Bloomberg Fixed Income Index Methodology

August 24, 2021

Bloomberg

Our global family of fixed income indices traces its history to 1973 when the first total return bond index was created. For nearly fifty years, these indices have been the market standard for fixed income investors seeking objective, rules-based, and representative benchmarks to measure asset class risk and return. On August 24, 2016, Bloomberg acquired these assets from Barclays Bank PLC. and co-branded the indices as the Bloomberg Barclays Indices for a term of five years. From August 24, 2021, we refer to them as the Bloomberg Fixed Income Indices.

In addition to the Bloomberg Fixed Income Indices, Bloomberg also offers other index families, including the Bloomberg AusBond, Commodity ("BCOM"), Currency Indices, and most recently Equity Indices.

- AusBond Indices are the leading fixed income benchmarks for Australia and New Zealand.
- BCOM are a family of benchmarks designed to provide liquid and diversified exposure to physical commodities through futures contracts.
- Currency Indices offer a real time measure of the underlying currencies against a diversified, dynamic basket of emerging and developed market currencies.
- Equity Indices are a complete set of global families covering over 99% of the available free float market cap in 49 developed and emerging countries.

These, among other, index families have separate methodologies and are not covered in the scope of this publication. These methodologies are available on the Bloomberg Terminal® and on the Bloomberg Index Website (www.bloomberg.com/indices).

While Bloomberg Index Services Limited ("BISL" and with its affiliates, "Bloomberg") 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 the methodology in a single publication. This guide supplements these index-specific documents to detail index rules and methodologies for most of the Bloomberg Indices 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

Understanding the 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 index group has dedicated teams of research analysts globally to work with clients on bespoke index and portfolio management solutions and assist clients with specific questions that may not be addressed in this methodology. 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.

Version Tracker*:

Date	Update	Owner
12 December 2018	Methodology Update for BMR requirements	Sherwood Kuo
29 April 2020	Methodology Update for ESG disclosures, as well as index changes and clarifications since previous version	Kate Onodi
24 August 2021	Methodology Update for end of co-branding agreement, and rules changes and clarifications since previous version	Kate Onodi

*For the latest updates and rules clarifications since the last version noted above, please see INP<GO> on the Bloomberg Terminal or contact a team member at indexhelp@bloomberg.net

Table of Contents

About Bloomberg Indices 5
Benchmark Index Design Principles 10
Benchmark Index Eligibility Rules 12
- Currency 13
- Sector 16
- Credit Quality 24
- Amount Outstanding 27
- Maturity 31
- Country 32
- Market of Issue 37
- Taxability 39
- Subordination 40

Benchmark Index Rebalancing Rules 42
Benchmark Index Pricing and Analytics 50
Benchmark Index Returns Calculations and Weighting Rules 54
Appendices 63
- Appendix 1: Total Return Calculations 63
- Appendix 2: Index Rules for Currency Hedging and Currency Returns 67
  - Currency Returns and Hedging for Series-B Indices 74
- Appendix 3: Detailed Discussion of Excess Return Computations 77
- Appendix 4: Benchmark Index Pricing Methodology 82
  - US Aggregate Index Components 82
  - Other US Indices 83
  - Pan-European Indices 84
  - Other Pan-European Indices 84
  - Asian-Pacific Indices 86
  - EM Local Currency Government Index-Eligible Currencies 87
  - Price Timing & Conventions for Nominal Bonds and Convertibles 87
  - Inflation-Linked Indices 89
- Appendix 5: Cloomberg Fixed Income Classification System and Codes 91
- Appendix 6: Glossary of Terms – Index Terms 93
- Appendix 7: Glossary of Terms – Index Analytics 99
- Appendix 8: Glossary of Terms – Index Aggregation Values 101
- Appendix 9: Index Governance and Index Methodology Considerations 102
- Appendix 10: Environmental, Social and Governance Disclosures 106

About Bloomberg Indices

BISL has two core index business lines: 1) Benchmark Indices and 2) Investable Index Products. 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 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 Bloomberg extends well beyond benchmark fixed income indices to include investable index products

The Bloomberg 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 index products and services offered by Bloomberg 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.). Portfolio analytics and portfolio modeling are complementary functions available through the PORT portfolio management platform available through the Bloomberg Terminal.

With dedicated teams in the US, Europe and Asia, Bloomberg is able to offer products and services for a broad array of investor types and portfolio management functions. By firm type, users of Bloomberg Indices and Bloomberg portfolio analytics and services include asset managers, insurance companies, pension funds/plan sponsors, investment banks, 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 Bloomberg Indices and Bloomberg 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.

Benchmark Indices

The Bloomberg 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 processes. With broad product coverage, a strong history of innovation, and objective and transparent rules, BISL has continually been recognized as the top index provider.[1] Bloomberg Indices are also the most widely used benchmarks for fixed income exchange traded funds ("ETFs").

History and Evolution

The Bloomberg index brand can trace its roots back more than 40 years, to 1973, with the launch of the US Government and US Corporate Indices

The Bloomberg Indices can trace their 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 researchers[2] 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.

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

[1] Based on Evestement data for fixed income indices.

[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. It was subsequently acquired by Barclays in 2008, and then by Bloomberg in 2016.

to include Mortgage Backed Securities ("MBS") securities. This expanded second-generation macro index was called the US Aggregate Index and was backfilled 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 the 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, the Global Aggregate in 1999, and the Asian-Pacific Aggregate in 2000

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, was 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, 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 LDI Index family was launched as a new replicable benchmark for US liability driven investors.

The evolution of indices continues at Bloomberg. In March 2017, Global Aggregate + China and EM Local Currency Government + China Indices were launched to incorporate China's RMB-denominated government and policy bank debt. In March 2018, Bloomberg began adding Chinese RMB-denominated government and policy bank debt into the flagship Global Aggregate Index in April 2019.

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 Bloomberg 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 Bloomberg 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

[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 remained as two distinct offerings: Series-B and Series-L Indices, respectively.

weights. In 2013, Bloomberg MSCI ESG Fixed Income Indices were introduced to offer debt investors a new market standard for benchmarks that formally integrate Environmental, Social and Governance criteria into their design. In addition, Bloomberg 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. In 2014, the Green Bond family of indices was launched to track bonds that use proceeds for environmental purposes.

Product Coverage

Bloomberg 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 120 countries and 42 local currency debt markets. Bloomberg 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. Bloomberg 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 benchmark index platform, there has been increased demand for bespoke measures of asset classes that may be more consistent with investor-specific portfolio objectives.

Bloomberg 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, Bloomberg 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 the index platform are shown in Figure 1.

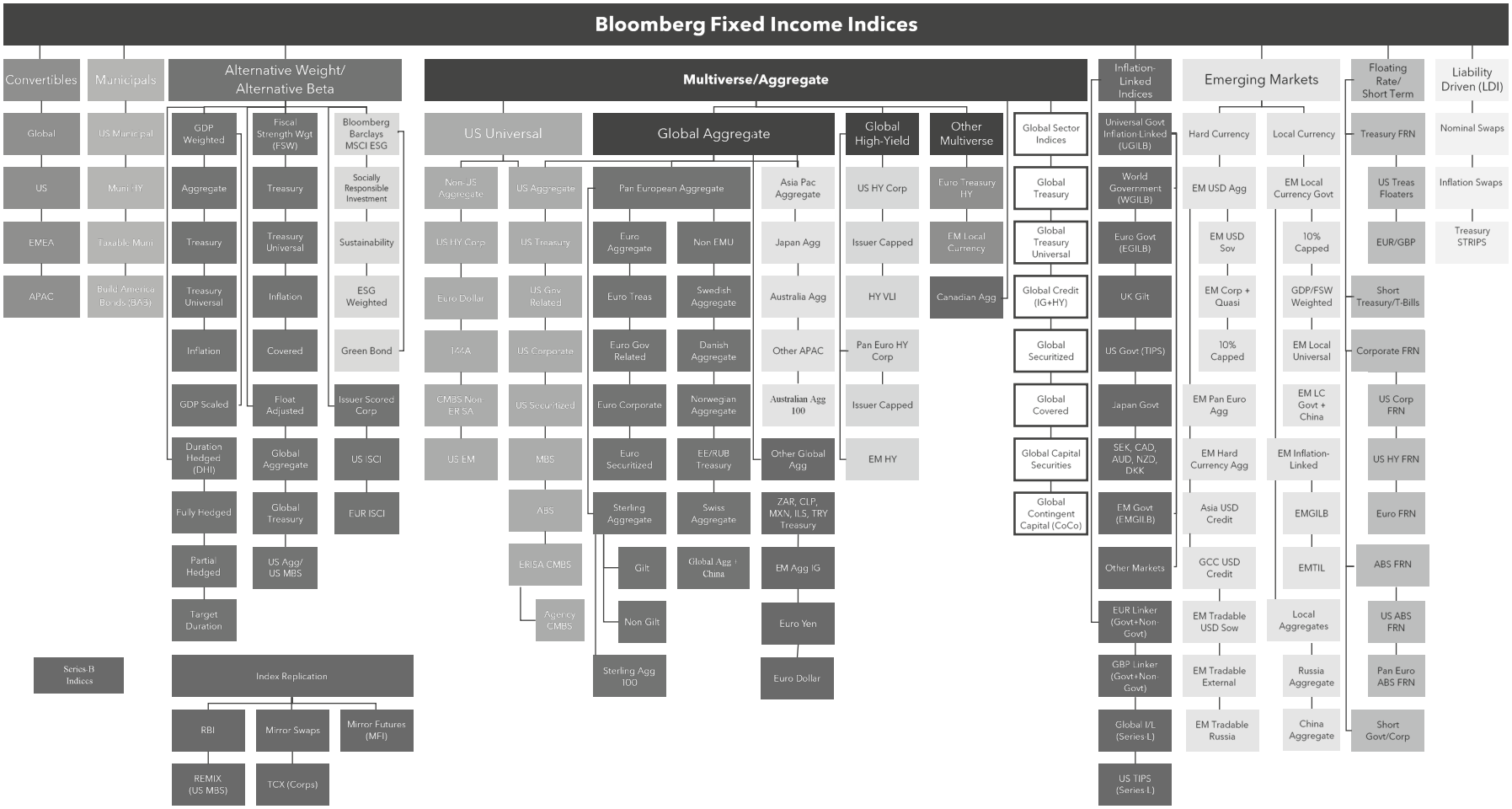
Figure 1
Common Types of Index Customizations

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

Replication Strategies

The index 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 (e.g., portable alpha strategies). Bloomberg also licenses its indices to third parties for use in index replication products, such as ETFs.

Figure 2
Bloomberg Fixed Income Indices[4]



[4] While this methodology intends to cover the general construction of most Bloomberg indices, not all of the rules discussed in this publication apply to all indices (e.g. Convertibles), while other indices have differing methodologies (e.g. Index Replication, Breakeven Inflation, Leveraged, etc.). Hence, these other indices are covered in separate publications. See INP<Go> on the Terminal or contact indexhelp@bloomberg.net for assistance in accessing these supplemental materials.

Benchmark Index Design Principles

The widespread use of Bloomberg 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 Bloomberg 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 Bloomberg 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 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 Bloomberg Indices

Understanding Portfolio Uses of Benchmark Indices

Bloomberg 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 (e.g., 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, Bloomberg 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, Bloomberg recognizes that no single benchmark design is universal or appropriate for all investors. The goal of Bloomberg Fixed Income Indices 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 as well as part of an overall asset allocation mix. As an index provider, Bloomberg remains impartial to the benchmark selection decisions made by investors.

