaneously sold in the spot FX market for 87.465 euros. These transactions result in a euro return of 0.81%.

⁹³ These values are arrived at by taking the reciprocal of the quoted exchange rate.

Hedged Returns

Now consider the currency-hedged version of the index containing the PEMEX bond. For currency-hedged indices, as well as unhedged indices, the currency return satisfies the relation:

$$\text{currency return} = \text{base currency total return} - \text{local return}$$

One can verify this using the numbers in Figure 3. The Barclays indices report a currency-hedged total return of 3.40% (EUR) for this bond. Subtracting the 3.50% local return comes to -0.10%, which equals the reported currency return for the bond in the currency-hedged version of the index.

While the definition of currency return remains unchanged, the calculation of base currency total return becomes somewhat more complicated for currency-hedged indices. The index position in a bond denominated in a foreign currency for a hedged index is actually a position in two instruments: the bond plus a one-month currency forward:

$$\begin{aligned} \text{base currency total return (hedged)} \\ = \text{base currency total return (unhedged)} + H (\text{Forward Return}) \end{aligned} \quad (5a)$$

where:

base currency total return (unhedged) is provided in Equation (2)

H is the size of the hedge measured in local currency.

$$\text{Forward Return} = \frac{\text{Forward Value} - FX_{end}}{FX_{beg}} \quad ()$$

Forward value is the number of base currency units to be received for each unit of the local currency delivered in the forward contract. This value is set in the marketplace at the beginning of the month and received at delivery at the end of the month.

Equation (3) can be used to re-express as follows:

$$\begin{aligned} \text{base currency total return (hedged)} \\ = \text{local return} + \text{currency return (unhedged)} + H (\text{Forward Return}) \end{aligned} \quad (6)$$

Note that the second term on the right hand side of Equation (6) is increasing in the end-of-month FX rate and the third term on the right hand side of Equation (6) is decreasing in the end-of-month FX rate. If the hedge were perfect, these terms would reduce to a constant and remove all sensitivity to the exchange rate at the end of the month.

Equation (5) is general. It provides the base currency total return under any hedging rule. By setting H according to Barclays index rules, Equation (5) becomes a full specification of base currency total return for Barclays indices.

For securities other than mortgages, Barclays indices set H as follows:

$$H = (1 + \text{yield}/2)^{(1/6)} \quad (7)$$

H is a projected end-of-month market value per unit of local currency invested at the beginning of the month. In Equation (7), local-currency security value is projected to grow at the rate implied by its yield. For non-bullet bonds, Equation (7) uses yield to worst.

The perfect currency hedge for the April return would set H equal to the bond's end-of-April local-currency value. However, the perfect hedge could not be obtained by an actual investor at the beginning of April: the local currency value of the index at the end of April is not knowable on March 31, when the hedge must be implemented. Index construction at Barclays always stresses the importance of investability. In this spirit, the index does not use

end-of-month values in determining the currency hedge. The yield in Equation (7) is the yield at the beginning of the month.

Returning to the PEMEX 4.875% coupon bond, Figure 3 reports that the yield on this bond at the beginning of April was 3.481% and that 0.778598 euros will be received for every US dollar delivered in current 1m currency forwards. Therefore, H is 1.00288 and the forward return is 2.581%. Using these values in Equation (5), together with the bond's 0.81% unhedged base-currency return, results in 3.40%, the bond's currency-hedged total euro return.

FIGURE 2

Unhedged Returns, Implementation for April 2013: PEMEX 4.875% Coupon Maturing January 24, 2022

	March 31	April 30
Price	110.500	114.000
Accrued Interest	0.907	1.314
EUR/USD Spot	1.2841	1.3184
Value of one USD in EUR	0.778756	0.758495

Transaction	EUR	USD	FX Rate	Comment
March 31				
Initial EUR Balance	86.759			
Purchase USD at Spot	-86.759	111.407	0.778756	USD Cash Price = 110.500 + 0.907 Cost in EUR is (0.778756)(USD Cash Price)
Purchase Bond		-111.407		
April 30				
Sell Bond		115.314	0.758495	USD Cash Price = 114.000 + 1.314
Sell USD into EUR	87.465	-115.314		
Final EUR Balance	87.465			
Total Return (Unhedged EUR)	0.81%			(EUR Proceeds/Initial EUR Investment) - 1

Source: Barclays Research

FIGURE 3

Hedged Return for April 2013: PEMEX 4.875% Coupon Maturing January 24, 2022

Price Return	3.14%	
Coupon Return	0.36%	
Paydown Return	0.00%	
Local Return	3.50%	
Currency Return	-0.10%	
Total Hedged Return in EUR	3.40%	
Yield (March 31, 2013) ⁹⁴	3.481%	
Hedge Magnitude per dollar invested (H)	1.00288	$= (1 + (3.481\%/2))^{(1/6)}$
EUR/USD Spot March 29, 2013	1.2841	
EUR/USD Spot April 30, 2013	1.3184	
1-Month Forward Value in EUR of one USD	0.778598	
FX_{beg}	0.778756	$= 1/(1.2841)$
FX_{end}	0.758495	$= 1/(1.3184)$
FX_{apprec}	-2.60%	$= (0.758495 - 0.778756)/(0.778756)$
Forward Return	2.58%	$= (0.778598 - 0.758495)/(0.778756)$
Total Hedged Return in EUR	3.40%	$= 0.81\% + (1.00288)(2.581\%)$
Expected Currency Return	-0.02%	$= (1.00288)(0.778598 - 0.778756)/(0.778756)$
Residual Currency Return	-0.08%	$= (1 + 3.40\% - 1.00288)(-2.60\%)$
Currency Return (Total)	-0.10%	$= -0.02\% + -0.08\%$

Source: Barclays Research

For each currency, the hedge for the entire index is the average of the security hedges weighted by the beginning-of-the-month index weight. Thus, the hedge for the April index return is the weighted average of the individual April security hedges using security market weights from the beginning of April.

For individual securities, the following equation can also be used to calculate currency returns according to hedged index rules:

From Equation (5a), currency return (hedged) is the sum of currency return (Unhedged) and H (Forward Return).

$$\text{currency return(hedged)} = \text{currency return(unhedged)} + H(\text{Forward Return})$$

This is shown as below from Equation (4) and Equation (5b).

$$\begin{aligned} \text{currency return(hedged)} &= (1 + \text{local return})(FX_{apprec}) + H \frac{\text{ForwardValue} - FX_{end}}{FX_{beg}} \\ &= (1 + \text{local return})(FX_{apprec}) + H \frac{\text{ForwardValue} - FX_{beg}}{FX_{beg}} - H \frac{FX_{end} - FX_{beg}}{FX_{beg}} \end{aligned}$$

Therefore,

$$\text{currency return} = H \frac{\text{ForwardValue} - FX_{beg}}{FX_{beg}} + (1 + \text{local return} - H)(FX_{apprec}) \quad (8)$$

⁹⁴ Yield is Barclays' published Yield to Worst for each security.

All of the components of the first term in Equation (8) are known at the time the hedge is implemented. This first term is often referred to as the carry from the hedge. In the PEMEX example, its value is $(1.00288)(0.778598 - 0.778756)/(0.778756)$, or 2.0bp.

Since index hedges are designed to be implementable by investors at the beginning of the month, they are not perfect: the bond will have residual currency exposure in the index after hedging. This residual currency exposure is equal to the difference between the size of the hedge and the market value of the security at the end of the month. The FX appreciation realized by this exposure is measured by the second term in Equation (8). The exact value of this term will not be known until the end of the month. In our example, this term is $(1.0340 - 1.00288)(-2.60\%)$, which equals -8.1bp. These two terms sum to the reported -10bp currency return for the bond in the hedged index. While 10bp is a fairly large magnitude for a hedged currency return, it is less than one-twentieth the size of the unhedged currency return.

FIGURE 4

Hedged Returns, Implementation for April 2013: PEMEX 4.875% Coupon Maturing January 24, 2022

	March 31	April 30		
Price	110.500	114.000		
Accrued Interest	0.907	1.314		
EUR/USD Spot	1.2841	1.3184		
Value of one USD in EUR	0.778756	0.758495		
Yield	3.481%	3.037%		
1-Month Forward Value in EUR of one USD	0.778598			
Projected Growth in Local Bond Value over Coming Month	0.288%			

Transaction	EUR	USD	FX Rate	Comment
March 31				
Initial EUR Balance	86.759			
Purchase USD at Spot	-86.759	111.407	0.778756	USD Cash Price = 110.500 + 0.907 Cost in EUR is (0.778756)(USD Cash Price)
Purchase Bond		-111.407		
Sell 111.728 One-Month Dollars				(111.407)(1.00288) = 111.728
April 30				
Sell Bond		115.314		USD Cash Price = 114.000 + 1.314
Close Forward Contract	86.9912	-111.728	0.778598	
Sell Residual USD into EUR	2.720	-3.586	0.758495	
Final EUR Balance	89.711			
Total Return (Hedged EUR)	3.40%			(EUR Proceeds/Initial EUR Investment) - 1

Source: Barclays Research

End-of-Month Roll of Currency Hedging Positions

A statistic, hedge market value, is available to help investors who wish to match index hedging procedures. Hedge market value applies index currency hedging rules to determine the one-month hedge for the portfolio position. These hedges are calculated based on market values from the current close of business. Hedge market value provides the hypothetical hedge that the index would implement today for a position of this magnitude if the current day were a month-end.

At the actual month-end, hedge market value reports the exact hedge that the index would use to hedge the portfolio position over the upcoming month. Prior to month-end, hedge market value can be viewed as an approximation of the hedge to be implemented at the beginning of the next month. This approximate becomes more precise as the month progresses and becomes exact at the actual month-end; it is designed to help investors roll forward their currency hedges at the end of the month.

Using Hedges of Longer Tenors

For many global investors, the amounts that need to be hedged in each currency are fairly stable from month to month. Therefore, although the index hedges with one-month currency forwards, many investors choose to use three-month contracts. While the use of three-month currency forwards introduces tracking error relative to a currency-hedged benchmark, these investors are willing to bear the tracking error for a variety of reasons. One justification is the perception that rolling a hedge four times a year in the three-month market entails lower execution costs than rolling the position twelve times a year in the one-month market. Another possible motivation, depending on the shapes of the two forward curves, is that the hedging cost (which is based on the deposit rate differential) can sometimes be significantly lower at longer tenors. While such strategies may add value, investors need to be aware that by extending the tenor of the hedge, they are essentially adding a view on short-term interest rates to their portfolios.

Common Questions about Currency Returns for Barclays Indices

Q: Why aren't unhedged currency returns exactly the same for all bonds denominated in a given currency?

A: All bonds in a given currency will be subject to the same change in FX rates, which is denoted as FX_{apprec} in this article. However, because Barclays expresses currency returns using an additive convention, the reported currency return also depends on the local return of a bond, as shown in Equation (4). Thus, different bonds (or indices) denominated in the same currency can have different currency returns.

Q: Why do hedged indices have currency returns? Isn't the currency risk hedged away?

A: Hedging can eliminate the majority of currency risk, but there is no way for foreign investors to earn exactly the same return as local investors, for two reasons. First, there is no way to know at the beginning of a month exactly what the market value of a given investment will be at the end of the month. The amount by which the size of the hedge is different from the ultimate end-of-month market value (either too big or too small) results in a (usually small) exposure to changes in FX rates. Second, even if we assume that the hedge is set up in exactly the right size, there is a carry component (which can be either positive or negative) that corresponds to the difference between spot and forward rates.

The carry is proportional to the difference between the short-term deposit rates in the two currencies. One will pay up to shift cash to a higher-yielding currency on a hedged basis; this negative carry is sometimes referred to as the cost of the hedge. A shift to a lower yielding currency on a hedged basis will yield a positive carry, essentially compensating the investor for the extra yield that has been foregone.

Both of these components of hedged currency return are seen explicitly in the formulation of Equation (8), in which the first term corresponds to the carry and the second to the FX return on the market value that remains unhedged.

Q: How is the size of the hedge determined in Barclays indices?

A: The size of the hedge is not assumed to be the ending market value, which cannot be known at the start of the month. It is also not assumed to be the beginning market value, since this would result in a systematic bias toward under-hedging. Barclays uses a simple projection of end-of-month market value based on the combination of beginning-of-month market value and yield.

Q: How are hedged returns calculated intra-month?

A: To calculate intra-month hedged returns, Barclays assumes that the FX forward contract is unwound using a prorated forward rate. A 30-day contract assumed for every month regardless the actual number of days in a month.⁹⁵

Q: What are the differences between Series-L and Series B currency hedging methodologies?

The precise hedging methodologies used to calculate hedged returns for both the Series-L and Series-B indices are very similar but some slight nuances do exist that would result in small differences in returns between Series-L and Series-B indices if one were to compare the hedged returns for the same index. The most significant difference is that the Series-L indices use projected month-end market values to calculate the amount to be hedged for the forthcoming month, whereas the Series-B indices simply use the beginning of month market values or as it is sometimes labelled the 'Current Value' method. All things being equal, the difference between the projected market value and the beginning of month market value is likely to be marginal, but when comparing with Series-B hedged returns for the same index, this methodological difference between the market values is likely to be the most significant source of tracking error.