No single benchmark design is universal or appropriate for all investors. The goal of Bloomberg Indices 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 Bloomberg 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 a 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 Bloomberg Indices and their evolution.

Bloomberg Benchmark Index Governance

Please see Appendix 9 for details on Bloomberg's index governance and control framework.

Benchmark Index Eligibility Rules

Bloomberg Fixed Income 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, Bloomberg 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 Bloomberg through a formal governance process that seeks stakeholder feedback to ensure they remain relevant and representative of asset class changes in an evolving market.

A common core set of security-level attributes are used to determine index eligibility for most fixed income indices

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 section explains the most commonly used bond index eligibility criteria and how they are applied to a variety of Bloomberg benchmark fixed income index families. The criteria include:

- **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.[5] 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 an 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.

Additional attributes that are used to determine index inclusion include whether a bond contains explicit **optionality** on the earlier repayment of principal (callable, putable, etc.), the **coupon type** used to determine interest payments (fixed- vs. floating-rate), as well as other considerations, such as sanctions. [6]

[5] Canada Aggregate family of indices additionally employ DBRS bond ratings beginning in August 2018.

[6] New debt from issuers on either the US Office of Financial Assets Control (OFAC) sectoral sanctions identification list that are considered restricted transactions for US persons or on the EU sanctions list are not eligible for Bloomberg Indices. Existing debt currently included in indices is typically eligible, but may be reviewed to see how the sectoral sanctions have affected their liquidity and investability. If sanctions are lifted, the Bloomberg Index team will review the affected bonds to determine whether they have become eligible to re-enter the index, provided they still meet all other index eligibility criteria.

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, Bloomberg 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 research teams. Often, index eligibility rules are reviewed 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 index group.

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. The Bloomberg benchmark index platform 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. Bloomberg evaluates local currency inclusion candidates for benchmarks such as the Global Aggregate and EM Local Currency Government 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 (duration, convexity, spread, etc.).

Local Currency Market Inclusion

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

The eligibility of local currency debt markets in broad-based, multi-currency indices is reviewed annually by Bloomberg. Historical inclusion by market is listed in Figure 3.

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 index 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.

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 the indices' EM definition.

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 characterized as difficult to gain exposure to[7] 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 Croatian, Egyptian, Indian and Taiwanese government bond markets are tracked but included only in the EM Local Government Universal Index, the broadest measure of EM local debt.[8]

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. To be considered for index inclusion, 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 index credit quality methodology).

Having fulfilled the qualitative assessment, 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 Refinitiv: WM/Reuters Closing Spot Rates at 4pm London time 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 assessment applies only to developed markets that have initiated a new linker program or revived an inactive one. For markets already included in the WGILB Index, market size is reviewed 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.

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 the end of third quarter of 2013, 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 first quarter of 2014.

[7] This is generally due to the presence of capital controls, quotas or other institutional constraints.
[8] Croatia and Egypt exited the flagship EM Local Currency Government Index in April 2014.

Figure 3
Index Inclusion by Currency

Currency	Global Aggregate Inclusion	WGILB Inclusion	EM Local Currency Government Inclusion
Argentine peso (ARS)	-	-	July 1, 2008 (added) July 1, 2011 (removed) August 1, 2017 (added)
Australian dollar (AUD)	January 1, 1990	January 1, 1997	-
Brazilian real (BRL)	-	-	July 1, 2008
British pound (GBP)	January 1, 1990	January 1, 1997	-
Canadian dollar (CAD)	January 1, 1990	January 1, 1997	-
Chilean peso (CLP)	January 1, 2005	-	July 1, 2008
Chinese renminbi (CNY)	April 1, 2019***	-	April 1, 2019***
Offshore Chinese renminbi (CNH)	-	-	April 1, 2013*
Colombian peso (COP)	September 1, 2020	-	July 1, 2008
Croatian kuna (HRK)	-	-	July 1, 2008*
Czech koruna (CZK)	January 1, 2005	-	July 1, 2008
Danish krone (DKK)	January 1, 1990	April 1, 2014	-
Egyptian pound (EGP)	-	-	July 1, 2008*
European euro (EUR)	January 1, 1990	October 1, 1998 (France) October 1, 2003 (Italy added) April 1, 2006 (Germany) August 1, 2012 (Italy removed) April 1, 2015 (Italy, Spain added)	-
Hong Kong dollar (HKD)	September 1, 2004	-	-
Hungarian forint (HUF)	January 1, 2005 (added) November 1, 2013 (removed) April 1, 2017 (added)	-	July 1, 2008
Indian rupee (INR)	-	-	July 1, 2008*
Indonesian rupiah (IDR)	June 1, 2018 (added)	-	July 1, 2008
Israeli shekel (ILS)	January 1, 2012	-	July 1, 2008
Japanese yen (JPY)	January 1, 1990	May 1, 2005	-
Malaysian ringgit (MYR)	January 1, 2006	-	July 1, 2008
Mexican peso (MXN)	January 1, 2005	-	July 1, 2008
New Zealand dollar (NZD)	January 1, 1990	January 1, 2014	-
Nigerian naira (NGN)	-	-	April 1, 2013*
Norwegian krone (NOK)	January 1, 1990	-	-
Peruvian sol (PEN)	September 1, 2020	-	July 1, 2008
Philippine peso (PHP)	-	-	July 1, 2008
Polish zloty (PLN)	January 1, 2005	-	July 1, 2008
Romanian leu (RON)	September 1, 2020	-	April 1, 2013
Russian ruble (RUB)	April 1, 2014	-	July 1, 2008
Singapore dollar (SGD)	January 1, 2002	-	-
South African rand (ZAR)	January 1, 2005 (added) May 1, 2018 (removed)	-	July 1, 2008
South Korean won (KRW)	January 1, 2002	-	July 1, 2008
Swedish krona (SEK)	January 1, 1990	January 1, 1997	-
Swiss franc (CHF)	January 1, 2010	-	-
Taiwan dollar (TWD)	January 1, 2006 (added) January 1, 2012 (removed)	-	April 1, 2013*
Thai baht (THB)	January 1, 2002 (added) March 1, 2007 (removed) July 1, 2008 (added)	-	July 1, 2008
Turkish lira (TRY)	April 1, 2014 (added) October 1, 2016 (removed)	-	July 1, 2008
US dollar (USD)	January 1, 1990	January 1, 1997	-

Note: *Eligible for the Bloomberg Emerging Markets Local Currency Government Universal Index only. ** Italy was removed from the WGILB on August 1, 2012 due to the credit rating rule for the WGILB Indices at the time. Eurozone ascension currencies that were historically index eligible before adopting the EUR include the Slovak koruna ("SKK") and the Slovenian tolar ("SIT"). ***On April 1, 2019, Bloomberg began adding Chinese RMB-denominated government and policy bank securities to the Global Aggregate Index over a 20-month period.

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, Bloomberg 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.

Bloomberg Fixed Income Classification System

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

The Bloomberg global sector classification scheme is a widely accepted standard for investors benchmarked to the flagship Bloomberg 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.[9]

The indices' 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 that is both enduring and allows for meaningful peer group comparisons.[10]

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 indices' global sector classification scheme can be found in Figure 4.[11] A table with classification codes is provided in Appendix 5.

Figure 4
Bloomberg Fixed Income Classification System

Class 1	Class 2	Class 3	Class 4
Treasury			
Government-Related	Agencies	Government Guarantee	
		Government Owned No Guarantee	
		Government Sponsored	
	Local Authorities		
	Sovereign		
	Supranational		
Corporate	Industrial	Basic Industry	Chemicals, Metals & Mining, Paper
		Capital Goods	Aerospace & Defense, Building Materials, Construction Machinery, Diversified Manufacturing, Environmental, Packaging

[9] 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).
[10] 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.
[11] The Bloomberg Fixed Income Classification System has been designed for fixed income securities and may at times diverge from the Bloomberg BICS classification scheme, which was designed for equities.

Class 1	Class 2	Class 3	Class 4
		Communications	Cable & Satellite (called Media Cable prior to July 2014), Media & Entertainment (called Media-Non-Cable prior to July 2014), Wireless, Wirelines
		Consumer Cyclical	Automotive, Consumer Cyclical Services, Gaming, Home Construction, Leisure (called Entertainment prior to July 2014), Lodging, Restaurants, Retailers*
		Consumer Non-Cyclical	Consumer Products, Food & Beverage, Healthcare, Pharmaceuticals, Supermarkets, Tobacco
		Energy	Independent, Integrated, Midstream (added in July 2014), Oil Field Services, Refining
		Technology	
		Transportation	Airlines, Railroads, Transportation Services
		Other Industrial	
	Utility	Electric	
		Natural Gas**	
		Other Utility	
	Financial Institutions	Banking	
		Brokerage, Asset Managers, Exchanges (called Brokerage prior to July 2014)	
		Finance Companies***	
		Insurance	Health Insurance, Life, P&C
		REITS	Apartment, Healthcare, Office, Retail, Other
		Other Financial	
Securitized	MBS Pass-Through	Agency Fixed-Rate^	GNMA 30y, GNMA 15y, Conventional 30y, Conventional 20y, Conventional 15y†
	ABS	Credit Card	
		Auto	
		Student Loans	
		Residential Mortgages	
		Whole Business	
		Stranded Cost Utility	
		ABS Other	
	CMBS	Agency CMBS	
		Non-Agency CMBS	
	Covered	Mortgage Collateralized	Pfandbriefe, Jumbo Pfandbriefe, Non-Pfandbriefe
		Public Sector Collateralized	Pfandbriefe, Jumbo Pfandbriefe, Non-Pfandbriefe
		Hybrid Collateralized	
		Other	Pfandbriefe, Non-Pfandbriefe

* Textiles was a Class 4 sub-sector prior to July 2014.
** Distributors and Pipelines were Class 4 sub-sectors prior to July 2014.
*** Non-Captive Consumer and Non-Captive Diversified were Class 4 sub-sectors prior to July 2014. Captive Finance sub-sector was retired in 2003.
† Class 4 granularity was added in July 2014.
^ Hybrid ARMs were retired in June 2017.

Sector Hierarchy and Definitions for Taxable Indices

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

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

Government-Related (Class 1)

The government-related sector groups all issuers with government affiliations in a single category. It has four sub-sectors: Agencies, 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 or from government agencies that carry direct guarantees from central government. 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[12] but issue debt that carries no guarantee of timely repayment. This includes direct ownership by 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.
- **Local Authority (Class 2)**: Debt issued directly by local authorities and by entities that are 50% or more owned 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.
- **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.
- **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 Bloomberg Indices' 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, revenue streams and operations that are used to service their debt. Classifications are frequently reviewed by the index group in response to market events, changes in an issuer's ownership structure, mergers and acquisitions, divestitures, or changes in the 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. The indices' bond classifications are specific to the global debt market and consist of peer group definitions that include 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 classification scheme: Industrial, Financial Institutions and Utilities. Further classifications at the

[12] 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.

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, Construction Machinery, Diversified Manufacturing, Environmental and Packaging.
  - **Communications (Class 3)**: Class 4 sub-sectors include Cable & Satellite (called Media-Cable prior to July 2014), Media & Entertainment (called Media Non-Cable prior to July 2014), Wireless and Wirelines.
  - **Consumer Cyclical (Class 3)**: Class 4 sub-sectors include Automotive, Consumer Cyclical Services, Gaming, Home Construction, Leisure (called Entertainment prior to July 2014), Lodging, Restaurants and Retailers.[13]
  - **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, Midstream (added in July 2014), Oil Field Services and Refining.
  - Technology (Class 3)
  - **Transportation (Class 3)**: Class 4 sub-sectors include Airlines, Railroads and Transportation Services.
  - Other Industrial (Class 3)
- **Utilities (Class 2)**
  - Electric (Class 3)
  - Natural Gas (Class 3)[14]
  - Other Utility (Class 3)
- **Financial Institutions (Class 2)**
  - Banking (Class 3)
  - Brokerage, Asset Managers and Exchanges (Class 3)[15]
  - Finance Companies (Class 3)[16]
  - **Insurance (Class 3)**: Class 4 sub-sectors include Health Insurance, Life and P&C.
  - **REITS (Class 3)**:[17] Class 4 sub-sectors include Apartment, Healthcare, Office, Retail, 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

[13] Textiles sector was retired on July 1, 2014.
[14] In July 2014, Class 4 sub-sectors for Distributors and Pipelines were retired. Pipeline issuers and non-investment grade natural gas distributors were reclassified to the newly created Midstream sub-sector, and investment grade natural gas distributors remained under Natural Gas.
[15] 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.
[16] 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 one is 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.
[17] Industrial issuers that have reorganized or are structured as REITS for tax purposes are classified within their respective industrial peer group.

mortgages, public sector loans, auto loans or credit card payments.[18] 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 the indices.[19] Beginning July 2019, the indices reflect both 45- and 55-day delay Freddie securities to reflect the UMBS initiative.
  - **Agency Fixed-Rate (Class 3)**: Sub-sectors include GNMA 30 Year, GNMA 15 Year, Conventional 30 Year, Conventional 20 Year, and Conventional 15 Year.[20]
  - **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, Class 3 sub-sectors are based on collateral types, though not all are represented in fixed- or floating-rate indices: auto, credit card, residential mortgages, stranded cost utility, student loans and whole business.[21]
- **CMBS (Class 2)**: CMBS are backed by commercial real estate loans or multi-family properties. Effective July 2014, Class 3 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).[22] Investors having recourse to the originator is the defining difference between covered bonds and ABS.[23] 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 collateralized 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.[24]
  - **Other (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

Bloomberg looks at several factors when assigning a new classification or reviewing a current classification

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

[18] Instruments such as CMOs that package other bonds into a new security are not index-eligible.
[19] Hybrid ARMs Class 3 sector was retired on June 1, 2017.
[20] MBS balloons were retired on January 1, 2008.
[21] ABS home equity loan sector was retired on October 1, 2009, and manufactured housing sector was retired on January 1, 2008. Starting from May 1, 2021, the ABS sector also includes motorcycle ABS (under the Auto ABS class), equipment ABS (under Other ABS class), and device payment plan (also under Other ABS class).
[22] For purposes of rules clarity, the Covered Bond Index will exclude bonds that primarily contain fixed income securities issued by third parties (other than the issuer) in the cover pool.
[23] 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.
[24] There are no hybrid Pfandbriefe, so there are no Class 4 sub-sectors.

- **Corporate Actions**: In the case of corporate actions, such as a merger, acquisition or spin-off, the classifications may be updated to better reflect the business lines of the new entities.[25] 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.
- **Change in Government Ownership**: A move between corporate and government-related may result from a decrease or increase in a government's ownership stake.[26] 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 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.
- **Evolution of Business Lines**: If the business lines of a corporate entity shift, it could be reclassified to reflect its new peer group. For example, 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 indices was updated from Financial Institutions > Finance Companies to Financial Institutions > Banking.

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, Bloomberg evaluates all publicly available information on a given entity to assign the most appropriate classification.

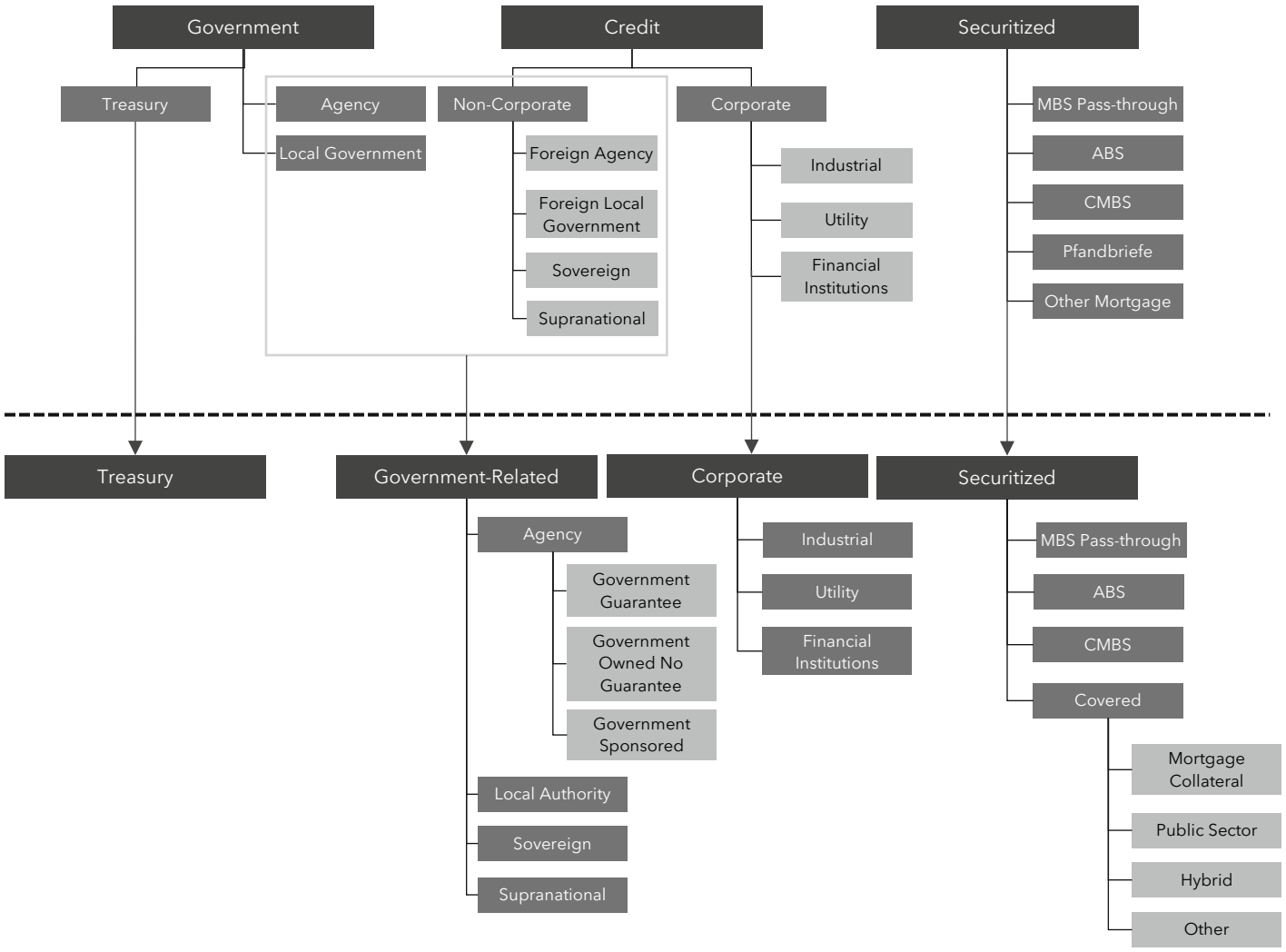
Evolution of the Bloomberg Fixed Income Classification System

As discussed above, bonds are divided into four main sectors at the Class 1 level in the Bloomberg classification scheme. Prior to January 2005, a three-pillar scheme was used, classifying bonds into government,[27] 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 5 provides the relationship between the classification scheme before and after the change.

[25] Due to potential uncertainty and complications surrounding corporate actions, changes to classifications for index purposes take effect after the close of transaction rather than following the announcement.
[26] 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.
[27] 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 (Series-B) indices, including Bloomberg Government Inflation-Linked and Bloomberg Government (Series-B) Indices, define "government" as including only treasury bonds (local currency debt issued by central governments).

Figure 5
Bloomberg Sector Classification Scheme: Before and After January 1, 2005



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

Municipal Index Classifications

Due to the unique nature of this asset class, Bloomberg 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 Bloomberg Municipal Bond Index are categorized into the following sector types[28]:

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

[28] Effective November 2019, US Municipals classification system was enhanced with extra granularity, and a previously used fourth sector type, Insured, has been retired.

Municipal bonds are also classified into municipal-specific classes 2 and 3. The scheme is detailed in Figure 6.

Figure 6
Municipal Index Classification Scheme

Class 1	Class 2	Class 3
Municipals	State	State
	Local	County
		City
		Tax Backed District
		School District
		Guaranteed
	Education	Higher Education
		Private Schools
		Charter Schools
	Health Care	Hospitals, Treatment/ Research Centers
		Nursing Homes/ Assisted Living
		Continued Care Retirement Center
	Lease	Education Lease
		Ad Valorem Lease
		Government Lease
		Appropriation
	Housing	Single Family
		Multi Family
		Student Housing
	IDR/ PCR	Tobacco
		Gas Forwards
		Resource Recovery
		Economic and Industrial Development
	Power	Electric and Public Power
		Combined Utilities
		Water/ Sewer
	Transportation	Airport
		Tollroad, Bridges & Tunnels
		Farebox (Mass & Rapid Transit)
		Port/ Marina
		Parking Facilities
	Special Tax	Sales Tax
		Bond Bank
		Special Assessment
		Miscellaneous Tax
		Income Tax
		Tax Increment Financing
		Mello Roos
	Other	Other

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. Bloomberg 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.

Bloomberg Index Rating

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

Bloomberg uses the middle rating of Moody's, S&P and Fitch[29] to determine a security's credit classification or index rating.[30] This essentially works as a "two-out-of-three" rule because at least two of the three agencies need to rate a bond as investment grade to qualify it for investment grade indices (or two agencies to rate it as high yield to qualify it for the high yield indices).

If only two agencies rate a security, the more conservative (lower) 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.[31]

Below are three examples using specific issues as of August 31, 2018:

1. Murphy Oil Corp., 7.05% Coupon, Maturing May 1, 2029
   Moody's Rating: Ba3
   S&P Rating: BBB-
   Fitch Rating: BB
   Index Rating: Ba2/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. Devon Energy Corp., 5.6% Coupon, Maturing July 15, 2041
   Moody's Rating: Ba1
   S&P Rating: BBB
   Fitch Rating: BBB+
   Index Rating: Baa2/BBB

   This issue has an index rating of Baa2/BBB because the Moody's rating (lowest) and the Fitch rating (highest) would be dropped.

   Sysco Corp., Coupon 3.3%, Maturing July 15, 2026
   Moody's Rating: A3
   S&P Rating: BBB+
   Fitch Rating: NR
   Index Rating: Baa1/BBB+

   This issue has an index classification of Baa1/BBB+, as Fitch rating is not available, and the more conservative S&P rating of the two available ratings is taken.