Derivation of Hedged Market Value (Series-L)

Projected end-of-month market value versus beginning-of-month market value for hedged amount:

Forward rate agreements are entered into for the projected end-of-month market value of Series-L indices, using the beginning-of-month bond yield.

$$H(\text{projected end-of-month MV per unit of local currency at beginning of the month}) \\ = (1 + \frac{\text{yield}}{2})^{(\frac{1}{8})}$$

Derivation of Hedged Market Value (Series-B)

For Series-B indices, forward rate agreements are entered into only for the beginning-of-month market value. Any subsequent appreciation or depreciation in the value of the index is unhedged until the next hedge is taken out.

One other methodological difference worthy of a mention is the different methods used to calculate intra-month hedged values. Each Index series uses a slightly different method of interpolating the intra-month forward rate for intra-month hedged index statistics.

⁹⁵ To calculate the number of days for which the forward contract is unwound, users need to account for the T+1 calendar day settlement assumption of the indices (T+0 for mortgages). Using such an assumption intra-month means that the day count as of a Friday business day will not include the weekend days. The unwind of the forward contract will account for those days on the first business day after the weekend.

Method of Interpolating Intra-Month Forward Rate (Series-L)

The prorated forward rate used by Series-L indices to unwind a FX forward contract on an intra-month day i is an interpolation between the spot (S_B) and 1-month forward rates ($F_{B,1M}$) at the beginning of the month. A 30-day contract is assumed for every month regardless of the actual number of days in a month.

$$F_i = S_B + (F_{B,1M} - S_B) \times \frac{\text{Number of calendar days passed}}{30}$$

Method of Interpolating Intra-Month Forward Rate (Series-B)

The interpolated forward FX rate for Series-B indices on an intra-month day i is calculated by linear interpolation between the spot (S_i) and 1-month forward rates ($F_{i,1M}$) on day i . Actual number of days are used for Series-B index hedging calculations.

$$F_i = S_i + (F_{i,1M} - S_i) \times \frac{\text{Remaining number of calendar days}}{\text{Actually number of days in the month}}$$

CURRENCY RETURNS AND HEDGING FOR SERIES-B INDICES

Returns for Barclays Series-B inflation-linked and government indices are also available in foreign currency and hedged versions. For Series-B indices, Barclays uses a current value methodology. This method hedges only the market value in each of the currencies at the end of each month, after any reweighting of the index constituents, and does not assume perfect foresight. As a result, there will be an element of currency mismatch at the end of the month if the value of the portfolio holdings in the currency changes.⁹⁶

The following section provides a detailed explanation of how foreign currency and hedged versions of index are calculated for Series-B indices.

Unhedged and Hedged Return Indices

Foreign Currency: Total Return Index (Unhedged)⁹⁷

The foreign currency versions of the local currency index are calculated using the local index and the spot foreign exchange rate between the local and “foreign” currencies. The formula below is used to calculate the Foreign Total Return Index. The same technique is used to calculate the associated clean and gross price indices.

$$TRI_{F,t} = TRI_{L,t} \times \frac{S_{LF,t}}{S_{LF,c}}$$

Where:

$TRI_{F,t}$ = Foreign Total Return Index at time t ;

$TRI_{L,t}$ = Local Total Return Index at time t ;

$S_{LF,t}$ = Spot exchange rate between local and foreign currency on day t ;

$S_{LF,c}$ = Spot exchange rate between local and foreign currency at commencement date of the index.

Hedged Return Calculations

The index uses the current value method to execute a one-month hedge at the beginning of each calendar month. One-month forward rate agreements are entered into for the full market value of the index at the beginning of each month. Any subsequent appreciation or depreciation in the value of the index is unhedged until the next hedge is taken out.

Single Currency Index Hedge

The hedged return on a single currency index or portfolio can be viewed as consisting of three parts:

- Local return
- Currency return on the unhedged portion of the fund
- Profit or loss on the hedge itself

Multi-Currency Index Hedge

In an index, income is reinvested across all the bonds in proportion to their weight. This takes place as soon as income is received; hence, the weight will depend on the local market

⁹⁶ Barclays uses WM Company closing mid values for spot and forward FX rates at 4pm London time. If the last calendar day of a month is a non-business day, the FX rates correspond to the previous business day.

⁹⁷ On Barclays inflation-linked index tool, unhedged total return index is displayed as ‘Foreign TRI’.

price and, in the case of a multi-currency basket, on the currency cross rates. Given this reinvestment strategy, we cannot observe the local currency return in the same way as described above. Instead, we use a simpler breakdown:

- Index return (in the desired currency)
- Profit or loss on the hedge itself (or in this case, on a series of currency hedges)

Calculating a Daily Hedged Index

To provide a daily estimate of the performance of the Monthly Hedged Index, we mark to market the currency hedge daily. This is done by unwinding the forward position and adjusting the return on the hedge. The hedge return is then combined with the month-to-date local currency return and the unhedged currency return to give an overall month-to-date hedged index return and, hence, the hedged index value.

As stated above, this is a daily estimation of the Monthly Hedged Index, not a true Daily Hedged Index. This is to provide continuity between the monthly and daily hedged total return series.

Pricing the Offsetting Forward

To mark the initial one-month forward position, we use an offsetting forward to the end of the month. This is more precise than using the spot rate because it takes into account expected interest rate differentials for the remainder of the month.

The easiest way to explain this is to look at an example. Suppose we are 10 days into the month and that the last business day of this month is the 28th. We would need to offset the starting one-month forward with an 18-day forward (ie, $28 - 10 = 18$ days). In theory, we could obtain an 18-day rate directly for the forward market; in practice, only certain periods (tenors) are quoted, and we need to interpolate to arrive at a rate for the desired period.

For the sake of simplicity, we use a linear interpolation based on the current one-month forward and spot rates. In our example, we calculate the 18-day forward rate as the current spot rate plus the premium or discount between spot and 1m forward prorated for 18 days.

Formulae for Monthly Calculation: Single Currency Index

$$\text{Local Return} = \text{LR} = \frac{\text{TRI}_{L,e}}{\text{TRI}_{L,s}} - 1$$

$$\text{Currency Return} = \text{CR} = \frac{S_{\text{LF},e}}{S_{\text{LF},s}} - 1$$

$$\text{Forward Return} = \text{FR} = \frac{F_{\text{LF},s,1\text{M}}}{S_{\text{LF},s}} - 1$$

$$\text{Currency Return on Unhedged Portion} = (1 + \text{LR}) \times \text{CR}$$

$$\text{Hedge Return} = \text{FR} - \text{CR}$$

$$\text{Hedged Index Return} = \text{LR} + \text{Currency Return on Unhedged Portion} + \text{Hedge Return}$$

$$\text{Hedged Index Value} = \text{Start Hedged Index Value} \times (1 + \text{Hedged Index Return})$$

Where:

s – Start date

e – End date

TRI_L – Local Currency Total Return Index

S_{LF} – Spot foreign exchange rate between local currency and the hedge currency

$F_{LF,1M}$ – One-month forward foreign exchange rate between local currency and the hedge currency.

Formulae for Daily Calculation: Single Currency Index

$$\text{MTD Local Return} = \text{MTD LR} = \frac{\text{TRI}_{L,i}}{\text{TRI}_{L,s}} - 1$$

$$\text{MTD Currency Return} = \text{MTD CR} = \frac{S_{LF,i}}{S_{LF,s}} - 1$$

$$\text{Forward Return} = \text{FR} = \frac{F_{LF,s,1M}}{S_{LF,s}} - 1$$

$$\text{MTD Currency Return on Unhedged Portion} = (1 + \text{MTD LR}) \times \text{MTD CR}$$

$$\text{Hedge Reversal Return} = \frac{S_{LF,i}}{F_{LF,i,R}} - 1$$

$$\text{MTD Hedge Return} = \text{FR} + \text{Hedge Reversal Return} - \text{MTD CR}$$

$$\text{MTD Hedged Index Return} = \text{MTD LR} + (1 + \text{MTD LR}) \times \text{MTD CR} + \text{MTD Hedge Return}$$

$$\text{Hedged Index Value} = \text{Start of Month Hedged Index Value} \times (1 + \text{MTD Hedged Index Return})$$

Where:

i – Intra-month date;

R – Remaining days in hedge;

$F_{LF,i,R}$ – Interpolated forward FX rate between local currency and hedge currency on day i for forward period R. This is calculated by linear interpolation between the spot rate $S_{LF,i}$ and the one-month forward rate $F_{LF,i,1M}$ where $1 < R < 1M$.

$$F_{LF,i,R} = S_{LF,i} + (F_{LF,i,1M} - S_{LF,i}) \times \frac{R}{M}$$

Where:

$S_{LF,i}$ – Spot foreign exchange rate between local currency and the hedge currency on day i ;

$F_{LF,i,1M}$ – One-month forward foreign exchange rate between local currency and the hedge currency on day i ;

R – Remaining number of days in the month (including holidays and weekends except at month-end);

M – Actual number of calendar days in the month.⁹⁸

Formulae for Monthly Calculation: Multi-Currency Index

$$\text{Unhedged Index Return} = \frac{\text{TRI}_{M,e}}{\text{TRI}_{M,b}} - 1$$

⁹⁸ When the last calendar day of a month falls on a weekend, the last weekday is treated as the last day of the month for calculations:

R= last weekday of the month - current day

M= last weekday of the month - first calendar day of the month (regardless whether it is a weekend or not).

$$\text{Hedge Return} = \sum_L [W_{L,b} \times \frac{F_{LM,b,1M} - S_{LF,e}}{S_{LF,b}}]$$

$$\text{Hedged Index Return} = \text{Unhedged Index Return} + \text{Hedge Return} =$$

$$\frac{TRI_{M,e}}{TRI_{M,b}} - 1 + \sum_L [W_{L,b} \times \frac{F_{LM,b,1M} - S_{LF,e}}{S_{LF,b}}]$$

$$\text{Hedged Index Value} = \text{Start Hedged Index Value} \times (1 + \text{Hedged Index Return})$$

Where:

B – Start date

e – End date

TRI_M – un – hedged Total Return Index in hedge currency

S_{LF} – Spot FX rate local currency into hedge currency

F_{LF,b,1M} – One-month forward FX rate local currency into hedge currency on day *b*

W_{L,b} – Weight of each local currency index on day *b* in the Multi-Currency Index:

$$W_{L,b} = \frac{M_{L,b} \times S_{LF,b}}{\sum_L (M_{L,b} \times S_{LF,b})}$$

Formulae for Daily Calculation: Multi-Currency Index

$$\text{MTD Unhedged Index Return} = \frac{TRI_{M,i}}{TRI_{M,b}} - 1$$

$$\text{MTD Currency Return} = \sum_L [W_{L,b} \times (\frac{S_{LF,i}}{S_{LF,b}} - 1)]$$

$$\text{Forward Return} = \sum_L [W_{L,b} \times (\frac{F_{LM,b,1M}}{S_{LF,b}} - 1)]$$

$$\text{Hedge Reversal Return} = \sum_L [W_{L,b} \times (\frac{S_{LF,i}}{F_{LF,i,R}} - 1)]$$

$$\text{MTD Hedged Index Return} = \text{Forward Return} + \text{Hedge Reversal Return} - \text{MTD Currency Return}$$

$$\text{MTD Hedged Index Return} = \text{MTD Unhedged Index Return} + \text{MTD Hedge Return}$$

$$\text{Hedged Index Value} = \text{Start of Month Hedged Index Value} \times (1 + \text{MTD Hedged Index Return})$$

Where:

i – Intra month date

R – Remaining days in hedge

F_{LF,i,R} – R period Forward FX rate local currency into hedge currency on day *i*

W_{L,b} – Weight of each local currency index on day *b* in the Multi-Currency Index:

$$W_{L,b} = \frac{M_{L,b} \times S_{LF,b}}{\sum_L (M_{L,b} \times S_{LF,b})}$$

APPENDIX 3: EXCESS RETURN COMPUTATIONS

The fixed income community generally gauges the efficacy of a manager's portfolio practices by measuring his or her performance of spread product asset classes relative to the treasury asset class. By calculating *excess returns* of spread securities over those of *equivalent* treasury securities, we are able to quantify the alpha a manager has generated. This practice can be applied in any currency with both spread products and government-issued debt. Intuitively and through the simple observation of nominal return differentials, asset managers expect performance compensation for holding risky assets. It follows that for an individual security, a portfolio or an entire asset class, excess returns offer a more pure measure of this compensation than nominal returns.

While many different excess return calculation methodologies exist, the differences mainly reflect the various ways to define an equivalent treasury position. The simplest technique compares the return of a spread sector security to the closest on-the-run Treasury, while more precise methods require the equivalent Treasury position to match the duration of the spread security. One more detailed method, known as the duration-bucket approach, calculates an equivalent Treasury return for each duration "neighborhood" and bases the excess return calculation on the average returns on Treasuries and spread sectors partitioned into semi-annual duration cells. Since the duration of a security does not fully reflect its yield curve exposure, particularly for securities with embedded optionality, such as callable bonds or MBS, an even more precise method is to fully characterize each security's exposure along the curve using a set of key rate durations (KRDs). Then its return can be compared with that of a hypothetical Treasury portfolio with the same KRD profile.

The following discussion details how key rate durations are calculated and used to construct equivalent treasury positions, which are then used to compute excess returns for US securities. The duration-bucket approach, which is used for non-US securities, is also discussed. The precise excess return computations are then complemented with an intuitive approximation based on option adjusted spread (OAS), which explains how to properly weight portfolio level spreads and spread changes to allow aggregated analytics to be used in excess return approximations.