[29] Bloomberg does not currently supplement the ratings of Moody's, Fitch and S&P with that of other ratings agencies for most asset classes or sub-sets of the global fixed income markets for index purposes (except the Canadian Aggregate Indices). However, the use of additional ratings sources is reviewed with index users on a periodic basis through the annual governance process.
[30] Though S&P and Fitch ratings are used in determining an index rating, Moody's nomenclature is used for all bonds. Ratings may be solicited or unsolicited.
[31] The only indices that additionally employ a fourth rating agency, DBRS, in the determination of index rating are the Canadian Aggregate family of indices beginning on August 1, 2018. For these indices only, index rating is determined by removing the highest and lowest of four ratings, and taking the lower of the two remaining ratings. If fewer than four ratings are available, the existing standard methodology based on three or fewer ratings is used.

Evolution of the Index Rating Methodology

Bloomberg 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.[32]

Of the three agencies used for most indices, 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.[33]

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 the 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.[34] 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 between S&P and Moody's for index inclusion purposes.[35] Index user interest in an even 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 of three ratings.

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 sovereign[36] rating from Moody's, Fitch and S&P for all outstanding bonds even if bond-level ratings are available.[37] 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.[38] 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.[39]

[32] The three ratings agencies used for most indices are widely accepted and followed by index users in their own credit evaluations, and offer wide coverage of the global fixed income markets.
[33] 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 instead.
[34] Index user interest in the use of additional ratings agencies gained considerable momentum after credit market volatility in 2002.
[35] 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.
[36] The long-term local currency sovereign rating is used for treasury issues; the long-term foreign currency sovereign rating is used for sovereign issues for all currencies except USD and CAD. For sovereign bonds denominated in USD and CAD, bond-level ratings are used.
[37] 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.
[38] US Agencies are assigned the same rating as US Treasuries.
[39] Effective May 1, 2018, if the local sovereign debt of a currency is not eligible for the Global Aggregate Index, then no other securities denominated in that currency will be eligible, regardless of the securities' issue-level ratings.

Classifications when Bond-Level Ratings are Unavailable

Credit quality may be assigned using an expected rating, issuer rating or sovereign rating 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 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, Bloomberg may apply the issuer rating that exists on any existing senior bond. For unrated subordinated securities, Bloomberg may apply the issuer subordinated rating. In cases where there is no subordinated rating, subordinated bonds will be excluded from the 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.

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. The index rating of each bond 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 (Figure 7).

Figure 7
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-

Numeric Value	Index Rating	Moody Rating	S&P Rating	Fitch Rating
21	Ca	Ca	CC	CC
22	C	C	C	C
23	D	D	D	D
24	NR	NR	NR	NR

Note: S&P and Fitch used AAA+ to distinguish between US government-backed bonds and other explicit AAA rated securities. The AAA+ rating was originally assigned a numeric value of 1, but has been retired in 2005.

Defaulted Securities

For index purposes, a security is considered to be in default if it missed a scheduled interest or principal payment, has an index rating of "D" based on the indices' credit quality methodology or is trading flat. Defaulted bonds from corporate issuers are not eligible for Bloomberg 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. 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, Bloomberg allows defaulted sovereign bonds to remain eligible for indices, such as the EM USD Aggregate Index.

For US municipals, a bond is considered to be in default if an issuer misses a principal and/ or an interest payment.

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, Bloomberg Indices have a minimum amount 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, US Aggregate Index and EM Local Currency Government Index are the same.[40] Different minimums are used for the 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.[41]

Local Currency Minimums

Global Aggregate and EM Local Currency Minimum Issue Sizes

Local currency minimums are based on market-specific issuance and benchmark issue sizes, and a comparison of

Effective April 2013, Bloomberg Indices use fixed minimum issue sizes for each local currency bond market.[42] 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

[40] US Aggregate minimum amount outstanding was increased to match that of Global Aggregate Index on April 1, 2017.
[41] Prior to April 2013, hard currency emerging market corporate bond issuers were subject to a USD1bn minimum issuer size constraint.
[42] Prior to April 2013, local currency minimums were set for non-G4 currencies by converting each currency into either USD, GBP, EUR or JPY, based on region, using exchange 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.

thresholds across markets to ensure similar size standards

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 Bloomberg's formal governance process to ensure an accurate representation of each market. Figure 8 lists minimum amounts outstanding for the Bloomberg Indices.[43]

Rules for Indices with Higher Minimum Issue Sizes

Higher liquidity versions of the Global Aggregate and 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.

Figure 8
Fixed Local Currency Minimums for Bloomberg 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	150,000**	600,000	-
		MXN	10,000,000	300,000 (UDI)	-
		COP	1,000,000,000	1,000,000 (UVR)	-
		PEN	1,000,000	-	-
		CLP	100,000,000	1,000 (UF)	-
	EM Local Currency Eligible	BRL	1,000,000	400,000	-
EMEA	Global Aggregate Eligible	CHF	300,000	-	100,000
		CZK	10,000,000	-	-
		DKK	2,000,000	5,000,000	-
		EUR	300,000	500,000	100,000
		GBP	200,000	300,000	50,000
		HUF	200,000,000	-	-
		ILS	2,000,000	1,500,000	-
		NOK	2,000,000	-	500,000
		PLN	2,000,000	500,000	-
		RON	1,000,000	-	-
		RUB	20,000,000	-	-
		SEK	2,500,000	4,000,000	1,000,000
	EM Local Currency Eligible	EGP	3,000,000	-	-
		HRK	3,000,000	-	-
		NGN	100,000,000	-	-
		TRY	2,000,000	500,000	-
		ZAR	2,000,000	400,000	-
Asia	Global Aggregate Eligible	AUD	300,000	700,000	-
		CNY	5,000,000	-	-
		HKD	2,000,000	-	-
		IDR	2,000,000,000	-	-
		JPY	35,000,000	50,000,000	-
		KRW	500,000,000	500,000,000	-
		MYR	2,000,000	-	-

[43] Effective April 1, 2017, the tranche size minimum for ABS and CMBS securities was lowered to USD25mn in the Global Aggregate. US MBS pool aggregates must have at least USD1bn amount outstanding to be eligible for the US Aggregate and Global Aggregate Indices, effective April 1, 2014.

Region		Currency	Global Aggregate/Global Treasury/EM Local Currency Minimum (000s)	Inflation-Linked Minimum (000s)	High Yield Corporate Minimum (000s)
		NZD	500,000	1,000,000	-
		SGD	500,000	-	-
		THB	10,000,000	20,000,000	-
	EM Local Currency Eligible	CNH	1,000,000	-	-
		INR	25,000,000	-	-
		PHP	20,000,000	-	-
		TWD	15,000,000	-	-

* The minimum for MBS generics is USD1bn as of April 2014.

** Canadian Aggregate minimum amount outstanding was lowered from CAD300mn to CAD150mn effective August 1, 2018.

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 8). 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 9).

- The US Aggregate Index has a minimum issue size of USD300mn for government, credit and covered bonds (as of April 1, 2017).
- 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).[44]
- 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.[45]

Figure 9
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.
April 2017	Minimum raised from 250mn to 300mn for non-securitized bonds.

Other Bloomberg Flagship Indices

High Yield Indices

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

[44] As of June 1, 2017, Hybrid ARMs were removed from the US Aggregate and retired as a stand-alone index. The US Aggregate in its entirety is included in the Global Aggregate Index.

[45] The Bloomberg Indices also offer broader CMBS indices that have no minimum tranche size rule and apply only original and current deal size constraints.

- 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.[46]

EM Hard Currency Indices

For the EM Hard Currency Aggregate Indices, higher minimum issue sizes are used: USD500mn, EUR500mn and GBP500mn. These are applied to the EM Hard Currency Aggregate family only.[47]

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 Bloomberg 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

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

For Bloomberg 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 debt.

- 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 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 to USD2bn to prevent unnecessary turnover due to short-term fluctuations in exchange rates or issuance. The existing market minimum is assessed on an annual basis.

Float Adjustments to Amount Outstanding

US Treasuries

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

Federal Reserve purchases and sales of nominal and inflation-linked US Treasuries in open market operations are adjusted in the Bloomberg 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.[48] These reports are released weekly by the Fed, usually Thursdays around 4:30pm New York time.

Adjustments to each security's amount outstanding are made in the Projected Universe for government purchases and sales for the Federal Reserve SOMA (System Open Market Account) on a weekly basis, typically on Fridays.[49] When US Treasury nominal or inflation-linked bonds are issued or reopened, the initial par amount outstanding that enters the Projected Universe is reduced for any issuance bought by the Federal Reserve at auction.[50]

[46] Prior to 2014, the Pan-European HY minimums were set as one-third of Global Aggregate minimums for each eligible currency.
[47] 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.
[48] https://www.newyorkfed.org/markets/soma/sysopen_accholdings.html.
[49] 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.
[50] 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 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

Bloomberg offers a series of Float-Adjusted Indices that adjust the par amount outstanding for central government holdings of other asset classes.[51] 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. These adjustments to each security's amount outstanding are made on a monthly basis in the Projected Universe,[52] and are reflected in the Returns Universe in the following month.

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 of the bond will be adjusted accordingly.[53]

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 estimated 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 Bloomberg 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.[54] 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.

Maturity

Most flagship Bloomberg Aggregate, High Yield, Inflation-Linked and Emerging Markets Indices have a minimum remaining time to maturity[55] 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, Bloomberg will generally use the lower bound when setting

[51] Central bank purchases of these securities are reflected in the Float Adjusted Indices.
[52] The monthly float adjustments are reflected in the Projected Universe usually around the 17th US business day. All securities use the latest data available at the time when float adjustments process is done, except for US MBS (which use Fed holdings as of the last Wednesday of the prior month).
[53] Excluded from Bloomberg Indices are sinkable local currency Russian OFZ bonds that were index-eligible prior to April 2014, but removed from the indices due to liquidity reasons.
[54] 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 Bloomberg Indices. Bonds that are partial PIK and partial cash pay are excluded.
[55] Actual value of time to maturity is calculated based on the day count convention of each bond.

a maturity range. For example, a 1-5 year index will generally include bonds with a maturity of between 1 and up to, but not including, 5 years as of the index rebalancing date.

Index Eligibility and Classification by Maturity

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

Bloomberg uses time to final maturity to determine index inclusion and classify bonds by their remaining term. 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.[56]
- 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.

For widely used benchmark indices, the index flag will automatically be updated on the first day of the month for securities dropping out of the Projected 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 Projected 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.[57]

Sub-Indices by Maturity

Sub-indices by maturity are inclusive of lower bounds

For sub-indices by maturity, Bloomberg will generally use the lower bound when setting a maturity range. Bloomberg 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.

Country

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

Country designation in Bloomberg Indices represents country of risk

Bloomberg Indices use a "country of risk" approach to determine country classifications.[58] For government, government-related and corporate bond issuers that are operating, domiciled or concentrated within a single market, country classification is generally a straightforward exercise. For corporates or other issuers with geographically diverse operations, complex ownership structures, a presence in multiple locations[59] or other risk exposures that span multiple markets, country classifications are more challenging. The primary criteria for classifying country of risk are:

[56] MBS analytics are calculated assuming same-day settlement.
[57] 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.
[58] Effective end of September 2019, the Indices' country of risk is sourced from Bloomberg Country of Risk (CoR) field. However, prior to September 2019, the two country of risk designations may have differed.
[59] Not all bonds under a ticker will have the same country of risk. The indices' framework 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; this is determined based on where the subsidiary operates in relation to the parent entity.

- 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.[60]

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 domiciled[61] 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

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

For certain large and complex issuers, cases can be made for a number of different country classifications using the criteria outlined above. Furthermore, even with established criteria, country classifications can change over time due to various factors. A few examples of recent country reassignments that illustrate some of these complexities include:

- 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.
- 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.
- In September 2012, the country of risk for NII Capital Corporation was updated to Brazil in the benchmark indices to more accurately reflect 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.

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. Bloomberg 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.

Bloomberg Indices' Emerging Markets Country List

An annually reviewed fixed list of emerging market countries is used to define country eligibility in flagship EM hard

In addition to being a requirement for inclusion in Bloomberg 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

[60] This is a fundamental consideration for multi-national corporations and entities that have operations spanning multiple regions (e.g., metals and mining companies).
[61] 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 company, 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.

currency, local currency and inflation-linked benchmarks

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, the indices 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.[62] 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 indices' EM country list: Czech Republic, Israel, South Korea and Taiwan.

Figures 10-12 show the Bloomberg Indices' EM country inclusion list by region.

Offshore entities

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

Figure 10
Asia EM Country Inclusion List

			3rd Party Classifications		Sov Ratings		Index Inclusion				
Sub Region	Current Coverage	Country	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	A1	A1	√	√	√	√	
		Cambodia	Middle Lower	Non-advanced	B2	B2	√				
		Indonesia	Middle Lower	Non-advanced	Baa2	Baa2	√	√	√	√	
		Malaysia	Middle Upper	Non-advanced	A3	A3	√	√	√	√	
		Mongolia	Middle Lower	Non-advanced	B2	B2	√	√			
		Papua New Guinea	Middle Lower	Non-advanced	B3	B3	√	√			
		Philippines	Middle Lower	Non-advanced	Baa2	Baa2	√	√	√	√	
		South Korea	High	Advanced	Aa2	Aa2	√	√	√	√	√
		Thailand	Middle Upper	Non-advanced	Baa1	Baa1	√		√	√	√
		Vietnam	Middle Lower	Non-advanced	Ba2	Ba2	√	√			
	No Index-Eligible Debt	American Samoa	Middle Upper	Non-advanced	NR	NR					
		Brunei	High	Non-advanced	NR	NR					
		Fiji	Middle Upper	Non-advanced	B1	B1					
		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					
		Marshall Islands	Middle Upper	Non-advanced	NR	NR					
		Micronesia	Middle Lower	Non-advanced	NR	NR					
		Myanmar	Middle Lower	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	High	Non-advanced	NR	NR					
		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		India	Middle Lower	Non-advanced	Baa3	Baa3	√			√	

[62] Prior to April 2013, a country was considered an emerging market if it 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; the current EM definition for Bloomberg Indices does not include this explicit exclusion for eurozone countries.

			3rd Party Classifications		Sov Ratings		Index Inclusion				
Sub Region	Current Coverage	Country	World Bank Income Group	IMF Classification	Foreign	Local	EM Hard Ccy	EM Sov	EM Local Govt	EM Local Govt Univ	EM Linker
	Index-Eligible Debt	Pakistan	Middle Lower	Non-advanced	B3	B3	√	√			
		Sri Lanka	Middle Lower	Non-advanced	Caa1	Caa2	√	√			
		Taiwan	High	Advanced	Aa3	Aa3	√			√	
	No Index-Eligible Debt	Afghanistan	Low	Non-advanced	NR	NR					
		Bangladesh	Middle Lower	Non-advanced	Ba3	Ba3					
		Bhutan	Middle Lower	Non-advanced	NR	NR					
		Maldives	Middle Upper	Non-advanced	Caa1	Caa2					
		Nepal	Middle Lower	Non-advanced	NR	NR					

Data are as of August 2021. Source: World Bank, IMF, Bloomberg

Figure 11
EMEA EM Country Inclusion List

			3rd Party Classifications		Sov Ratings		Index Inclusion				
Sub Region	Current Coverage	Country	World Bank Income Group	IMF Classification	Foreign	Local	EM Hard Ccy	EM Sov	EM Local Govt	EM Local Govt Univ	EM Linker
Europe & Central Asia	Index-Eligible Debt	Armenia	Middle Upper	Non-advanced	B1	B1	√	√			
		Azerbaijan	Middle Upper	Non-advanced	Ba1	Ba1	√	√			
		Belarus	Middle Upper	Non-advanced	B3	B2	√	√			
		Croatia	High	Non-advanced	Baa3	Baa3	√	√		√	
		Czech Republic	High	Advanced	Aa3	Aa3			√	√	
		Georgia	Middle Upper	Non-advanced	Ba2	Ba2	√	√			
		Hungary	High	Non-advanced	Baa2	Baa2	√	√	√	√	
		Kazakhstan	Middle Upper	Non-advanced	Baa2	Baa2	√	√			
		Poland	High	Non-advanced	A3	A2	√	√	√	√	√
		Romania	Middle Upper	Non-advanced	Baa3	Baa3	√	√	√	√	
		Russia	Middle Upper	Non-advanced	Baa3	Baa2	√	√	√	√	√
		Serbia	Middle Upper	Non-advanced	Ba1	Ba1	√	√			
		Tajikistan	Middle Lower	Non-advanced	B3	B3	√	√			
		Turkey	Middle Upper	Non-advanced	B1	Ba3	√	√	√	√	√
		Ukraine	Middle Lower	Non-advanced	B2	B2	√	√			
		Uzbekistan	Middle Lower	Non-advanced	B1	Ba3	√	√			
	No Index-Eligible Debt	Albania	Middle Upper	Non-advanced	B1	B1					
		Bosnia and Hrz	Middle Upper	Non-advanced	B3	B3					
		Bulgaria	Middle Upper	Non-advanced	Baa2	Baa2					
		Kosovo	Middle Upper	Non-advanced	NR	NR					
		Kyrgyzstan	Middle Lower	Non-advanced	B2	B2					
		Macedonia	Middle Upper	Non-advanced	Ba3	Ba3					
		Moldova	Middle Upper	Non-advanced	B3	B3					
		Montenegro	Middle Upper	Non-advanced	B2	B2					
		Turkmenistan	Middle Upper	Non-advanced	NR	NR					
Middle East & North Africa	Index-Eligible Debt	Bahrain	High	Non-advanced	B1	B1	√	√			
		Egypt	Middle Lower	Non-advanced	B2	B2	√	√		√	
		Iraq	Middle Upper	Non-advanced	Caa1	Caa1	√	√			
		Israel	High	Advanced	A1	A1	√	√	√	√	√
		Jordan	Middle Upper	Non-advanced	B1	B1	√	√			
		Kuwait	High	Non-advanced	A1	A1	√	√			
		Lebanon	Middle Upper	Non-advanced	D	Ca	√	√			
		Morocco	Middle Lower	Non-advanced	Ba1	Ba1	√	√			
		Oman	High	Non-advanced	Ba3	Ba3	√	√			
		Qatar	High	Non-advanced	Aa3	Aa3	√	√			
		Saudi Arabia	High	Non-advanced	A2	A2	√	√			
		Tunisia	Middle Lower	Non-advanced	B3	B3	√	√			
		United Arab Emirates	High	Non-advanced	Aa2	Aa2	√	√			
	No Index-Eligible Debt	Algeria	Middle Lower	Non-advanced	NR	NR					
		Djibouti	Middle Lower	Non-advanced	NR	NR					
		Iran	Middle Lower	Non-advanced	NR	NR					
		Libya	Middle Upper	Non-advanced	NR	NR					
		Syria	Low	Non-advanced	NR	NR					
		West Bank and Gaza	Middle Lower	Non-advanced	NR	NR					
		Yemen	Low	Non-advanced	NR	NR					
Sub Saharan Africa	Index-Eligible Debt	Angola	Middle Lower	Non-advanced	Caa1	Caa1	√	√			
		Ethiopia	Low	Non-advanced	Caa1	Caa1	√	√			
		Gabon	Middle Upper	Non-advanced	Caa2	Caa2	√	√			
		Ghana	Middle Lower	Non-advanced	B3	B3	√	√			

			3rd Party Classifications		Sov Ratings		Index Inclusion				
Sub Region	Current Coverage	Country	World Bank Income Group	IMF Classification	Foreign	Local	EM Hard Ccy	EM Sov	EM Local Govt	EM Local Govt Univ	EM Linker
		Ivory Coast	Middle Lower	Non-advanced	Ba3	Ba3	√	√			
		Kenya	Middle Lower	Non-advanced	B2	B2	√	√			
		Mozambique	Low	Non-advanced	Caa2	Caa2	√	√			
		Namibia	Middle Upper	Non-advanced	Ba3	Ba3	√	√			
		Nigeria	Middle Lower	Non-advanced	B2	B2	√	√		√	
		Senegal	Middle Lower	Non-advanced	B1	B1	√	√			
		South Africa	Middle Upper	Non-advanced	Ba3	Ba2	√	√	√	√	√
		Tanzania	Middle Lower	Non-advanced	B2	B2	√				
		Togo	Low	Non-advanced	B3	B3	√				
		Zambia	Middle Lower	Non-advanced	C	Caa3	√	√			
		Benin	Middle Lower	Non-advanced	B1	B1					
		Botswana	Middle Upper	Non-advanced	Baa1	Baa1					
		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	B3	B3					
		Central African Rep	Low	Non-advanced	NR	NR					
		Chad	Low	Non-advanced	NR	NR					
		Comoros	Middle Lower	Non-advanced	NR	NR					
		Congo, Dem. Rep.	Low	Non-advanced	Caa1	Caa1					
		Congo, Rep.	Middle Lower	Non-advanced	Caa2	Caa2					
		Equatorial Guinea	Middle Upper	Non-advanced	NR	NR					
		Eritrea	Low	Non-advanced	NR	NR					
		Gambia	Low	Non-advanced	NR	NR					
		Guinea	Low	Non-advanced	NR	NR					
		Guinea-Bissau	Low	Non-advanced	NR	NR					
	No Index-Eligible Debt	Lesotho	Middle Lower	Non-advanced	NR	B2					
		Liberia	Low	Non-advanced	NR	NR					
		Madagascar	Low	Non-advanced	NR	NR					
		Malawi	Low	Non-advanced	NR	NR					
		Mali	Low	Non-advanced	Caa1	Caa1					
		Mauritania	Middle Lower	Non-advanced	NR	NR					
		Mauritius	Middle Upper	Non-advanced	Baa2	Baa2					
		Niger	Low	Non-advanced	B3	B3					
		Rwanda	Low	Non-advanced	B1	B1					
		São Tomé and Principe	Middle Lower	Non-advanced	NR	NR					
		Seychelles	High	Non-advanced	B2	B2					
		Sierra Leone	Low	Non-advanced	NR	NR					
		Somalia	Low	Non-advanced	NR	NR					
		South Sudan	Low	Non-advanced	NR	NR					
		Sudan	Low	Non-advanced	NR	NR					
		Swaziland	Middle Lower	Non-advanced	NR	NR					
		Uganda	Low	Non-advanced	B2	B2					
		Zimbabwe	Middle Lower	Non-advanced	NR	NR					