Using Key Rate Duration to Compute Excess Returns

The US Treasury off-the-run yield curve is modeled daily at Barclays by fitting a smooth discount curve to the prices of US Treasury securities. In addition, a term structure of volatility is fitted to a selected set of caps and swaptions. These fitted curves serve as the basis for the Barclays OAS models: a lognormal tree model for government and corporate securities and a Monte Carlo simulation model for mortgage backed securities. In both models, sensitivities to changes in interest rates are measured by shocking the yield curve by a fixed amount, keeping volatility constant and repricing each security at a constant OAS. This mechanism is used to calculate option adjusted durations as sensitivities to a parallel shift in the Treasury par curve.

Key rate durations are sensitivities to the movement of specific parts of the par yield curve. The movements of the par yields at six key points along the curve (6 months, 2 years, 5 years, 10 years, 20 years and 30 years to maturity) are assumed to capture the overall movement of the yield curve. In other words, sensitivities of a security to these six yields summarize its exposure to yield curve movements. To compute these sensitivities, or KRDs, the yield curve is perturbed by applying a change in the par yield curve around each of these points, one at a time, and re-pricing the bond at a constant OAS. The sum of the six key rate durations is approximately equal to the option adjusted duration, while the distribution of

the bond's duration among the six KRDs gives a more detailed view of how it will respond to different types of yield curve moves.

Calculating Excess Returns Using KRDs

To calculate excess returns using KRDs, Barclays first constructs a set of six hypothetical par coupon treasuries corresponding exactly to the maturities of the six KRDs of a spread security at the beginning of the month. To the six hypothetical bonds, each priced exactly off the curve at zero OAS, a riskless one-month cash security is added. A combination of these seven securities is then used to match the market value and KRD profile of the security at the beginning of the month. This combination constitutes the equivalent treasury position to which a security's return is compared. The KRD-matched hypothetical treasuries are held constant throughout the month and not rebalanced intra-month due to change in the KRD profile of the security to which it is being compared. At month-end, each of the hypothetical par coupon treasuries is re-priced at zero OAS off the end-of-month treasury return, and its total return for the month is calculated. The excess return for the security is then calculated as the difference between its total return and that of the equivalent treasury position.

Duration-Bucket Approach

A duration-bucket approach is used to calculate excess returns for non-US benchmark indices. Using this methodology, Barclays first buckets the universe of treasuries that correspond to a bond's currency denomination⁹⁹ into half-year duration buckets starting at zero. Treasuries are bucketed based on their beginning-of-month duration value and will not change buckets intra-month. A market value weighted return is then calculated for each half-year duration bucket. The return for a given security's duration-matched risk-free asset is interpolated from its duration at the beginning of the month and the duration and total return of the two adjacent treasury buckets. The excess return for the security is then calculated as the difference between its total return and the interpolated return.¹⁰⁰

Approximating Excess Returns from OAS

OAS-Based Excess Return Calculation

As discussed previously, no excess return methodology has been standardized in the fixed income market. For the basis of comparison, we use a simple approximation based on sources of excess return for a spread product to derive excess returns at the index level. Securities considered riskier than treasuries *usually* earn a spread over treasury yields; when the spread remains unchanged, the excess return should be approximately equal to the spread itself. When spreads change (and the risk of spread securities is realized), the additional excess return is given by the change in spread multiplied by the spread duration.

Let:

ER_i = The excess return of bond, i

S_i = Option adjusted spread (OAS)

D_i = Spread duration

ΔS_i = Monthly change in OAS

Our simple first-order approximation for monthly excess return is given by

⁹⁹ For EUR-denominated securities, this basket is comprised of German bunds only. Prior to July 1, 2013, the basket also included French and Dutch treasuries.

¹⁰⁰ Published excess return is set to zero for all Aaa-rated EUR treasuries.

$$(1) \quad ER_i \approx \frac{S_i}{12} - D_i \Delta S_i$$

The simplicity of this approximation might lead one to ask why this should not be adopted as the official Barclays definition of excess return. The simple model does not cover all possible sources of return differences between treasuries and spread product, however. For example, called bonds generate excess return due to volatility changes, even with an unchanged option-adjusted spread. Additionally, returns on mortgage backed securities are affected by prepayment surprises and volatility changes, in addition to spread moves. For these reasons, it is important to retain a model that works in return space at the security level by subtracting an equivalent treasury return from the total return of each spread security.

While an OAS approximation for excess return may not be rigorously correct for instruments that are volatility sensitive, it provides intuitive results for a largely non-callable index such as the US Credit Index.

In the application of the OAS-based approach for portfolio- or index-level excess returns, one detail merits a closer look. It is important to pay attention to the weighting mechanism used to compute portfolio averages. While the spread levels should be weighted by market value, the changes in spreads should be weighted by dollar duration (the product of market value and spread duration). A failure to do so can lead to inaccuracies when the market experiences changes in the term structure of spreads.

For a portfolio, let w_i represent the percentage of portfolio market value in security i . The one-month excess return for the portfolio is then the weighted sum of the component securities' returns:

$$(2) \quad ER_p = \sum_i w_i ER_i \approx \frac{\sum_i w_i S_i}{12} - \sum_i w_i D_i \Delta S_i$$

Let us look at how this calculation can be expressed in terms of portfolio level quantities. The portfolio averages for spread duration, spread and spread change can be interpolated as follows, where the superscript MW refers to a market weighted portfolio and the superscript DDW denotes a dollar duration weighted average. The quantity DPMW is the market weighted average portfolio spread duration, sPMW is the market weighted average portfolio OAS and $\Delta sPDDW$ is the dollar duration weighted average portfolio OAS change.

$$(3) \quad \begin{aligned} D_p^{MW} &= \sum_i w_i D_i \\ s_p^{MW} &= \sum_i w_i S_i \\ \Delta s_p^{DDW} &= \frac{\sum_i w_i D_i \Delta S_i}{\sum_i w_i D_i} \end{aligned}$$

The approximation for portfolio excess return given in equation (2) can be rewritten as:

$$(4) \quad ER_p = \frac{s_p^{MW}}{12} - D_p^{MW} \Delta s_p^{DDW}$$

The first term of equation (2) is given by the market weighted spread. In the second term, the duration cancels out the denominator of the duration weighted spread, leaving an expression identical to that found in equation (2).

This weighting scheme is in accord with our intuition. The first component corresponds to the return that will be earned by each security if its spread remains unchanged. The spread should be weighted by market value, as are returns. The second term represents the return effect of spread changes. Spread changes in longer securities will have a greater effect and should be given greater weights.

Calculating Periodic and Cumulative Excess Returns

Since excess returns are the arithmetic differences between the total return of the index and a duration-matched hypothetical risk free security, compounding monthly excess returns is not an accurate way to display excess returns over time frames longer than one month. But whereas excess returns cannot be compounded, total returns can. Since Barclays publishes both the total and excess returns of each index monthly, we also calculate a total return of the implied duration-matched treasury portfolio of that index (the difference between the excess and total returns of the index).

Mathematically, total returns of the index and the implied treasury portfolio can then be compounded separately and compared, even as its composition is reset every month, yielding a valid periodic excess return derived from the arithmetic differences between the two.

The following example explains the technique using a three-month horizon (January 2013-March 2013):

Let:

TR_{index} = Total Return of the Index

ER_{index} = Excess Return of the Index

$TR_{impliedtsy}$ = Total Return of the Implied Duration Matched Treasury Portfolio

For any given month:

$$TR_{index} - ER_{index} = TR_{impliedtsy}$$

For the three-month horizon:

$$Jan13TR_{index} - Jan13ER_{index} = Jan13TR_{impliedtsy}$$

$$Feb13TR_{index} - Feb13ER_{index} = Feb13TR_{impliedtsy}$$

$$Mar13TR_{index} - Mar13ER_{index} = Mar13TR_{impliedtsy}$$

Over the three-month period, ending March 2013, the total return of the index would be:

$$ThreeMonthTR_{index} = [(1 + Jan13TR_{index}) * (1 + Feb13TR_{index}) * (1 + Mar13TR_{index})] - 1$$

The total return of the implied duration-matched treasury portfolio over the same three-month period would be:

$$ThreeMonthTR_{impliedtsy} = [(1 + Jan13TR_{impliedtsy}) * (1 + Feb13TR_{impliedtsy}) * (1 + Mar13TR_{impliedtsy})] - 1$$

Then the compounded three-month excess return at the end of March 2013 is simply:

$$ThreeMonthER_{index} = ThreeMonthTR_{index} - ThreeMonthTR_{impliedtsy}$$

APPENDIX 4: BENCHMARK INDEX PRICING METHODOLOGY

This appendix describes the pricing method, timing and settlement assumptions for securities and specific sectors measured in the Barclays benchmark indices. No single method is used to price every bond in our indices because certain sectors are valued using sector- and/or region-specific market conventions and valuation frameworks. This appendix outlines pricing mechanics by sector and region to provide more detail on how specific asset classes are priced.

Before discussing sector-specific pricing mechanics, we provide an overview of the general principles used in pricing the Barclays benchmark indices. This framework will later be used to describe our pricing method for specific sectors and regions.

Pricing Sources and Inputs

Barclays market makers and third-party pricing providers are used as direct inputs and in the pricing verification process for Barclays benchmark indices. Both pricing provider quotes and our valuation models rely on a variety of observable inputs to calculate a security's index price. Some of these will be directly provided by the price contributors in their valuations, while others may be used to drive a pricing matrix or other valuation models when a direct quote is unavailable. The priority of specific inputs used to price a security may change on a day-to-day basis, as certain features may be more direct drivers of valuation at the time of pricing. Ultimately, the factors used in pricing a bond are left to the judgment of the pricing provider and the Barclays index pricing group in their verification process. Inputs used in index pricing include:

- Benchmark yields (Treasury and swaps curves)
- Transactional data for new issuance and secondary trades (eg, TRACE™ data)
- Barclays dealer quotes and other publicly available broker/dealer quotes
- Security cash flows and structures
- Sector and issuer level spreads
- Credit ratings/maturity/weighted average life/seasoning/capital structure
- Security optionality
- Corporate actions
- Underlying collateral data
- Prepayment speeds/loan performance/delinquencies
- Public covenants
- Comparative bond analysis
- Derivative spreads
- Third-party pricing sources

Pricing Quote Conventions

Index-eligible securities can be quoted in a number of different ways (eg, nominal spreads over benchmark securities/treasuries, spreads over swaps, direct price quotes, etc.). However, every quote is translated to a specific “dollar price” that represents the security's value as a percentage of par.

Most index-eligible securities are quoted on the bid side, with the exception of inflation-linked securities and EUR-, GBP-, and JPY-denominated nominal treasuries, which are priced on the mid side and new corporates¹⁰¹ entering the index on the offer side.

While different markets or asset classes represented in Barclays benchmark indices may be quoted using different conventions, we maintain the concept of “one price” for index bonds. In other words, each bond will employ only one price from one pricing source that will be used in all benchmark indices for which it is eligible.¹⁰²

Pricing Timing and Frequency

Generally for Barclays Aggregate Indices, bonds are priced at 3pm New York time each day for the US and Canadian¹⁰³ markets and 4:15pm London time for the Pan-European markets. For Asian-Pacific indices, prices are taken at different times, depending on the local market convention and are subject to change based on periodic reviews: 3pm for Japan; 3:30pm for Thailand and Taiwan; 4:30pm for Australia, South Korea and Malaysia; 4:45pm for Singapore; 4:50pm for China; and 5pm for New Zealand. When the markets close early for holidays, prices may be taken earlier in the day.

Calculated index prices and valuation models are updated daily to reflect changes in any of the inputs used to price a security. Prices may change because of an update of the underlying price quote (eg, an updated security spread over a reference curve) or changes to any of the other underlying inputs used to derive a dollar price (eg, treasury or swap curve movements that would change the present value of discounted cash flows).

Pricing Settlement Assumptions

For index purposes, securities in Series-L indices are assumed to settle on the next calendar day, except for US MBS pass-throughs, which use same-day settlement

Securities in the indices are assumed to settle on the next calendar day for each index pricing date, except for US MBS pass-throughs (fixed-rate and hybrid ARMs), which are priced for Securities Industry and Financial Markets Association (SIFMA, formerly Public Securities Association or PSA) settlement in the following month and then discounted back to same-day settlement at the mortgage repurchase rate.

At the end of the month, the settlement date is assumed to be the first day of the following month, even if the last business day is not the last calendar day of the month. This procedure allows for one full month of accrued interest to be calculated. The only exception is the US MBS Index, for which end-of-month index returns are calculated assuming that the trade date and the settlement date are the last calendar date of the month.

Series-B indices, such as the World Government Inflation-Linked Bond Index (WGILB), use local market settlement conventions for accrued interest calculations

Series-B indices, such as the World Government Inflation-Linked Bond Index (WGILB), use local market settlement conventions for accrued interest calculations.

Pricing Verification

The quality of all index pricing is maintained by 1) using comparisons to a broad range of pricing sources including third parties, Barclays internal valuation models, and Barclays market makers and/or 2) employing a variety of statistical techniques applied on both day-to-day movements and point-in-time levels using tolerance bands set at relevant issuer, sector, quality and maturity levels.

Possible outliers resulting from the verification process are resolved by our team dedicated to the pricing validation. Index users may also challenge price levels, which are then

¹⁰¹ Investment grade and USD- and EUR-denominated corporates.