Data are as of August 2021. Source: World Bank, IMF, Bloomberg

Figure 12
Latin America EM Country Inclusion

			3rd Party Classifications		Sov Ratings		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	Ca	Caa2	√	√		√	
		Bolivia	Middle Lower	Non-advanced	B2	B2	√	√			
		Brazil	Middle Upper	Non-advanced	Ba3	Ba3	√	√	√	√	√
		Chile	High	Non-advanced	A2	A1	√	√	√	√	√
		Colombia	Middle Upper	Non-advanced	Ba1	Baa3	√	√	√	√	√
		Ecuador	Middle Upper	Non-advanced	B3	B3	√	√			
		Paraguay	Middle Upper	Non-advanced	Ba1	Ba1	√	√			
		Peru	Middle Upper	Non-advanced	Baa1	A3	√	√	√	√	
		Suriname	Middle Upper	Non-advanced	D	D	√	√			
		Uruguay	High	Non-advanced	Baa2	Baa2	√	√			
	No Index-Eligible Debt	Guyana	Middle Upper	Non-Advanced	NR	NR					
		Venezuela	N/A	Non-Advanced	D	Caa3					

			3rd Party Classifications		Sov Ratings		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
Central America & Caribbean	Index-Eligible Debt	Bahamas	High	Non-advanced	Ba3	Ba3	√	√			
		Belize	Middle Lower	Non-advanced	D	Ca	√	√			
		Bermuda	High	Non-advanced	A2	A2	√	√			
		Costa Rica	Middle Upper	Non-advanced	B2	B2	√	√			
		Dominican Rep	Middle Upper	Non-advanced	Ba3	Ba3	√	√			
		El Salvador	Middle Lower	Non-advanced	B3	B3	√	√			
		Guatemala	Middle Upper	Non-advanced	Ba3	Ba2	√	√			
		Honduras	Middle Lower	Non-advanced	B1	B1	√	√			
		Jamaica	Middle Upper	Non-advanced	B1	B1	√	√			
		Mexico	Middle Upper	Non-advanced	Baa2	Baa1	√	√	√	√	√
		Panama	Middle Upper	Non-advanced	Baa2	Baa3	√	√			
		Trinidad and Tobago	High	Non-advanced	Ba1	Ba1	√	√			
	No Index-Eligible Debt	Antigua and Barbuda	High	Non-advanced	NR	NR					
		Aruba	High	Non-advanced	Ba2	Ba2					
		Barbados	High	Non-advanced	Caa1	Caa1					
		Cayman Islands	High	Non-advanced	Aa3	Aa3					
		Cuba	Middle Upper	Non-advanced	Caa2	Caa2					
		Curaçao	High	Non-advanced	Baa3	Baa3					
		Dominica	Middle Upper	Non-advanced	NR	NR					
		Grenada	Middle Upper	Non-advanced	NR	NR					
		Haiti	Middle Lower	Non-advanced	NR	NR					
		Nicaragua	Middle Lower	Non-advanced	B3	B3					
		Puerto Rico	High	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	B3	B3					
		Turks and Caicos	High	Non-advanced	Baa1	Baa1					
		Virgin Islands (US)	High	Non-advanced	NR	NR					

Data are as of August 2021. Source: World Bank, IMF, Bloomberg

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 constraints[63] 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 issuer's 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 Indices.

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

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 ("SEC") and are subject to SEC reporting requirements.[64]
- Debt that is exempt from registration with the SEC.[65]
- 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.[66]

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 generally be sold only to Qualified Institutional Buyers ("QIBs"). Bloomberg 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

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

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 Bloomberg 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 Reg-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**, Bloomberg 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 (e.g., high yield or non-rated bonds), Bloomberg 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.[67] Broader benchmarks, such as the US

[64] If an issue is registered with the SEC and the issuer later deregisters the bond, it will not affect index eligibility.
[65] For example, bank debt issued under Rule 3(a)(2) is exempt from registration with the SEC.
[66] 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.
[67] For example, 144A Chile bonds that were added to the indices before Chile was added to the EM country list in April 2013 continue to use the 144A tranche for index purposes. The rule of using of the same tranche when the bond changes from EM to DM (and vice versa) applies to all indices.

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.[68] 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.

Bonds that are marketed primarily to retail investors, even if an institution could buy them, are excluded from the 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.[69]

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.

Taxability

Bloomberg 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 Bloomberg 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, Bloomberg 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 tax-exempt US municipal bond market is tracked in a standalone family of indices.

[68] E.g. effective December 2019, a security needs to be placed with at least 10 institutional investors at issuance to be referred to as "widely distributed" and to be eligible for the Canada Aggregate Indices.
[69] Retail bonds are often issued with a very specific coupon and/or issue sizes that are typically not round numbers.

For flagship indices, Bloomberg 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.[70]

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, Bloomberg Indices make a clear distinction between tax-exempt municipals in standalone municipal indices and other taxable bonds in 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.

Calculation of Index Returns

Bloomberg does not make any tax assumptions or adjustments when calculating flagship 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), Bloomberg 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 a 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, Bloomberg 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,

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

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 distinction between senior debt and subordinated debt, including hybrid capital.

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 13 lists subordination classifications for secured credit bonds within Bloomberg Indices.

Figure 13
Subordination Classifications of Secured Credit Bonds in Bloomberg 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 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).

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 Bloomberg Indices.[71] 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.

Subordinated Debt

Subordinated bonds typically carry lower credit ratings and offer a higher spread than more senior ranked bonds in the capital structure to compensate investors for the additional risk they carry. Within the benchmark indices, Bloomberg distinguishes between subordinated bonds or debentures and capital securities. Subordinated bonds that are not considered capital securities by Bloomberg are assigned values of Subordinated, Subordinated Debentures, Junior Subordinated Debentures or Senior Subordinated Debentures in the subordination type

[71] 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.

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. Bloomberg publishes a Global Capital Securities Index to track the market for these bonds, which also qualify for the 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 Bloomberg aggregate and high yield indices, but are 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 T1 instruments generally include:
  - Perpetual, but callable.
  - No contractual obligation to pay dividends or interest to T1 bondholders, with the deferral of a coupon usually being at the option of the issuer.
  - Deferred coupons are non-cumulative.
  - T1 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 UT2 securities are cumulative (e.g., 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. LT2 bonds have a minimum maturity of five years and often have interest step-ups and calls five years prior to maturity.[72]
- **Capital Credit ("CCRDT")**: 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,[73] 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.

Benchmark Index Rebalancing Rules

Most Bloomberg benchmark indices are rebalanced monthly, offering intra-month stability in index composition.[74] 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 Bloomberg 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.

[72] Effective September 7, 2017, subordination classification of Senior Non-Preferred debt changed to "Senior" from "Lower Tier 2 (LT2)".
[73] 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.
[74] 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 universes.

Benchmark Returns and Projected Universes

Two universes of securities are maintained for each Bloomberg index: a fixed "Returns Universe" and a dynamic "Projected Universe"

For each Bloomberg 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, based on which index users are officially measured against. The Returns Universe is not adjusted for securities that become ineligible for the index during the month (e.g., due to ratings downgrades, called bonds, securities falling below one year to maturity) or for issues that are newly eligible (e.g., ratings changes, new issuance). Because the Returns Universe is held constant throughout the month, fund managers avoid having to hit a moving target.

The Projected (Forward) 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 Projected 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 Projected and Returns Universes of the index and may cause bonds to enter or fall out of the Projected Universe, but will affect the composition of the Returns Universe only at month-end. The examples below illustrate how several transactions are treated in the Returns and Projected Universes over the course of a month.

1. Returns and Projected Universe Dynamics: Sample Movements
    - 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 Projected 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 in the Projected Universe.
    - The downgraded bond will enter the US Corporate High Yield Index Projected Universe once it drops from the US Corporate Investment Grade Index.
2. ABC Company 2.875% of 1/15/2027 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 Projected Universe for June (assuming all security reference information and pricing are available).
3. US Treasury 1.875% of 6/30/2024 was issued months ago and has several years to maturity on September 15.
    - This bond will be included in both the Returns and Projected Universes for September.
4. RST Company 3.750% of 6/30/2017 meets all criteria for the US Corporate Investment Grade Index on May 31, 2016.
    - 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 Projected Universe on the first day of June.
    - All flagship 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 8/15/2017 is called on April 15, 2016.

- This bond contributes to returns for April. The ending price is the call price.
- This bond will drop out of the Projected Universe as of the call date.

Bloomberg "Index Flags"

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

For many flagship Bloomberg 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.[75] [76]

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 so 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
- **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, Agency CMBS
- **Convertibles**: US, EMEA, APAC

Municipals: Municipal, Taxable Municipal, Municipal HY

Index flags will have one of four values that identify whether a security should be included in the Returns or Projected 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 Projected Universes of a given flagship index (Area B within Figure 14).
- **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 Projected Universe of a given flagship index and will contribute to index returns only after the next index rebalancing (Area C within Figure 14). 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

[75] Although index flags encompass many of the core attributes discussed in the previous section through a single data field, there may be other index eligibility criteria embedded in a derived index flag value.
[76] 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.

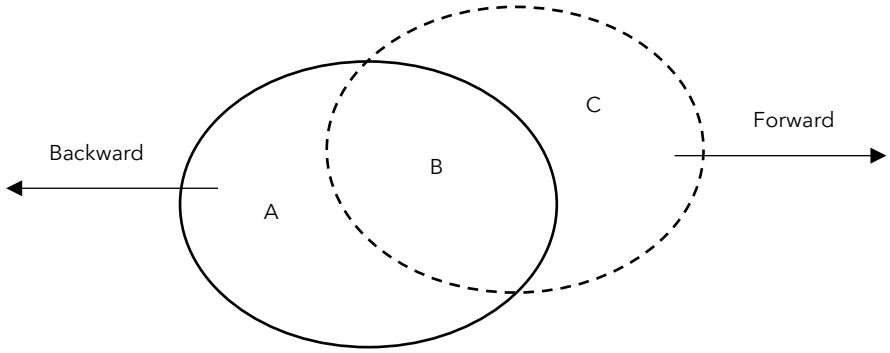
grade may have the FORWARD index flag for a high yield benchmark if it meets all other index inclusion rules after the ratings change and a BACKWARDS flag for the investment grade index it is departing.

- **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 14), and not the Projected Universe.
- **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 also 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 Projected Universes 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 Projected 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.

Figure 14
Bloomberg Index Dynamics



Returns (Backwards) Universe (A+B)	Projected (Forward) Universe (B+C)
Static universe of index-eligible bonds set at the beginning of month to avoid having to hit a moving target.	Dynamic universe that changes daily and reflects index-eligible bonds at that time.
Includes bonds that lose eligibility during the month (A) because they were called, downgraded/upgraded, or fell below one year to maturity or the minimum liquidity.	Includes bonds that become index eligible during the month (C), such as new issues and bonds that were upgraded/downgraded into an index.
Bonds that lose eligibility do not leave the Returns Universe until month-end.	Used for rebalancing since Projected Universe becomes Returns Universe at month-end.
Used to report index performance (returns).	Used to report index statistics (duration, market value, OAS, etc.).

Index Rebalancing Dynamics

Index Turnover

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

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 Projected 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 "additions".[77]

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.

All Bloomberg 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 Bloomberg 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 generic[78] 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 HUF-denominated debt in the Global Aggregate and Global Treasury Indices in April 2017.

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

TURNOVERMonthly = MVBeginningDrops + MVEndingAdditions

% TURNOVERMonthly = (MVBeginningDrops + MVEndingAdditions) / MVBeginningIndex

[77] 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 addition (to sub 10 year maturity indices) and a drop (from 10+ year maturity indices) to other narrower maturity based sub-indices.

[78] The Bloomberg US 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 the indices, is a proxy for all of the outstanding eligible pools for a given program, coupon and origination year. Beginning July 2019, Freddie generics are further separated into 45- and 55-day delay securities to reflect UMBS initiative. The identifiers for MBS generics are not street CUSIPs or identifiers, but rather proprietary constructs of Bloomberg MBS methodology.

Annual Turnover

TURNOVERAnnual = Sum of Monthly Drops + Sum of Monthly Additions

% TURNOVERAnnual = Sum of Monthly Drops % + Sum of Monthly Additions %

Treatment of Cash

The timing and treatment of cash in Bloomberg 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.[79] 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.[80]

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 at 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 duration[81] for non-US indices.

Returns Universe Duration vs. Projected Universe Duration

For both the Returns and Projected Universes, 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 Projected Universe) and the amount of cash earned by the index from coupon and principal (accumulated in the Returns Universe).

Because the Projected Universe duration is not adjusted for cash, each bond is weighted by its current market value to derive the index-level Projected Universe duration. The bonds contributing to the Projected 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.

Returns Universe duration is calculated the same way as Projected 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:

[79] 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.

[80] 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.

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

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 Projected duration will be the same.

Duration Extension Methodology

At the close of the last business day of each month, the Bloomberg 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 Projected 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 Projected 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 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 Projected Universe duration of an index at month-end. Prior to month-end, Bloomberg publishes periodic index duration extension estimates using forecasted turnover and cash estimates. These projections appear in Summary of Index Duration Changes and in Benchmark Index Duration Extension & Rebalancing Forecast reports available on INP<GO> (the Index Publications page on the Bloomberg Terminal).

Other Index Rebalancing Mechanics

Settlement Assumptions

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

For index purposes, securities are assumed to settle on a T+1 calendar day basis,[82] except for US MBS pass-throughs, which assume 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.[83] This allows for one full month of accrued interest to be calculated.[84] 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 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.[85]

[82] 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. Accrual for the weekend will be reflected on the first business day after the weekend.
[83] This applies to both Series-L and Series-B indices.
[84] 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.
[85] 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. Series-L US TIPS bonds settle on a T+1 calendar day

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 Bloomberg Indices employ a regional approach for index holiday schedules

The Bloomberg 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 indices can be found in Figure 15. 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.

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.[86] 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.

Figure 15
Regional Holiday Calendars Observed by Currency

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

basis (or if month end - on 1st calendar day of next month), whereas Series-B US TIPS bonds that trade on Friday would settle on Monday (or Tuesday if Monday is a US holiday).

[86] 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.

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.[87]

Inclusion of When Issued US Treasuries

US Treasuries are added to the Projected Universes of the US Aggregate and US Treasury Indices with an assumed coupon on the announcement date, if auctioned in the same month. The coupon is then updated on the auction date. If US Treasuries are not auctioned in the same month as when they are announced, they are added to the Projected Universe of the indices in the month they are auctioned.

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 (Projected) Universe and take effect as of the annual rebalancing date on December 1.

GDP weights are announced in early October, reflected in the November Forward (Projected) Universe and take effect as of the annual rebalancing date on December 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.

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.

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 (e.g., rates will rise) or achieve specific objectives of their mandate (e.g., minimize risk).

[87] Fungible bonds that will funge within two months from issue are not eligible for indices. Funge amount is included in existing bond when funge.

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

Benchmark Index Pricing

In pricing the benchmark indices, Bloomberg aims to mark each bond with an appropriate and observable level when available, whether sourced internally or supplied by a third-party pricing vendor.[88] In addition to pricing sources, other pricing considerations (quote side, settlement and timing) are important 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 Bloomberg benchmark indices. For additional details on asset classes and regions, please see "Appendix 4: Pricing Methodology for the Bloomberg Indices."

Pricing Sources

Independent and transparent pricing is an important part of Bloomberg's index family. Rather than relying on single-dealer pricing or composite pricing across a small number of dealers, the primary pricing source of bonds in Bloomberg 's Indices is BVAL. BVAL provides credible, transparent and defensible valuations across a broad spectrum of financial instruments, including fixed income, derivatives and structured notes. These prices are independent, drawing on numerous sources relevant to the market. This broad global dataset of market observations is combined with analytics to produce objective pricing with transparency into how the prices are derived. As of the publication date of this document, the only Bloomberg index families not priced by BVAL are CHF-denominated bonds (which use SIX Swiss Exchange) and JPY Corporates (which use Japan Securities Dealers Association, aka JSDA). If any of the pricing sources were to fail to generate a security's price, the security will be priced using information from the last index publication date.

Details regarding BVAL's pricing methodologies, including the use of extrapolation techniques in creating such input data, are available at BVLI <Go> on the Terminal.

Pricing Verification

A dedicated index pricing team validates the quality of index pricing daily, including review of possible outliers resulting from the verification process. Index users may also challenge price levels, which are then reviewed by the pricing team. If a discrepancy arises, the team works with BVAL and may adjust prices on a going forward basis.

For inquiries regarding access to BVAL prices and methodologies, please contact the BVAL team at BVAL@bloomberg.net. For any other questions, please contact your regional index team or email indexpricing@bloomberg.net.

Pricing Quote Conventions

Most index-eligible securities are quoted as a percentage of par. Some inflation-linked bonds use Real or Native yield as a direct input.

Most securities are also 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 corporates[89] entering the index on the offer side in the first month.

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.

[88] Bond-level prices are made available to appropriately licensed users.
[89] Investment grade and USD- and EUR-denominated corporates. US High Yield corporates also enter on the offer side starting June 1, 2017. Prior to that date, US High Yield securities entered on the bid side.

Mid side pricing 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 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.

While different markets or asset classes represented in Bloomberg 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.[90]

Pricing Timing and Frequency

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 markets (except Taxable Municipals, which are priced at 4pm), 4pm New York time for 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 Tokyo time for Japan; 5pm Shanghai time for China; 5pm Tokyo time for Hong Kong, Malaysia, Singapore, South Korea, Taiwan and Thailand; 12pm London time for India; and 5pm Sydney time for Australia and New Zealand. In addition, Asia High Yield is priced at 5pm Tokyo time; GCC[91] is priced at 4:15pm London time; and local currency LATAM bonds are priced at 4pm New York time. When the markets close early for holidays, prices may be taken earlier in the day.

Most index bonds are priced daily, except on market holidays.

Pricing Settlement Assumptions

For index purposes, securities in the Series-L indices are assumed to settle on the next calendar day (T+1) for each index pricing date, except for US MBS pass-throughs, which are priced based on same-day settlement (T+0).

At month-end, 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.

Benchmark Index Analytics

Index users rely on a range of fixed income analytics calculated by Bloomberg 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).

The following section provides an overview of the major types of analytics available for the Bloomberg Indices (duration, convexity, spread and yield) and a brief discussion of the types of

[90] 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.
[91] GCC is defined as: Qatar, Bahrain, UAE, Saudi Arabia, Kuwait, and Oman.

model-driven, research-based metrics that have been developed in recent years. Calculations for many of these can be found in "Appendix 7: Glossary of Terms – Index Analytics."

Duration

While several variants of duration exist for fixed income securities, investors generally think of 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 Bloomberg Indices

Bloomberg calculates a number of measures of duration for each security, including **Modified Duration, Macaulay Duration and Option Adjusted Duration ("OAD")**.[92] 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.[93] 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 in ISMA yield calculations instead of the semi-annual coupon in the OAD calculations.

In addition to OAD, Bloomberg 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, Bloomberg calculates asset class-specific durations (e.g., real versus nominal duration for US TIPS) and incorporates certain conventions for other asset classes, such as mortgage duration. Please see the "Appendix 7: Glossary of Terms – Index Analytics" for more details on these fields.

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.[94]

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

[92] 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.
[93] Bloomberg uses a lognormal option model and the current price of the bond to calculate the option adjusted spread (OAS) of the bond.
[94] 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.

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")**. 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 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 (e.g., 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. The Indices' most widely used yield metrics are yield to worst and yield to maturity, though certain asset class-specific yield measures are also calculated.

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. This curve is constructed 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 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 Bloomberg mortgage research team, which incorporates macroeconomic views on the housing market, interest rates, etc.

Benchmark Index Returns Calculations and Weighting Rules

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 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. Bloomberg 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 weigh 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 Bloomberg 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 of 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 Bloomberg 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.[95] Calculating these returns requires daily bond prices, accrued interest calculations, and a record of the timing and amount of coupon and principal payments.[96] 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.

Monthly Price Return

The price return for a given period is derived from changes in security price 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,[97] even for markets that are quoted on a dirty basis since changes in accrued interest are tracked separately as part of the coupon return.

$$Price\ Return = \frac{(Price_{Ending} - Price_{Beginning})}{(Price_{Beginning} + Accrued\ Interest_{Beginning})}$$

[95] 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.

[96] Though generally consistent with the calculation of other fixed income asset classes tracked by Bloomberg Indices, the price, paydown and coupon return calculations for US mortgage backed pass-throughs differ slightly by incorporating a survival factor into the equation.

[97] 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.

Monthly Coupon Return

The coupon return for a given period measures the interest income earned by a security, reflecting changes in accrued interest[98] 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.[99]

$$Coupon\ Return = \frac{[(Accrued\ Interest_{Ending} - Accrued\ Interest_{Beginning}) + Interest\ Payment}{(Price_{Beginning} + Accrued\ Interest_{Beginning})}$$

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. Bloomberg 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.[100]

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.

$$Paydown\ Return = principal\ payment * \frac{(100 - Price_{Ending} - Accrued\ Interest_{Ending})}{(Price_{Beginning} + Accrued\ Interest_{Beginning})}$$

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. Bloomberg 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.

$$Currency\ Return = (1 + Local\ Return) * (FX\ Appreciation)$$

Where:

$$Local\ Return = Price\ Return + Coupon\ Return + Paydown\ Return$$

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

Monthly Currency Return (Hedged)

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

$$Currency\ Return\ Hedged = Expected\ Currency\ Return + Residual\ Currency\ Return$$

The components for each can be found in Figure 16.

Figure 16
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)

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 the indices' 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. The excess return published for flagship Bloomberg 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.[101]

Excess return is calculated for Bloomberg Indices using either a key rate duration matching approach or a duration-bucket approach. Both of these methods are discussed in more detail in "Appendix 3: Detailed Discussion of Excess Return Computations."

[98] 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 interest to be calculated.
[99] 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.
[100] Though defaulted corporates are not eligible for Bloomberg benchmark indices, such as high yield and emerging markets indices, defaulted treasury and sovereign debt remain index-eligible.
[101] For users looking for such benchmark solutions, Bloomberg 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 Bloomberg Mirror Futures & Duration Hedged Benchmark Indices.

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 many Bloomberg 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 Bloomberg 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 Bloomberg 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:

$$Market\ Value_{Bond} = (Price_{Bond} + Accrued\ Interest_{Bond}) * Par\ Amount\ Outstanding_{Bond}$$

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.[102] The market value used for each bond is the same across all market value weighted indices and their related sub-indices by sector, maturity, currency, etc.

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

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 alterative 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 held constant throughout the month for each bond in the Returns Universe.