¹⁰² An illustration of the “one price” concept is when a bond marked on the bid side in an investment grade index is downgraded to below investment grade status and enters a high yield index still at the bid price, not at the offer price.

¹⁰³ Canadian inflation-linked government bonds are priced at 5:30pm.

reviewed by the pricing team. If a discrepancy arises, prices may be adjusted on a going forward basis using input from the primary pricing source and/or available broker quotes.

Barclays welcomes any general questions on our index pricing methods or inquiries on the pricing of specific securities. Please contact our index pricing teams based in New York and London:

- indexpricingny@barclays.com
 - USD-denominated bonds, CAD-denominated bonds, other Latin American securities
- indexpricinglondon@barclays.com
 - European currency denominated securities
- indexpricing@barclays.com
 - All other global inquiries

US AGGREGATE INDEX COMPONENTS

US Treasury Index

- **Source:** Barclays market makers
- **Quote Convention/Inputs:** Dollar price from Barclays trading desk
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All securities, including off-the-run bonds, in the US Treasury Index are priced daily on the bid side by the Barclays trading desk

All securities, including off-the-run bonds, in the US Treasury Index are priced daily on the bid side by the Barclays trading desk. This market is very transparent and liquid. These Treasury marks serve as the foundation for the pricing of benchmark curves for many other asset classes in Barclays indices quoted relative to Treasuries.

US Agency Index

- **Source:** Barclays market makers, third-party pricing sources
- **Quote Convention/Inputs:** Spread to Treasuries for approximately 200 liquid bullet agencies; option-adjusted spread (OAS)¹⁰⁴ to the swaps curve for various maturity buckets (callables)
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

The Barclays trading desk provides spreads for approximately 200 liquid agency bullet securities each day used to create an agency bullet curve

The Barclays trading desk provides spreads for approximately 200 liquid agency bullet securities each day. These are used to create an agency bullet curve (also known as a spline curve) that is used to price the remaining bullet securities, which are grouped by issuer and maturity, and an additional spread is added in basis points to the fitted yield from the spline curve based on the issuer and maturity.

For callable securities, a sub-set is marked directly by Barclays traders using OAS as an input. For the remaining callable securities, two models are used. For securities with European call options, a BMA OAS model is used. For securities with American or Bermudan call options, an HJM model is used. Option-adjusted spreads are updated daily by Barclays traders for various maturity buckets of these sub-sets. Adjustments can also be made at the issuer level.

¹⁰⁴ OAS is a measure of the credit risk in a bond, taking into account the security's optionality; for bonds without embedded optionality, the OAS is the same as Z-spread. It is measured in basis points over a specific reference curve.

US Credit/Corporate (Investment Grade) Index

- **Source:** Barclays market makers
- **Quote Convention/Inputs:** Bid side spreads to Treasuries; daily updated Treasury curve
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

At mid-month and month-end, every bond in the US Credit/Corporate index is marked and reviewed by Barclays traders

At mid-month and month-end, every bond in the index is marked and reviewed by Barclays traders. On the other dates, spreads are captured from trader pricing runs (~1000 securities daily). Many of the spreads captured populate a set of issuer curves (~50 issuers) representing the most actively traded issuers in the market.

The spreads captured daily also drive a spread matrix. The securities that are not driven by the issuer curves are marked using this matrix, which is driven by sector, quality and duration. This is seeded with the daily OAS percentage changes of the active trader marks. Manual adjustments are made by the index pricing group where warranted. Specific credit events are excluded from the matrix pricing and priced separately by the index pricing group and traders. After a spread has been determined for each security in the index, the updated Treasury curve is used to convert spreads to dollar prices.

All but a handful of the securities in the US Credit Index are priced using a spread to Treasuries. Certain bonds marked on a dollar price basis would be characterized as crossovers (having some ratings below investment grade and others above) or securities that are under credit duress.

Issues that are new to the index are marked on the offer side for their first month-end mark

Corporate issues that are new to the index are marked on the offer side for their first month-end mark and are subsequently marked on the bid side.

US MBS Index

- **Source:** Barclays market makers
- **Quote Convention:** Spreads to TBAs
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** Daily for fixed-rate MBS and hybrid ARMs
- **Settlement:** Same-day settlement for all dates except month-end, which is last calendar date of the month

The US MBS Index tracks fixed-rate mortgage-backed pass-through and hybrid ARM pools issued by Ginnie Mae (GNMA), Fannie Mae (FNMA) and Freddie Mac (FHLMC). The index is composed of MBS “generics” that group the larger universe of eligible agency mortgage pass-through pools according to four main characteristics: agency, program, coupon, and vintage. While the fixed-rate and hybrid ARM components of the index use aggregates and sub-aggregates to price the index, the process for mapping pools to aggregates, as well as the pricing mechanics, differs for fixed-rate and hybrid ARM securities.

Prices for index-eligible MBS generics are calculated using the prices for TBAs trading in the market and the spread associated with each generic based on its vintage

Barclays traders then quote spreads (pay-ups) relative to TBAs to value seasoned MBS generics

These TBA and pay-up quotes are then fed into a matrix to generate PSA-settle prices (in dollar terms) for the index-eligible generics

Once a price quote is obtained for a generic MBS, it must be adjusted for the difference between index and market settlement conventions

Hybrid ARM securities are priced differently from fixed-rate MBS because there is no TBA market for hybrid ARM securities

Fixed-Rate Agency MBS Pricing Methodology

Prices for index-eligible generics are calculated using the price levels for to-be-announced (TBA) contracts in the market and the spread associated with each generic based on its vintage. These marks are generated using market settlement conventions, which are then discounted back to same-day settlement to arrive at the index price.

Deriving PSA Quotes for Index Generics Using TBAs

The process begins with the Barclays market maker pricing (in dollar terms) TBA MBS issues by agency, program and coupon. When MBS securities trade on a TBA basis, the seller and buyer agree to the type of security, coupon and price at the time of the trade, but do not specify the actual pools to be delivered at the specified settlement date. A single standard settlement day each month is designated by SIFMA for each sector of the MBS market. The basis for MBS generic pricing are these TBA prices, which assume standard forward settlement. Only the most liquid programs and coupons are traded on a TBA basis.

Barclays traders quote spreads (pay-ups) relative to TBAs to value MBS generics based on where the market is trading for pass-throughs bonds with characteristics similar to the annual aggregate. The set of origination years (based on factor date and WALA) for which pay-ups are provided is chosen separately for each sector and coupon level to best represent the way the market trades. Typically, the years for which spreads are quoted for a particular coupon will correspond to those in which it experienced significant issuance. An origination year that is not quoted explicitly is assigned the same pay-up as the nearest benchmark generic with a WAM equal or greater to its own. Since the current pricing methodology of the index reflects only the four characteristics of the market as previously defined, each generic in the index is priced according to the combined characteristics of the non-specified pools within each generic. These TBA and pay-up quotes are then fed into a matrix to generate forward settle prices (in dollar terms) for the index-eligible generics.

Adjusting PSA Quotes to Obtain Index Prices

Once a forward settle price quote is obtained for an MBS generic, it must be adjusted for the difference between index and market settlement conventions. A single standard settlement day each month is designated by SIFMA for each sector of the MBS market. Quoted prices for MBS generics are always for this standard settlement, and all securities in the index switch to their respective next-month settlement dates at the same time¹⁰⁵. The MBS Index, however, uses a same-day settlement convention to reflect the current prices of securities held in the index. The discrepancy between the settlement conventions used for quotes and for pricing the index necessitates price adjustments of two types. First, there is a pure adjustment of forward prices to spot prices to reflect the cost of carry.¹⁰⁶ Second, when the index and PSA settlement dates are in different months, the index price includes one more payment of principal and interest, which requires an additional price adjustment.¹⁰⁷

Hybrid ARM Pricing Methodology

Hybrid ARM securities are priced differently from fixed-rate MBS because there is no TBA market for hybrid ARM securities. Index-eligible generics are priced on a Z-spread basis according to agency, program, coupon and roll period.

¹⁰⁵ SIFMA's Class A notification date.

¹⁰⁶ This present value calculation uses 1m Libor for the discount factor.

¹⁰⁷ We estimate the amount of the principal and interest to be paid using the previous month's survival rate, SMM (the percentage of last month's current face that survived into the current month), for the first part of the month and then the current month's actual survival rate once it becomes known as the estimator for next month's survival rate on the 16th business day of each month.

Hybrid ARM Index Generics

The US Hybrid ARM Index is composed of agency hybrid ARM pools that map to aggregates, which are used to determine index eligibility, and sub-aggregates, which are used to price the index. Aggregates are formed based on the following characteristics.

- Agency (FNMA, FHLMC, GNMA)
- Program (3/1, 5/1, 7/1 and 10/1)¹⁰⁸
- Fixed coupon (in 0.25% increments)
- Origination year (2012, 2011, 2010, etc.)

If an aggregate has a market value greater than \$1bn, then all of its sub-aggregates will qualify for the index.

Hybrid ARM sub-aggregates are further segregated by the following attributes to more accurately price index-eligible securities:

- Reference rate index for floating coupon (1y Libor, 6m Libor, 1y CMT)
- Floating coupon cap structure (5/2/5, 2/2/6, 5/2/6, 1/1/5). The interest rate on the floating leg is subject to three caps: a first reset, a periodic reset and a lifetime cap. The first reset cap limits the amount the coupon rate can change at the first reset date. The periodic cap limits the amount the rate can change at any subsequent reset date. The lifetime cap limits the amount the interest rate can increase over the lifetime of the security.
- Interest only or level pay

Each sub-aggregate may have a par amount less than \$1bn, but the total par amount of all sub-aggregates mapping to a single hybrid ARM aggregate will always be greater than \$1bn.

Hybrid Pricing Methodology

- Prices are provided by the Barclays trading desk for hypothetical zero WALA generic securities. These securities are broken down by agency, program and coupon.
- From these quotes, within each agency, coupon and program, a Z-spread¹⁰⁹ is calculated for each of the following fixed-rate periods: 36, 60, 84 and 120 months.

For example, for FNMA 10/1 5.5% coupon, Z-spreads are generated for four input points: 36 months to roll date, 60 months, 84 months and 120 months.

- This curve is used to obtain the appropriate Z-spread for each generic in the index using the generic's months to roll as input.
- A pay-up is potentially added to the Z-spread based on the security's reference rate, cap structure and IO versus level pay characteristics.
- Using the final Z-spread, a price is calculated for each generic.
- For FNMA/FHLMC securities with less than 24 months to reset:

¹⁰⁸ A pool issued under the 3/1 Hybrid ARM program, for example, would have a fixed-rate for three years and then convert to floating-rate and reset annually thereafter. Hybrid ARMs exit the index one year prior to conversion to floating rate.

¹⁰⁹ Z-spreads are computed using the Treasury forward curve at 15% CPR until balloon at reset.

- A matrix will be used that contains prices for several coupon and month-to-reset combinations
- Price will be computed by interpolating the matrix on coupon and month-to-reset dimensions

US CMBS Index

- **Source:** Barclays market makers (non-agency CMBS), IDC (agency CMBS)
- **Quote Convention/Inputs:** Bid side dollar prices or spreads to daily updated swaps curve
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** CMBS prices for non-agency CMBS generated via a matrix updated on a daily basis
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

CMBS bonds are marked by Barclays traders using a pricing matrix comprising the following buckets: average life, origination year, original rating and tranche type

Non-agency CMBS bonds are marked by Barclays market makers using a pricing matrix comprising the following buckets: average life, origination year, original rating and tranche type. While a majority of the bonds are marked by a spread matrix to the swaps curve, they may also be valued using price-based buckets in the matrix. In addition, constituents within a bucket may be subject to security-specific spread or price add-ons relative to the bucket.

US Fixed- and Floating-Rate ABS Indices¹¹⁰

- **Source:** Barclays market makers
- **Quote Convention/Inputs:** Bid side dollar prices and spreads to daily updated swaps curve
- **Timing:** 3pm New York; 1pm on early close unless otherwise noted
- **Frequency:** Fixed- and floating-rate ABS are updated weekly. All ABS are updated at month-end.
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Securities in the US ABS Indices are hand-marked by traders on a weekly and month-end basis

Securities in the US ABS Indices are hand-marked by traders on a weekly and month-end basis. From those prices, a spread for each security in the index is calculated and kept constant until the next update. The daily updated swaps curve is used to convert the spreads to dollar prices on a daily basis.

¹¹⁰ The US Fixed-Rate ABS Index is composed of the following collateral types: autos, credit cards and stranded-cost utility (rate reduction bonds). The US Floating-Rate ABS Index is composed of autos, credit cards and student loans.

OTHER US INDICES

US Corporate High Yield Index

- **Source:** Interactive Data Corp (IDC)
- **Quote Convention/Inputs:** Bid side prices, dollar priced
- **Timing:** 3pm New York
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

The US High Yield Index is marked on the bid side, including new issues, by a third-party pricing vendor, Interactive Data Corp (IDC). Because the bonds are marked on a dollar price basis, no spread matrix is used.

US Municipal Bond Index

- **Source:** Interactive Data Corp (IDC)
- **Quote Convention/Inputs:** Bid side prices, dollar priced
- **Timing:** 4pm New York
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which first calendar date of following month

Methodology

The US Municipal Index is marked by a third-party pricing vendor, Interactive Data Corp (IDC).

PAN-EUROPEAN INDICES

Pan-European indices track multiple local currency debt markets (euro, pounds sterling, Norwegian krona, Swedish krona, Danish krone, Hungarian forint, Polish zloty, Russian ruble, Slovakian koruna and Czech koruna) and use a variety of pricing sources. This section outlines pricing procedures first for the Pan-European Aggregate Index and then for our other Pan-European Indices, including the Euro Corporate FRN, Pan-European EM, Pan-European HY and the Pan-European Securitised Indices.

Euro Treasury, Euro Government (Series-B), UK Gilt Indices (Series-L and Series-B)

- **Source:** Barclays market makers, other third-party pricing sources
- **Quote Convention/Inputs:** Mid side prices
- **Timing:** 4:15pm London; 12:15pm London on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:**
 - Series-L: Next-day settlement for all dates except month-end, which is first calendar date of following month
 - Series-B: Local settlement used for accrued interest calculation

Methodology

All euro treasuries and UK gilts are priced daily

All securities are priced daily. This market is very transparent and liquid. These prices serve as the foundation for Barclays curve generation.

Pan-European Government-Related, Securitised¹¹⁴ (Fixed Coupon) and Corporate Indices

- **Source:** Barclays market makers, Reuters and Interactive Data Corp (IDC). Pricing sources may be changed intra-month.
- **Quote Convention/Inputs:**
 - Barclays quotes:
 - Sterling: Bid side spreads over benchmark Gilts
 - Euro and other currencies: Bid side spreads over benchmark bunds or swap curves
 - Third-party quotes: Bid side prices
- **Timing:** 4:15pm London; 12:15pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

At mid-month and month-end, security-specific spreads are updated for all bonds priced by Barclays market makers. On the other dates, ad hoc spread adjustments are made by

¹¹⁴ Securitised sectors include ABS, Pfandbriefe and other covered bonds.

Barclays traders and flow through immediately to the index so that the index prices are responsive to name-specific credit events. Bonds priced by third-party sources (Interactive Data and Reuters) are reviewed daily.

After a spread has been determined for each Barclays priced security in the index, it is converted to a price (percentage of par) using the appropriate updated swaps curve for that bond. Certain bonds that would be characterized as crossovers (with some ratings below investment grade and others above) or securities that are under credit duress are priced directly on a price/dollar basis. Third-party prices are quoted directly as a percentage of par and are then used to derive comparable spread levels and analytics using Barclays models.

Securities that are due to enter the index at month-end are marked on the offer side.

Pan-European ABS FRN Index

- **Pricing Source:** Barclays market makers
- **Quote Convention/Inputs:** Bid side spreads to specific swap curves; dollar prices
- **Timing:** 4:15pm London; 12:15pm London on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

The Barclays trading desk maintains the prices, spreads, and prepayment, default and call assumptions on each bond. The principal and interest cash flow projections are modelled by Intex. Certain bonds that would be characterized as crossovers (with some ratings below investment grade and others above) or securities that are under credit duress are priced regularly on a price/dollar basis. The spreads on all other bonds are affected by changes made by the traders to a generic sector spread matrix. These matrix spreads are adjusted at least once a week, often more frequently. The traders also adjust individual bond spreads at mid-month and month-end as needed to reflect the differential of each bond to the generic sector. After a spread has been determined for each Barclays priced security in the index, it is converted to a dollar price using the appropriate swap curve for that bond.

Securities that are due to enter the index at month-end are marked on the offer side.

The Barclays trading desk maintains the prices, spreads, prepayment, default and call assumptions for bonds in the Pan-European ABS FRN Index

OTHER PAN-EUROPEAN INDICES

Pan-European High Yield Corporate Index

- **Sources:** Interactive Data Corp (IDC) and Barclays market makers
- **Quote Convention/Inputs:** Bid side prices, new issues on the offer side
- **Timing:** 4:15pm London; 12:15pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

The Pan-European High Yield Corporate Index is priced daily by a combination of Barclays market makers and third-party sources (IDC).

Euro and Sterling Treasury Bills Indices

- **Sources**
 - Euro treasury bills: Barclays market makers
 - Sterling treasury bills: Reuters
- **Quote Convention/Inputs:**
 - Euro treasury bills: Mid side prices¹¹⁵ (bid side prior to 21 October 2011)
 - Sterling treasury bills: Bid side prices
- **Timing:** 4:15pm London; 12:15pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which first calendar date of following month

Methodology

Sterling treasury bills are individually priced daily by Reuters. Euro treasury bills are individually priced daily by Barclays traders.

Pan-European Corporate FRN Index

- **Source:** Interactive Data Corp (IDC)
- **Quote Convention/Inputs:** Third-party bid side prices
- **Timing:** 4:15pm London; 12:15pm on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Bonds are priced using the Interactive Data Corp (IDC) prices.

¹¹⁵ Bid side prior to 21 October 2011.

Other Pan-European Local Currency Indices

- **Sources:**
 - Barclays market makers and Reuters: Croatian kuna, Czech koruna, Danish krone, Hungarian forint, Norwegian krone, Polish zloty, Russian ruble, Swedish krona
 - SIX Swiss Exchange: Swiss franc
- **Quote Convention/Inputs:**
 - Bid side prices
- **Timing:**
 - 4:15pm London; 12:15pm on early close unless otherwise noted
 - 5pm CET/4pm London for Swiss franc
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Bonds are marked daily by a combination of Barclays market makers and third-party sources.

ASIAN-PACIFIC INDICES

Barclays Asian-Pacific indices track multiple local currency debt markets, including Japanese yen, Australian dollar, New Zealand dollar, Hong Kong dollar, Singapore dollar, Malaysian ringgit, South Korean won, Thai baht, Indian rupee and Chinese yuan. With the exception of Japanese government bonds (JGBs), the indices are priced by third-party sources, but analytics and returns are calculated by Barclays. We first outline the indices that are priced by Barclays market makers, then those that are priced by third-party sources.

Japanese Government Bond Index

- **Source:** Barclays market makers
- **Quote Convention/Inputs:** Mid side¹¹⁶
- **Timing:** 3pm Tokyo; 11am on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All securities in the Japanese Government Bond Index are priced daily by Barclays traders

All securities are priced daily. This market is very transparent and liquid. These prices serve as the foundation for curve generation, as well as pricing and analytics for many other asset classes within the Barclays Japanese Aggregate Index.

Other JPY-Denominated Corporate, Government-Related and Securitized Indices

- **Sources:** Japan Securities Dealers Association (JSDA), Interactive Data Corp (IDC)
- **Quote Convention/Inputs:** Bid side prices
- **Timing:** 3pm Tokyo; 11am on early close unless otherwise noted
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All securities are priced daily. The primary source of non-JGB JPY-denominated bonds is JSDA Reference Prices published by JSDA (Japan Securities Dealers Association). However, since JSDA Reference Prices are mid prices, Barclays calculates bid prices based on these. Interactive Data Corp (IDC) bid prices are used as a secondary source.

Other Asian-Pacific Aggregate Components

- **Source:** Interactive Data Corp (IDC)
- **Quote Convention/Inputs:** Bid side prices
- **Timing:** (all local time below)
 - Australian dollar: 4:30pm Melbourne

¹¹⁶ Prior to December 2010, bid side was used.

- New Zealand dollar: 5pm Auckland
- Thai bhat: 3:30pm Bangkok
- Malaysian ringgit: 4:30pm Kuala Lumpur
- Hong Kong dollar: 4:30pm Hong Kong
- Singapore dollar: 4:45pm Singapore
- South Korea won: 4:30pm Seoul
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which first calendar date of following month

Methodology

Bonds in the index are priced using the “evaluated” prices from Interactive Data Corp (IDC), the primary third-party pricing source for these currencies.

EM LOCAL CURRENCY GOVERNMENT INDEX-ELIGIBLE CURRENCIES

This section covers pricing conventions, sources, and methodologies for currencies within the EM Local Currency Government and EM Local Currency Government Universal Indices.

- **Sources:**
 - Barclays market makers and Reuters: Argentine peso, Brazilian real, Canadian dollar, Chilean peso, Colombia peso, Croatian kuna, Egyptian pound, Israeli shekel, Turkish lira, Peruvian sol
 - Barclays market makers and Interactive Data Corp (IDC): Chinese yuan, Indonesian rupiah, Philippines peso, South African rand, Taiwan dollar
 - Proveedor Integral de Precios S.A.: Mexican peso
 - Clearing Corporation of India (CCIL): Indian rupee
- **Quote Convention/Inputs:** Bid side dollar prices
- **Timing:**
 - Argentina, Brazil, Canada, Chile, Mexico, Peru: 3pm New York
 - Croatia, Egypt, Israel, South Africa, Turkey, Indonesia, Romania, Nigeria: 4:15pm London
 - Philippines: 4pm Manila
 - China: 4:50pm Beijing
 - Taiwan: 3:30pm Taipei
 - India: 5:30pm Mumbai
- **Frequency:** Daily
- **Settlement:** Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Barclays traders mark bonds for which they make markets. Third-party sources may be used for remaining securities. Certain emerging market bonds (eg, Brazil, Chile, South Korea and Israel) are traded dirty (with accrued interest) and may be quoted on a nominal (or currency) basis. For index purposes, all prices are converted to clean (without accrued interest) prices and quoted as a percentage of par.

PRICE TIMING & CONVENTIONS FOR NOMINAL BONDS AND CONVERTIBLES

FIGURE 1

G10 Currencies (Nominal Bonds): Price Timing & Conventions

Currency Name	Currency Code	Sector	Timing	Bid/Mid
Australian dollar	AUD	All	4:30pm Melbourne	Bid
Canadian dollar	CAD	All	3pm New York	Bid
Swiss franc	CHF	All	5pm CET/4pm London	Bid (new issues at ask)
Euro	EUR	Corporate FRN	4:15pm London	Bid
Euro	EUR	High grade corporates, government-related, emerging markets	4:15pm London	Bid (new corp issues at ask)
Euro	EUR	High yield corporates	4:15pm London	Bid (new corp issues at ask)
Euro	EUR	Treasuries	4:15pm London	Mid
Euro	EUR	Treasury bills	4:15pm London	Mid
British pound sterling	GBP	ABS, covered bonds	4:15pm London	Bid (new issues at ask)
British pound sterling	GBP	Corporate FRN	4:15pm London	Bid
British pound sterling	GBP	Gilts	4:15pm London	Mid
British pound sterling	GBP	High grade corporates and government related, emerging markets	4:15pm London	Bid (new corp issues at ask)
British pound sterling	GBP	High yield corporates	4:15pm London	Bid (new corp issues at ask)
British pound sterling	GBP	Treasury bills	4:15pm London	Bid
Japanese yen	JPY	Government	3pm Tokyo	Mid
Japanese yen	JPY	Non-government	3pm Tokyo	Bid
Norwegian krone	NOK	All	4:15pm London	Bid (new issues at ask)
New Zealand dollar	NZD	All	5pm Auckland	Bid
Swedish krona	SEK	All	4:15pm London	Bid (new issues at ask)
United States dollar	USD	Treasuries	3pm New York	Bid (Series-L)/Mid (Series-B)
United States dollar	USD	Agencies, high grade corporates, MBS, CMBS, ABS	3pm New York	Bid (new corp issues at ask)
United States dollar	USD	High yield corporates, corporate FRN,	3pm New York	Bid
United States dollar	USD	Municipals	4pm New York	Bid

Source: Barclays Research

FIGURE 2

Non-G10 Currencies (Nominal Bonds): Price Timing and Conventions

Currency Name	Currency Code	Sector	Timing	Bid/Mid
Argentine peso	ARS	Treasuries	3pm New York	Bid
Brazilian real	BRL	Treasuries	3pm New York	Bid
Chilean peso	CLP	Treasuries	3pm New York	Bid
Chinese yuan	CNY	All	4:50pm Beijing	Bid
Offshore renminbi	CNH	All	3pm Hong Kong	Bid
Colombian peso	COP	Treasuries	3pm New York	Bid
Czech koruna	CZK	Treasuries	4:15pm London	Bid
Danish krone	DKK	All	4:15pm London	Bid (new issues at ask)
Egyptian pound	EGP	Treasuries	4:15pm London	Bid
Hong Kong dollar	HKD	Treasuries	4:30pm Hong Kong	Bid
Croatian kuna	HRK	Treasuries	4:15pm London	Bid
Hungarian forint	HUF	Treasuries	4:15pm London	Bid
Indonesian rupiah	IDR	Treasuries	4:15pm London	Bid
Israeli shekel	ILS	Treasuries	4:15pm London	Bid
Indian rupee	INR	Treasuries	5:30pm Mumbai	Bid
Korean won	KRW	All	4:30pm Seoul	Bid
Mexican peso	MXN	Treasuries	3pm New York	Bid
Malaysian ringgit	MYR	Treasuries	4:30pm Kuala Lumpur	Bid
Nigerian naira	NGN	Treasuries	4:15pm London	Bid
Peruvian nuevo sol	PEN	Treasuries	3pm New York	Bid
Philippine peso	PHP	Treasuries	4pm Manila	Bid
Polish zloty	PLN	Treasuries	4:15pm London	Bid
Romanian leu	RON	Treasuries	4:15pm London	Bid
Russian ruble	RUB	All	4:15pm London	Bid
Singapore dollar	SGD	All	4:45pm Singapore	Bid
Thai baht	THB	Treasuries	3:30pm Bangkok	Bid
New Turkish lira	TRY	Treasuries	4:15pm London	Bid
New Taiwan dollar	TWD	Treasuries	3:30pm Taipei	Bid
South African rand	ZAR	All	4:15pm London	Bid

Source: Barclays Research

FIGURE 3

Convertible Bonds: Price Timing and Conventions

Currency Name	Currency Code	Timing	Bid/Mid
UAE dirham	AED	4:15pm London	Bid
Swiss franc	CHF	4:15pm London	Bid
Euro	EUR	4:15pm London	Bid
British pound sterling	GBP	4:15pm London	Bid
Swedish krona	SEK	4:15pm London	Bid
United States dollar	USD	3pm New York	Bid
South African rand	ZAR	4:15pm London	Bid

Source: Barclays Research

INFLATION-LINKED INDICES

Barclays government inflation-linked bond indices track multiple local currency inflation markets (euro, pounds sterling, Swedish krona, Danish krone, Polish zloty,) and are predominately priced by Barclays market makers.

Universal Government Inflation-Linked Bond Index (UGILB)
 World Government Inflation-Linked Bond Index (WGILB)
 EM Government Inflation-Linked Bond Index (EMGILB)
 Global Inflation-Linked Bond Index (Series-L)

- **Sources:**
 - Barclays market makers: ARS, AUD, BRL, CLP, COP, DKK, EUR, GBP, ILS, JPY, KRW, MXN, , SEK, THB, , USD
 - NZFMA: NZD¹¹⁷
 - RBC Dominion: CAD
 - ABSA Capital: ZAR
 - Third-Party Vendor: TRY and PLN
- **Quote Convention/Inputs:** Mid side prices are used and local market quote conventions are observed.
- **Timing:** Please refer to Figure 4
- **Frequency:** Daily
- **Settlement:**
 - UGILB, WGILB, EMGILB Indices: local market settlement conventions for all calculations.
 - Global-Inflation-Linked Bond Index (Series-L): Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology


All securities are priced daily at the mid side and adhere to local market quote conventions. A bond may have different inflated values/index ratios in Series-B and Series-L indices depending on the settlement assumption used.

All inflation-linked government bonds are priced daily on the mid side

¹¹⁷ NZFMA: The New Zealand Financial Markets Association.

FIGURE 4

Inflation-Linked Bond Indices – Price Sources and Timing

Currency Name	Currency Code	Source	Timing	Bid/Mid	Universal GILB	World GILB	Global ILB (Series-L)	EMGILB
Australian dollar	AUD	Barclays market makers	5:30pm Melbourne	Mid	✓	✓		
Canadian dollar	CAD	RBC Dominion	4pm Toronto	Mid	✓	✓	✓	
Euro	EUR	Barclays market makers	4:15pm London	Mid	✓	✓ 	✓	
British pound sterling	GBP	Barclays market makers	4:15pm London	Mid	✓	✓	✓	
Japanese yen	JPY	Barclays market makers	3pm Tokyo	Mid	✓	✓	✓	
Swedish krona	SEK	Barclays market makers	4:15pm Stockholm	Mid	✓	✓	✓	
United States dollar	USD	Barclays market makers	3pm New York	Mid	✓	✓	✓	
New Zealand Dollar	NZD	NZFMA	4.30pm Wellington	Mid	✓	✓	✓	
Argentine peso	ARS	Barclays market makers	1pm New York	Mid	✓			✓
Brazilian real	BRL	Barclays market makers	6pm Sao Paulo	Mid	✓			✓
Chilean peso	CLP	Barclays market makers	3pm New York	Mid	✓			✓
Colombian peso	COP	Barclays market makers	3pm New York	Mid	✓			✓
Korean won	KRW	Barclays market makers	4:15pm Seoul	Mid	✓			✓
Mexican peso	MXN	Barclays market makers	3pm Mexico	Mid	✓			✓
Polish zloty	PLN	Third Party Vendor	4:15pm Warsaw	Mid	✓			✓
New Turkish lira	TRY	Third Party Vendor	4:15pm Istanbul	Mid	✓			✓
South African rand	ZAR	ABSA Capital	3:15pm Johannesburg	Mid	✓			✓
Israeli shekel	ILS	Barclays market makers	2.30pm Tel Aviv	Mid	✓			✓
Danish krone	DKK	Barclays market makers	4:15pm London	Mid	✓	✓	✓	
Thai bhat	THB	Barclays market makers	5:30pm Singapore	Mid	✓			✓

Source: Barclays Research

¹¹⁸ Italy is not currently eligible for the WGILB Index, as its sovereign rating is below the minimum A3/A- threshold.

APPENDIX 5: GLOSSARY OF TERMS

Index Terms

Accrued Interest	The amount of interest as a percentage of par that accrues between the last coupon date and the current index settlement date owed to a buyer of the bond.
Alternative Weight Indices	Indices that use rules-based weighting schemes other than standard market value weights. Examples are GDP Weighted, Fiscal Strength Weighted and ESG Weighted Indices.
AUM	Assets Under Management.
Barclays Live	Web-based portal for clients to access index data, analytic tools, research, index factsheets, etc.
Base Currency	The specified reporting currency of a published index. Returns for index-eligible securities in a currency other than the base currency are converted into base currency returns on an unhedged or a hedged basis.
BCIX	Function on Bloomberg to access Barclays Inflation-Linked and Series-B Indices.
Bellwether	Bellwether indices track on-the-run US Treasury issuance for the 3m, 6m, 2y, 3y, 5y, 10y and 30y issues. Bellwethers can also refer to the specific instrument against which the spread of a bond is quoted.
Breakeven Inflation	The spread that relates nominal and inflation-linked treasury bond prices. To calculate breakeven inflation, the market convention takes the difference between the real yield on an inflation-linked security and the nominal yield on a similar maturity nominal treasury. Breakeven inflation is an approximation that allows for a relative value analysis, representing the point of indifference between owning an inflation-linked and a nominal treasury bond. Over the life of a bond, if the realized rate of inflation exceeds the breakeven rate, the inflation-linked security will outperform the nominal security.
Canadian Model	Refers to the way in which many inflation-linked bonds trade. The notable characteristic of the Canadian Model is that it allows all calculations to be done in real terms, with a conversion factor to adjust into a nominal price on any given day.
Capital Security	Deeply subordinated fixed income securities that qualify for treatment as regulatory capital by regulators or receive quasi-equity credit from ratings agencies.
Capped Index	Indices that cap exposure to a certain index attribute, such as issuer or country of risk, to a fixed percentage.
Composite Indices	Indices in which fixed weights are assigned to various sub-components (commonly defined as currency, country, sector, maturity or credit quality sub-indices) to match a specified or targeted portfolio allocation. Weights will rebalance back to the target weights at each rebalancing.
Contingent Capital	Capital securities (sometimes referred to as “CoCos”) that convert into equity or are written down based on explicit capital ratio/viability triggers. CoCos are not eligible for Barclays Aggregate indices but are tracked in a standalone benchmark.
Country	Country of risk of an index-eligible security. The primary criteria for classifying country of risk are where a bond’s guarantee originates if the issuer is backed by a government or parent corporate entity ;where the largest source of revenue, operations or cash flows are generated from the issuer; and the location of an issuer’s headquarters or where its centralized decision-making occurs. Additional criteria that may be used include the country of incorporation or legal domicile; where an issuer’s stock is listed and traded; and where existing issuers within the index that are similarly structured or organized are classified
Coupon Return	Returns derived from the interest payments accrued and/or received during the return period.
Covered Bond	Recourse debt instrument that is secured by a ring-fenced pool of assets on an issuer’s balance sheet (commercial real estate, residential mortgages, public sector loans or other assets). Within Barclays classification scheme, covered bonds are classified within a sub-sector of Securitized.
CPI Type	The Consumer Price Index (CPI) series to which an inflation-linked bond is linked (eg, French CPI ex tobacco, HICP).
Currency Return	Returns (hedged or unhedged) derived from converting local currency security returns to a base reporting currency.
CUSIP	Security identification number for the US and Canada. A CUSIP consists of eight alphanumeric characters. The first six identify the issuer; the following two identify the issue. A ninth (check digit) is left off identifiers in Barclays indices.
Dated Date	The date on which interest begins to accrue on a fixed income bond. Investors who purchase a bond between interest payment dates must pay the seller or issuer any interest that has accrued from the dated date to the purchase date or settlement date.
Day Count Convention	The calendar conventions used to calculate accrued interest and other cash flow-based analytics for a given bond as of a given settlement date. Represented as (number of days per month)/(number of days per year), day count convention may vary from security type and local market. Examples include 30/360, ACT/360, ACT/ACT, etc.
Defaulted Bond	For Barclays index purposes, a security is considered to be in default if it has missed a scheduled interest payment, has an index rating of “D” based on Barclays credit quality methodology or is trading flat. Defaulted securities are not eligible for corporate high yield indices; however, defaulted emerging markets sovereigns remain index eligible.

Dim Sum Bond	Renminbi- or CNH-denominated bonds issued outside the People's Republic of China.
Discount Margin	Incremental spread earned above a specific reference rate for a floating-rate bond.
Dividends Received Deductible (DRD)	An equity-like security for which interest payments are partially subject to income tax for the end investor. These types of securities are excluded from Barclays indices.
Duration Extension	This quantifies the instant index duration change that occurs when the index membership is reset each month-end. It accounts for monthly index turnover, but also factors in the outflow of accumulated cash as the index is reset. Calculated as the difference between the OAD of the returns universe and statistics universe at month-end.
Duration-Hedged Index (DHI)	An index whose return reflects that on the underlying cash index, with its OAD exposure hedged (fully or partially) using its Mirror Future Index (MFI).
Emerging Market	Barclays uses a fixed list of countries defined as emerging markets countries for index inclusion purposes that is based on World Bank Income group definitions (Low/Middle), IMF country classifications (Non-Advanced Economies), and other advanced economies that may be less accessible or investable for global debt investors.
Enhanced Equipment Trust Certificates (EETC)	A type of pass-through security commonly used in aircraft finance in the US. In the transaction, a trust certificate is sold to investors to finance the purchase of an aircraft by a trust, which then leases it to the airline and the trustee passes payment through the trust to the investors. EETC bonds are eligible for Barclays indices and are classified as corporates within the global classification scheme.
ESG	Environmental, Social and Governance (ESG) is an investment theme/set of criteria used to evaluate non-financial risks to which an investment is exposed in an investment portfolio. An established investment theme in equities, ESG is emerging as a more prominent consideration in fixed income and can be evaluated using Barclays MSCI ESG fixed income benchmarks.
Eurodollar/Euroyen	US dollar-denominated bond issued outside the US/Japanese yen-denominated securities issued outside of Japan.
Excess Return	Measure of performance of a spread security over that of an equivalent treasury security. For municipal bonds, excess return is calculated over the non-zero, non-callable Aaa GO duration-neutral curve.
Exchange Traded Fund (ETF)	A registered and exchange listed investment fund that is generally designed to track a bond or equity benchmark index passively, though active ETFs do exist. Barclays fixed income benchmark indices are licensed by a number of ETF providers.
Ex-Dividend Date	The first date on which the holder of a bond is not entitled to receive the next interest payment. Index users will see the accrued interest of a bond show as negative once it starts trading ex-dividend and the expected coupon payment is discounted back to the current index settlement date.
Expected Rating	When the credit rating assigned by a rating agency is referred to as "expected," it generally indicates that a full rating has been assigned based on the agency's expectations of receiving final documentation from the issuer. Once the final documentations are received and reflect the agency's expectations, the expected rating is converted to a final rating. Expected ratings may be used for index classification purposes to ensure bonds are added to indices in a timely manner or to classify split-rated issuers properly.
Fiscal Strength Weighted	Alternative weighting methodology for Barclays indices that tilts the natural market value weight of bonds based on measures of sovereign and institutional strength such as debt as a percentage of GDP, deficit as a percentage of GDP, and current account balance as a percentage of GDP.
Flash Index Report	Daily report published at about 4:30pm (New York time) that estimates preliminary index returns for select US indices based on initial pricing. Final index returns may differ from early estimates based on additional pricing verification and corrections.
Float Adjusted	Within Barclays indices, adjustments made to the par amount outstanding of bonds for holdings of central governments that are publicly available. US nominal and inflation-linked bonds held by the US government in SOMA accounts are adjusted in flagship Barclays Aggregate Indices. Bank of England and Bank of Japan holdings are not adjusted in flagship aggregate indices..
Floating-Rate Note (FRN)	Bonds that accrue interest based on a specified spread over a reference rate that resets periodically. Floating rate corporate, ABS and treasury indices are available within the Barclays platform.
Forward Value	In Barclays currency hedging methodology, the number of base-currency units to be received for each unit of the local currency delivered in the forward contract. This value is set in the market place at the beginning of the month and is received at delivery at the end of the month.
FX Spot/Forward Rate	FX spot and 1m forward exchange rates sourced from WM Reuters at 4pm London time for purposes of currency return and market value calculations in Barclays indices.
GDP Weighted	Alternative weighting methodology for Barclays indices that weights bonds based on the gross domestic product (GDP) of a bond's country of risk.
Global Risk Model	Multi-factor risk model available through Barclays POINT® platform that quantifies risks exposures of portfolio instruments by identifying common sources of risk along different dimensions (systematic risk factors). For fixed-income instruments, systematic risk factors are typically divided into two sets: those that influence securities across asset classes (eg, yield curve risk) and those specific to a particular asset class (eg, prepayment risk in securitized products).

Government Guaranteed Agency	Classification within Barclays scheme that includes issues that carry direct guarantees of timely payment of interest and principal from central governments.
Government Owned Agency	Classification within Barclays scheme that includes issuers that are 50% or more owned by central or local governments, but that carry no guarantee of timely repayment. Ownership includes all direct central and local government, as well as indirect ownership through other government-owned entities.
Government Sponsored Agency	Classification within Barclays scheme that includes issuers that are not at least 50% government owned and that have no guarantee, but that carry out government policies and benefit from “closeness” to the central government.
Hedge Market Value	The par amount that a one-month currency forward is put on for in Barclays index currency hedging rules.
Hybrid Performance Attribution (HPA) Model	Multi-currency attribution model with daily outperformance calculation and compounding available through Barclays POINT® platform. The HPA model covers the majority of asset classes, including fixed income and equity cash instruments; interest rate, currency, credit and equity derivatives; and ETFs and funds of funds.
Identifier	Preferred identifier displayed in POINT® for a security that can be CUSIP, ISIN, deal acronym or Barclays-assigned identifier for bonds without a CUSIP.
Inception Date	Historical start date of a published Barclays index return series. For a given index, this can vary depending on the base currency in which returns are run. When a new index is created, index returns are available only on a monthly basis historically through its inception date and then on a daily basis.
Index Name	All indices published by Barclays are identified by a unique index numerical ID and have a short and a long name associated with that ID. For guidance on official naming conventions, please see the associated chapter in the index handbook.
Index Pricing Service	Fee-based service requiring proper licensing that provides bond-level prices via FTP for the US Aggregate, US TIPS and US STRIPS Indices between 4:30 and 5pm (New York time). Index returns are not calculated as part of this service.
Index Rating	Index Rating is a derived value that is used to classify bonds by credit quality in Barclays indices. It is set as the middle rating of Moody's, Fitch and S&P; when a rating from only two agencies is available, the lower is used; if only one agency rates a bond, that rating is taken.
Index Ratio	Generally, the ratio of domestic CPI (as of the index settlement date) to the base reference CPI of an inflation-linked security that is used to adjust the nominal principal and coupon payments so that their real value remains unchanged. Because each security has its own unique base CPI depending on when it was issued, the index ratio differs for each bond. Different market conventions exist for index ratio calculations.
Index Turnover	An estimate of gross index compositional shift measured by the market value of securities entering and exiting an index (as a percentage of the index's beginning market value). Users of POINT® and the enhanced index website can run an index turnover report under the Index Dynamic tab for Barclays benchmark indices. The report provides turnover estimates for a specified time, as well as changes in par amount outstanding for an index. If an index turnover report is run over a period longer than one month, the report will compare changes only from the beginning and ending universes.
Index Value	Calculated as the Since Inception Total Return plus 100. This is essentially the Since Inception Total Return value indexed to 100 (instead of zero) to calculate cumulative returns between any two points in time.
Index Flag	An index data field that combines all of the underlying rules of a flagship index into a single field to identify whether a bond meets the eligibility criteria of a particular index. An index flag value of BOTH_IND indicates a bond is eligible for both the returns and statistics universe. An index flag value of BACKWARD indicates a bond is included in the returns universe only. An index flag value of FORWARD indicates a bond is included in the statistics universe only. An index flag value of NOT_IND indicates a bond is not included in an index.
IndexID	Unique numeric identifier for each published Barclays benchmark index. Each index may be available in a number of different base reporting currencies on a hedged or an unhedged basis, but each return series will share the same IndexID.
IndexReporter	A delivery platform for index-level and bond-level benchmark index data. Initial set-up of client jobs and any subsequent adjustments must be made by Barclays index products team. Delivery can be via FTP feed or e-mail.
Information Ratio	An asset's excess return over a specified risk free benchmark per unit of volatility. Calculated as (annualized excess return over Treasuries)/(annualized standard deviation of monthly excess return).
Inflation-Linked/Treasury Inflation Protected Securities (TIPS)	Inflation-linked securities whose principal is adjusted for inflation to guarantee investors a real rate of return regardless of the inflationary environment. These securities provide purchasing power for the buyer and set a real cost of finance for the issuer. In the US, these securities are called TIPS.
Intermediate	Within the context of Barclays index construction, Intermediate sub-indices include securities with at least 1 year and up to, but not including, 10 years to final maturity.
ISIN	An alphanumeric 12-character identifier assigned by the local national numbering agency. An ISIN consists of a two-letter country code followed by the nine-character alphanumeric national security identifier and a check digit.
Issuer Class 1-4	Four-pillar (Treasury, Government-Related, Corporate and Securitized) classification of securities by issuer sector/industry in Barclays indices launched in 2005 and backfilled historically. There are up to four levels of granularity within each pillar.

LEHM	Bloomberg page that allows users to access index returns and statistics, grouped by regional and sector categories, as well as historical data for Barclays benchmark indices that have been tickerized. Bloomberg terminals must be permissioned for the LEHM functionality by Barclays index team.
Liability Driven Investing (LDI)	Investment strategy designed to match a specific investor's liability stream or future cash flow obligation. Barclays Russell LDI Index Series are a standard benchmark LDI index offering for US investors. Barclays also offers customized LDI benchmark indices that use strips or swaps in addition to cash bonds.
Loan Participation Note (LPN)	Fixed income instrument that permits investors to buy portions of an outstanding loan or package of loans. LPNs are a common form of issuance for Russian corporate and government-related entities due to tax considerations. Similar structures have also been used by other emerging European issuers.
Long	Within the context of Barclays index construction, Long sub-indices include securities with at least 10 years to final maturity.
MBS Generic	Within Barclays indices, US agency pass-through mortgage pools are grouped into pool aggregates or "generics" based on program, origination year and coupon for purposes of index construction.
MBS Pass-Through	A fixed income structure that pools mortgage loans with similar characteristics into a mortgage backed security. Principal and interest payments of underlying loans are allocated to security holders on a pro rata basis. MBS pass-throughs issued by the US agencies, Fannie Mae, Freddie Mac and Ginnie Mae, are eligible for the US Aggregate and Global Aggregate Indices. Private-label or non-government issued MBS pass-throughs are not index eligible.
Medium Term Note (MTN)	A debt instrument that is offered continuously to investors by an agent of the issuer based on a shelf registration.
Mirror Future Index (MFI)	An MFI is a funded index whose return reflects that on a funded set of treasury futures contracts, weighted so as to match closely the beginning-of-the-month OAD of an underlying standard bond index.
Mirror Swap Indices	Indices that provide excess returns of Barclays sector indices with respect to swaps. The purpose of mirror indices is to track the performance of high grade indices (eg, aggregate, government/credit, credit, agencies, MBS) relative to swaps on a KRD-matched basis.
Municipal Bond	Bonds issued by US local authorities that can be either tax-exempt or taxable to end investors. Tax-exempt municipals are tracked in a separate and broad benchmark index family, while taxable municipals qualify for the Barclays US Aggregate Index.
Non-Deliverable Forward (NDF)	A forward or futures contract where counterparties settle differences between the contracted price and the spot rate at settlement, rather than taking actual delivery. A number of currencies in Barclays indices trade as NDF in the forward markets.
Paydown Return	Returns related to scheduled and unscheduled payments of principal.
Payment-in-Kind (PIK)	A type of bond that pays interest in the form of additional bonds. PIK bonds are eligible for Barclays US High Yield Indices.
Pfandbriefe	A type of regulated covered bond security issued by German banks that can be collateralized by assets such as mortgage loans and public sector loans. Distinctions between Pfandbriefe and non-Pfandbriefe securities are made at the Class 4 level within the covered bond sector in Barclays indices.
Placement Type	Indicates whether a bond is publicly registered, exempt from registration or privately placed. Can also identify a bond as being marketed and sold to local investors only, non-local investors or globally offered in multiple markets.
POINT®	Barclays index analysis and portfolio management platform available to licensed clients. It is a desktop, web-based software platform portal for delivering Barclays valuation models, research content, security-level index data and returns and advanced analytics.
Prepayment Penalty Return (CMBS)	The return due to additional penalty premiums paid in connection with certain prepayments. The premiums are generally distributed as excess interest on the certificates.
Price Return	Capital appreciation/depreciation derived from underlying security bond price changes.
Public Securities Association (PSA) Settlement	Refers to the forward settlement conventions of the US agency MBS market. In 2006, the PSA merged with the Securities Industries Association and became the Securities Industry Financial Association (SIFMA); however, the term "PSA Settlement" is still used within Barclays US MBS Index pricing and methodology.
Pseudo Coupon	For a bond with an ex-dividend convention, the amount of interest that accrues between the ex-dividend date and the coupon payment date. Used for coupon return calculations in Barclays indices.
QDI-Eligible	Qualified Dividend Income (QDI) securities that under various tax laws are more equity-like than traditional fixed income securities. These types of securities are not eligible for Barclays indices.
Replicating Bond Index (RBI)	RBI baskets are portfolios of derivative instruments designed to track a bond index. The basket is reconstituted each month, using a mechanistic algorithm to match, as closely as possible, the term structure and spread exposures of a given Barclays index.
Returns (Backwards) Universe/ Statistics (Forward) Universe	For each index, Barclays maintains two universes of securities: the Returns (Backward) and Statistics (Forward) Universes. The composition of the Returns Universe is rebalanced at each month-end and represents the fixed set of bonds on which official index returns are calculated for the next month. The Statistics Universe is a forward-looking projection that changes daily to reflect issues dropping out of and entering the index, but is not used for return calculations. The composition of the Statistics Universe on the last day of the month (the rebalancing date) becomes the Returns Universe for the following month.

Sector Code	Non-hierarchical issuer classification scheme used for high level sector classifications. This scheme predates more granular, nested classification schemes that are currently in use, but are the basis of a number of historical index definitions.
Series-B/Series-L Indices	For overlapping index families, refers to legacy Lehman Brothers (Series-L) indices, such as the Global Inflation-Linked Index, and legacy Barclays Capital (Series-B) indices, such as the World Government Inflation-Linked (WGILB) Index, after the two index families were merged under a single “Barclays Indices” name in October 2008. While index eligibility is largely the same, index conventions and mechanics, such as settlement date, may differ.
Settlement Date	For index purposes, the date used for pricing, accrued interest, return, and analytics calculations. For all Series-L indices, settlement date is assumed as T+1 calendar day, except for MBS, which assume same-day settle. At month-end, index settlement is assumed to be the first calendar day of the following month. For Series-B indices, index settlement assumes local market conventions and can vary from market to market, based on conventions and holiday calendars. For portfolio management purposes, settlement date is the date on which an executed security transaction must be completed and the buyer must pay for the securities delivered by the seller.
Sharpe Ratio	An asset's excess return over a risk-free asset divided by its volatility, measured by the standard deviation of its returns.
Since Inception Total Return	Cumulative total return of an index since its inception date. Can be calculated in a number of reporting currencies and on a hedged or an unhedged basis.
Sinking-Fund Bond	A bond where interest payments are paid out of an issuer's sinking fund, a pool of money set aside to repurchase a portion of the bonds it has issued each year. The issuer has an option to repurchase bonds either at the sinking fund price or the current market price.
Sovereign Rating	A Barclays credit quality classification field that represents the foreign currency long-term debt rating of a bonds' country of risk using the middle of Moody's, S&P and Fitch ratings.
Step-Up Bond	A bond that pays an initial coupon rate for a specified time, followed by a higher coupon rate in subsequent periods.
Strategy Index	An index constructed to track the returns performance of a systematically defined, tradable index strategy.
Structured Note	Fixed income instrument with an embedded derivative component. These are not index eligible.
Sukuk Bond	Securities structured to comply with Islamic law and investment principles, which prohibit charging or paying interest.
Supranational	An international organization, or union, whereby member states transcend national boundaries or interests to share in the decision-making and vote on issues pertaining to the wider group. Supranational is a sub-sector of Government-Related in Barclays classification scheme.
Systematic Strategy	Common investment strategies include fundamental, enhanced carry, trend following, relative value, momentum and macro thematic.
Target Maturity Index	Indices where eligibility is defined by a range of target maturity dates, rather than time to maturity.
TBA	To-Be-Announced contract. An agreement between two counterparties to buy and sell agency mortgage pools in the future. TBA prices serve as the basis for pricing of US MBS Index generic identifiers.
Third-Party Index/Source	Within Barclays POINT, refers to non-Barclays indices or data attributes/analytics sourced from outside Barclays index database.
Ticker	Broad issuer-level identifier used in Barclays indices. Ticker is used for issuer constrained indices, VLI indices and rules-based issuer-level index definitions. Ticker may also refer to a unique identifier of an index on Bloomberg.
Toggle Note	A type of a PIK bond that has an embedded option that allows the issuer to pay coupon in cash or in additional securities.
Total Return Swap (TRS)	TRS are over-the-counter derivative agreements whereby an exchange of payments is made that is linked to or references a published index.
Trade to Flag	Indicates whether a security is trading to a call date, put date, maturity date or is in default.
US Rule 144A	Securities issued under US Rule 144A do not have to file a public registration statement with the Securities and Exchange Commission, but can be sold only to qualified institutional buyers (QIBs). Issuers of US Rule 144A bonds may or may not have the right to register the bonds with the SEC in the future. To be included in the US Aggregate Index, issuers must have the option to register the bond at a later date.
Very Liquid Index (VLI)	A narrower subset of an existing Barclays broad-based flagship index (such as the US High Yield Index) that follows the eligibility criteria as the index on which it is based, but only includes more recently issued bonds with a higher minimum par amount outstanding and restricts inclusion by issuer to only the largest issue or issues.
Write-down Return (CMBS)	The return related to the reduction in the outstanding class balance due to loss of principal. The principal loss is valued at the ending price of the bond.
Yankee	A USD-denominated bond issued by a non-US entity in the US market. Within Barclays indices, Yankees were recognized as a separate sector until July 2000, when all Yankee corporate were absorbed into their respective industry and sector classification.

Index Analytics

Ask Spread	Calculated as the Spread to Benchmark (see below for definition) minus 10bp.
Average Life	The par-weighted average time (in years) to the principal repayment for non-callable securities and the par-weighted average time (in years) to the probable call/put for callable securities.
Blended Spread	Analytic specific to EM bonds. Measures the riskiness of Brady bonds, which were issued in the 1980s by struggling sovereign countries and partially collateralized by the US Treasury, excluding said collateralization.
Convexity (OAC)	Convexity is the second derivative of the price-yield function and measures the second-order change in the price of a bond with respect to yield changes. OAC is positive for conventional bonds and is generally negative for mortgage pass-throughs. Negative convexity dampens the price appreciation if interest rates fall and aggravates the price decline if interest rates rise.
Corporate Default Probability (CDP)	A forward-looking default probability prediction generated by Barclays Portfolio Modeling group, which is used in the POINT Global Risk Model. This metric is calculated using both a structural and a reduced-form approach.
Constant Prepayment Rate (CPR)	For ABS, MBS and CMBS bonds, CPR measures prepayments as a percentage of the current outstanding balance. CPR can be realized or projected; realized CPR is used in MBS prepayment return calculations, while projected CPR for MBS is generated by Barclays mortgage prepayment model and serves as the basis for index analytics such as duration. It is expressed as an annual rate (eg, a CPR of 10 indicates that 10% of a pool's current loan balance is projected to prepay over the next year).
Current Yield	Defined as the ratio of the annual income (interest or dividends) received by the bond divided by the current price of the security.
Duration Times Spread (DTS)	Duration Times Spread is usually calculated as L-OAS * OASD. This measure is popular for spread/credit risk analysis, as the volatility of the spread return of a security is typically proportional to its DTS. DTS performance attribution is available through Barclays POINT® platform, and DTS factors are used for a number of asset classes in the POINT® Hybrid Performance Attribution Model and Global Risk Model.
DV01	The dollar duration or DV01 is defined as the derivative of the security with respect to its yield. It can also be seen as the product of modified duration and the price of the financial instrument.
ISMA Duration	ISMA duration is used in place of OAD for non-US securities. The major difference between these two measures is the assumption of an annual coupon instead of a semi-annual coupon in ISMA yield calculations.
ISMA Yield	Represents a standard yield to maturity calculation recommended by the International Securities Market Association (ISMA, formerly AIBD). The ISMA yield is compounded annually regardless of the coupon frequency.
Key Rate Duration (KRD)	A measure of the sensitivity of a security to a specified maturity range on the constant maturity par yield curve. The KRD maturities used are the 6m, 2y, 5y, (7y for JPY), 10y, 20y and 30y. The sum of the KRDs will not necessarily equal the OAD; the parallel shift OAD makes the assumption that all points on the yield curve are perfectly correlated (eg, they move in parallel), where KRD calculations assume a linear correlation for nearly all maturities. The shift size is 25bp for corporate bonds and 5bp for government and securitized issues.
Libor Option Adjusted Duration (L-OAD)	A measure of a security's sensitivity to interest rates. Barclays uses a lognormal option model and the current price of the bond to calculate the Libor-option adjusted spread (L-OAS) of the bond. Keeping L-OAS constant, L-OAD is calculated by shocking the par swap curve (as opposed to the par treasury curve for OAD) up and down by a fixed amount and measuring the resulting change in price. The shift size for computing L-OAD is 25bp for non-government securities and 10bp for government securities. For swaps, the size of the shift is 1bp.
Libor Option Adjusted Spread (L-OAS)	The Libor Option Adjusted Spread (L-OAS) is the constant spread that when added to all discount rates from the swap curve on the binomial interest rate tree model (used by Barclays) will make the theoretical value of the cash flows equal to the market price of the instrument.
Liquidity Cost Score (LCS)	A bond's LCS measures the cost (in basis points) of immediately executing a roundtrip transaction for a standard institutional trade.
Macaulay Duration	A measure of the weighted average time to maturity (in years) for an investor to receive the present value cash flows from a bond.
Maturity	The time (in years) for which an instrument remains outstanding. The term refers to a finite period at the end of which the instrument will no longer exist and the principal is repaid with interest.
Modified Duration	A measure of the effect that a 100bp change in interest rates will have on the price of a bond.
Mortgage Rate Duration	A measure of the price sensitivity to changes in the mortgage rate used in the term structure model. It can be thought of as the delta of the embedded prepayment option in an MBS where the option strike is the current mortgage rate.
Muni Duration	The duration of a tax-exempt municipal bond. It is calculated using the non-zero, non-callable AAA General Obligation (GO) Municipals curve, instead of a standard treasury-based yield curve.
Muni Yield	The yield for tax-exempt municipal bonds. It is yield to call if a bond is priced above its call price and yield to maturity when it is priced below the call price.

Nominal Duration	Calculated for inflation-linked securities as a beta-adjusted duration. Also referred to as Empirical Duration. Calculated for Series-L US TIPS only. The beta used is a 60-day trailing beta.
Nominal Yield	Represents the coupon rate on a bond. The nominal yield is the interest rate (to par value) that the bond issuer promises to pay the bond holders.
Option Adjusted Duration (OAD)	A measure of a security's sensitivity to interest rates. Barclays uses a lognormal option model and the current price of the bond to calculate the option adjusted spread (OAS) of the bond. Then keeping this OAS constant, OAD is calculated by shocking the par yield curve (as opposed to the zero or forward curves) up and down by a fixed amount and measuring the resulting change in price. The shift size for computing OAD is 25bp for non-government securities and 10bp for government securities. For swaps, the size of the shift is 1bp.
Option Adjusted Spread (OAS)	The constant spread that when added to all discount rates from the treasury curve on the binomial interest rate tree model (used by Barclays) will make the theoretical value of the future cash flows equal to the market price of the instrument.
Option Adjusted Spread Duration (OASD)	A measure of a security's price sensitivity to changes in the OAS. The shift size for computing the OASD is 25bp for non-government securities, 10bp for government securities and 1bp for interest rate derivatives.
Par Curve	Graph of the yields of hypothetical treasury bonds trading at par. On the par curve, the yield to maturity of a security is equal to its coupon. The par curve can be derived from the spot curve.
Real Duration	Calculated for inflation-linked bonds as the sensitivity in real prices to changes in real yield. Real duration calculations mirror standard calculations for nominal duration, but use real instead of nominal yields.
Returns OAD	Index-level OAD based on the returns universe of an index. Each bond contributes based on RU Security Market Value/RU Total Market Value, which effectively scales returns OAD downward for cash.
Real Yield	Represents an interest rate that has been adjusted to remove the effects of inflation. It reflects the real cost of funds to the borrower and the real yield to the lender. The real interest rate is calculated as the difference between the nominal rate and inflation projections.
Spline Curve	The treasury spot curve generated by a spline process. Barclays treasury curves are constructed via the Vasicek-Fong cubic exponential spline, which is a fitted parametric discount function that prices government zero coupon bonds at any maturity and models the discount factors as a weighted sum of exponential functions. The spline depends on parameters determined by minimizing the quadratic error of the market price of a given set of coupon bonds and sums their discounted cash flows.
Spot Curve	A representation of the term structure of interest rates in the government bond markets. Barclays swap curves are constructed via a bootstrap methodology. The spot curve can be used as a starting point to price any fixed income security and to derive the par or forward curves.
Spread to Benchmark	The quoted spread of a bond that is relative to the security off which it is priced, typically an on-the-run treasury (the 2y US Treasury bellwether, the 5y US Treasury bellwether, etc.). For MBS, this represents a calculated value, which is derived as the yield of the MBS generic minus the yield of the US Treasury bellwether with the closest average life to the MBS generic.
Statistics OAD	Index-level OAD based on the statistics universe of an index. Each bond contributes based on its current market value.
Vega	A measure of a security's sensitivity to implied volatility. Barclays uses a lognormal option model and the current price of the bond to compute option-adjusted analytics. The vega is computed by bumping the implied volatility in the stochastic interest rate model by 1% while keeping everything else constant.
Yield to Maturity	Represents the rate of return anticipated on a bond if held until its maturity. The YTM calculation takes into account the bond's current market price, par value, coupon interest rate and time to maturity under the assumptions that all cash flows received are reinvested at the same rate as the bond's current yield.
Yield to Worst	Represents the lowest potential yield that an investor would receive on a bond if the issuer does not default. The yield to worst is calculated by making worst-case scenario assumptions on the issue by calculating the returns that would be received if provisions, including prepayment, call or sinking fund, are used by the issuer. The YTW is used to evaluate the worst-case scenario for yield to help investors manage their risk and exposures.
ZV Spread	The zero-volatility spread represents the spread that the investor would realize over the entire treasury spot rate if the bond is held to maturity. It is the spread that makes the present value of the cash flows from corporate bond when discounted at the treasury spot rate plus the spread equal to the corporate bond's price.

Index Aggregation Values

Amount Outstanding	Par amount outstanding of a bond expressed in the index base reporting currency. Amount Outstanding for an index-eligible security is adjusted for full or partial calls, sink events and agency MBS prepayments. Float adjustments are also made to Amount Outstanding values in Barclays flagship indices for nominal and inflation-linked US Treasuries. It reflects the current amount outstanding of a bond in the statistics universe; changes to amount outstanding are reflected in a bond's contribution to index-level returns in the month following the adjustment.
Amount Outstanding BOM	This reflects the par amount outstanding of a bond at the beginning of the month and is held constant during the month within a given index. This is the outstanding value that determines a bond's contribution to index-level returns, along with beginning of the month price and accrued interest.
Amount Outstanding (Global Aggregate)	For each index-eligible security, Amount Outstanding (Global Aggregate) is calculated as a scaled unit that is used to determine Global Aggregate Index eligibility. The fixed minimum issue size for each local currency bond market is set to 300mn Amount Outstanding (Global Aggregate) units, establishing the ratio for calculation of this value for all bonds denominated in a given local currency. For example, a JPY-denominated bond with 35bn par amount outstanding, which is equal to the Global Aggregate minimum for JPY, would show an Amount Outstanding (Global Aggregate) value of 300mn, while a JPY-denominated bond with a 70bn par amount outstanding would show an Amount Outstanding (Global Aggregate) value of 600mn.
Amount Outstanding (Native)	Par amount outstanding of a bond expressed in the currency denomination of the bond. Amount Outstanding (Native) can be equal to the Amount Outstanding depending on whether the bond is denominated in the index base reporting currency. For example, a GBP-denominated bond would have Amount Outstanding expressed in EUR to reflect the base reporting currency of the Pan-European Aggregate Index, but Amount Outstanding (Native) would be expressed in GBP. A EUR-denominated bond would have both Amount Outstanding and Amount Outstanding (Native) expressed in EUR.
Capped Market Value	An instrument's market value adjusted to reflect bond-level weights within a constrained, composite or other alternative weight index. Within a given alternative weight index, the value that is displayed in the "Market Value" field will reflect the specific weighting scheme of the benchmark. "Capped Market Value" is not an explicit attribute that is available to index users.
Market Value	This reflects the current price, accrued interest and amount outstanding of a bond and is used in the aggregation of index-level statistics such as duration and yield. It is calculated as $[(\text{Ending Price} + \text{Accrued Interest}) * \text{Amount Outstanding}] / 100$. Index users looking at the Market Value field within the context of index that is constructed using an alternative weighting scheme will see a value that reflects the specified capping, composite weights, etc.
Market Value BOM	This reflects the market value of a bond at the beginning of the month and is held constant during the month for index purposes. This is the value that determines a bond's contribution to index-level returns and is a function of the beginning of the month amount outstanding, price and accrued interest.
RU Cash Market Value	Defined as $\text{RU Market Value} - \text{RU Security Market Value}$. RU Cash Market Value is used in the calculation of returns OAD, which is scaled downward for cash held in the index.
RU Market Value	Calculated as $[(\text{Price BOM} + \text{Accrued BOM}) * \text{Outstanding BOM}] * (1 + \text{Total Return})$. RU Market Value is used in the calculation of returns OAD, which is scaled downward for cash held in the index.
RU Security Amount Outstanding	For MBS and CMBS, calculated as the beginning of the month Amount Outstanding minus any Principal Payments. For bonds that have been reopened, calculated as the beginning of the month Amount Outstanding. For all other securities, calculated as the ending Amount Outstanding value. Used as an input for RU Security Market Value.
RU Security Market Value	Calculated as $[(\text{Ending Price} + \text{Ending Accrued}) * \text{RU Security Amt Outstanding}]$. RU Security Market Value is the numerator in the weighting of each bond's contribution to index-level OAD calculated on the returns universe.

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