Bond-Level Weights for Index Statistics Calculations

Index-level statistics such as duration, yield and OAS, are weighted by the daily or "Ending" market value of each index-eligible bond in the Projected Universe. Published sector allocation percentages for flagship indices are also based on the Projected Universe using ending market value.[103]

$$Projected\ Universe\ Market\ Value\ \% = \frac{Security\ Market\ Value_{Ending}}{\sum Security\ Market\ Value_{Ending}}$$

In alternative weight indices, the amount outstanding for each bond in the Projected 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 Projected 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 Bloomberg 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 Bloomberg 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, 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.

[102] For other analytics and statistics, dynamic market values as of each index calculation date are used and are reported for the Projected Universe index composition.
[103] To avoid a circular reference, average price and coupon are weighted by end of period par value.

The Bloomberg 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 Bloomberg 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. Bloomberg MSCI ESG weighted indices are another fundamentally themed alternative that uses 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.[104]

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 Bloomberg 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.

$$Index\ Total\ Return_{MTD} = \sum (Bond\ Return_{MTD} * Bond\ Weight_{Beginning})$$

Cumulative and Periodic Total Return Calculations

Since Inception Total Return and Index Value

For each Bloomberg index, the cumulative total return since index inception is calculated and used to determine periodic returns over longer and/or intra-month time horizons. **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.

$$Since\ Inception\ Total\ Return = \left[\left(100 + SITR_{Beginning}\right) * \left(1 + Total\ Return_{MTD}\right)\right] - 100$$

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

$$Index\ Value = SITR + 100$$

[104] Returns over a given interval are calculated from end-of-day to end-of-day. For example, the return for October 2016 is calculated from September 30, 2016 to October 31, 2016 and includes interest earned on October 31, 2016, but not interest earned on September 30, 2016.

Daily Total Return Calculations

All daily returns (total return, price return, currency return, paydown return and 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 day[105]:

$$Daily\ Total\ Return = \frac{(MTD\ Total\ Return_T - MTD\ Total\ Return_{T-1})}{[1 + (MTD\ Total\ Return_{T-1}/100)]}$$

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. Bloomberg 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

Bloomberg 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 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 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.

Accessing Indices

Bloomberg Indices may be accessed through a variety of platforms.

Bloomberg Terminal®

- **INDE<GO>**: The Bloomberg Indices dashboard page, which contains daily, monthly, and year-to-date index returns for key indices from each index family as well as a link to index publications.
- **IN<GO>**: The Bloomberg Index Browser displays the latest performance results and statistics for the indices as well as history. IN presents the indices that make up Bloomberg's global,

[105] Prior to October 1, 2003, all daily return numbers were calculated as the arithmetic difference in return between the MTD Returns over the one-day period.

multi-asset class index families into a hierarchical view, facilitating navigation and comparisons. The "My Indices" tab allows a user to focus on a set of favorite indices.

- **INP<GO>**: A page dedicated specifically to all Bloomberg index publications, which among others include:
  - **Index Announcements** and **Technical Notes** related to the indices
  - **Index Factsheets** for selected indices
  - **Primers and Guides**
  - Monthly publications, such as **Duration Extension, Global Family of Indices (GFOI)**, and **Linker Monthly Report**
- **DES<GO>**: The index description page provides transparency into an individual index including membership information, aggregated characteristics and returns, and historical performance.
- **PORT<GO>**: Bloomberg's Portfolio & Risk Analytics solution includes tools to analyze the risk, return, and current structure of indices. Analyze the performance of a portfolio versus a benchmark or use models for performance attribution, tracking error analysis, value-at-risk, scenario analysis, and optimization.

Bloomberg Indices Website[106]

The Index website makes available limited index information including current performance numbers, tickers and factsheets for select indices.

Data Distribution

Index subscribers may choose to receive index data in files. Files may include:

- Index level and/or constituent level returns and characteristics for any indices
- Automatic delivery of files via email or SFTP following the completion of the index production process after market close
- Clients may receive standard files or may customize file contents

Index data is also available via authorized redistributors.

Index Licensing

Bloomberg requires index data licenses for services and products linked to the Indices.[107]

[106] https://www.bloomberg.com/indices
[107] This includes index and constituent-level redistribution, bond pricing service, Exchange Traded Funds (ETFs), Exchange Traded Notes (ETNs), index-linked insurance products, mutual funds, OTC derivative products, and custom index solutions.

Appendices

Appendix 1: Total Return Calculations

Figure 1
Components of Total Return Calculations

Where:	
P_b = beginning price	A_b = beginning accrued interest
P_e = ending price	A_e = ending accrued interest
$Outstand_b$ = balance outstanding at beginning of period	IntPayment: Interest payment during period
$Outstand_e$ = balance outstanding at end of period	PrincPayment: Principal payment during period
MV_b = beginning market price (P_b + A_b)	
For CMBS Bonds Only:	
PrincWritedown: Principal lost during period	
PrepayPrem: Prepayment premium	
For All Security Types:	*For CMBS Bonds Only:*
Price Return The return derived from price changes due to movements in interest rates, volatility, credit events and other factors. **Monthly price return** = (P_e – P_b) / MV_b	**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. **Monthly Writedown Return** = [(PrincWritedown/$Outstand_b$) * (P_e + A_e)] / MV_b
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. **Monthly coupon return** = [(A_e – A_b) + IntPayment] / 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. **Monthly Prepayment Premium Return** =[(PrepayPrem/$Outstand_b$)*100] / MV_b
Paydown Return The return related to scheduled and unscheduled payments of principal. **Monthly Paydown Return** = [(PrincPayment/$Outstand_b$) * (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. **Monthly Currency Return (Unhedged)** = % change in spot * (1+local return) Local Return = price return + coupon return + paydown return **Monthly Currency Return (Hedged)** = Expected Currency Return + 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 = $(1 + Yield\ beginning/2)^{(1/6)} - 1$ ● 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 = Price Return + Coupon Return + Paydown Return + Currency Return + Writedown Return (CMBS Only) + Prepayment Premium Return (CMBS Only)	

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 (Pb + Ab)	$MarketValue_b$ = beginning of period market value = MV_b * $Outstand_b$
RU Market Value Weight in % = $\frac{\text{MarketValue}_b}{\sum_{RU} MarketValue_b} = \frac{(P_b+A_b)*Outstand_b}{\sum_{RU}(MV_b*Outstand_b)}$	

Figure 3
Index Return Calculations

Index Total Return MTD = ∑ (Bond Weight * Bond Total Return MTD)

Index Excess Return MTD = ∑ (Bond Weight * Bond Excess Return MTD)

Where:

Bond Weight = % security contribution to Returns Universe using market value weights or other 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 SITR = [(100 + $SITR_{BOM}$) * (1 + TR_{MTD})] - 100	Where: IV_B = beginning of period Index Value (SITR + 100) IV_E = end of period Index Value (SITR + 100)
Since Inception Price Return (SIPR) Cumulative price return since inception of the index	**Periodic 3 Month** 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** Rolling 6-month total returns = [(IV_E / IV_B) * 100] - 100
Since Inception Other Return Cumulative paydown and currency return, linking an index's MTD other return **Since Inception Coupon with Reinvestment** Cumulative coupon return with reinvestment = SITR – SIPR – Inception Other	
Index Value (IV) Cumulative total return since inception indexed to 100. IV = 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 level (December 31, 2012) by the beginning index level (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 cumulative returns	*Example: Global Aggregate five-year annualized return (December 31, 2012)*

1. Divide the end index level (December 31, 2012) by the beginning index level (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 Indices' returns 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 $CH_t = CH_{t-1} + \sum_i \left(C_{i,t} * N_{i,t}\right)$. 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

$m_{i,t} = \left(P_{i,t} + A_{i,t} + X_{i,t}\right) * N_{i,b}$ = 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 Capitalization

The total market capitalization, 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:

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

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:

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

Figure 9
Total Return Index

The Total Return Index (TRI_t) is calculated as:

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

Figure 10
Daily Total Return

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

$$Total\ Return = \frac{TRI_t}{TRI_{t-1}} - 1$$

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:

$$FX\ Appreciation = \frac{FX_{end} - FX_{beg}}{FX_{beg}} \qquad (1)$$

FXbeg and FXend 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:

$$\begin{aligned} Base\ Currency\ Total\ Return &= (1 + local\ return) * (1 + FX\ Appreciation) - 1 \qquad (2) \\ &= local\ return + FX\ Appreciation + (local\ return) * (FX\ Appreciation) \end{aligned}$$

To keep analytics as intuitive and tractable as possible, Bloomberg decomposes index returns into additive components. Accordingly, currency return[108] is defined as follows:

$$currency\ return = base\ currency\ total\ return - local\ return \qquad (3)$$

where:

$$local\ return = price\ return + coupon\ return + paydown\ return$$

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

$$\begin{aligned} currency\ return &= FX\ Appreciation + (local\ return) * (FX\ Appreciation) \qquad (4) \\ &= (1 + local\ return) * (FX\ Appreciation) \end{aligned}$$

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 Appreciation, while the bond's currency return is FX Appreciation + (local return) * (FX Appreciation). The bond's currency return contains an interaction component (local return) * (FX Appreciation) in addition to the capital gain on a currency investment.

Example: Unhedged Returns

Consider an index with the euro as the base currency and which contains the USD-denominated PEMEX bond described in Figure 17. 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%.

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,

[108] The Bloomberg Indices source FX spot and forward rates from Refinitiv. FX rates are taken at 4pm London time.

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.[109]

Here FX Appreciation 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 + local return) and (1 + FX Appreciation) is (1.0350) (0.9740), which comes to 1.0081. Subtracting one provides the bond's 0.81% total return in euros.

Figure 17
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	
FX Appreciation	-2.60%	
Currency Return	-2.69%	=(1.0350)* (-0.026)
Total Return (Unhedged) in EUR	0.81%	=(1.0350)* (1 - 0.0260) - 1

Sample Implementation: Unhedged Returns

Figure 18 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%.

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:

$$currency\ return = base\ currency\ total\ return - local\ return$$

One can verify this using the numbers in Figure 19. The Bloomberg Indices report a currency-hedged total return of 3.40% (EUR) for this bond. Subtracting the 3.50% local return comes to -

[109] These values are arrived at by taking the reciprocal of the quoted exchange rate.

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:

$$base\ currency\ total\ return\ (hedged) \quad (5a)$$
$$= base\ currency\ total\ return\ (unhedged) + H * (Forward\ Return)$$

where:

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

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

$$Forward\ Return = \frac{Forward\ Value - FX_{end}}{FX_{beg}} \quad (5b)$$

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:

$$base\ currency\ total\ return\ (hedged) \quad (6)$$
$$= local\ return + currency\ return\ (unhedged) + H * (Forward\ Return)$$

Note that the second term on the right hand side of Equation (6) moves in the opposite direction as the third term. 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 (5a) is general. It provides the base currency total return under any hedging rule. By setting H according to index rules, Equation (5a) becomes a full specification of base currency total return for Bloomberg Indices.

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

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

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 known on March 31, when the hedge must be implemented. Index construction 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 20 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 (5a), together with the bond's 0.81% unhedged base-currency return, results in 3.40%, the bond's currency-hedged total euro return.

Figure 18
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 = (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**

Figure 19
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)[110]	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 Appreciation	-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%

For each currency, the hedge for the entire index is the average of 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:

[110] Yield is the Bloomberg published Yield to Worst for each security.

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

$$currency\ return\ (hedged) = currency\ return\ (unhedged) + H * (Foward\ Return)$$

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

$$currency\ return\ (hedged) = (1 + local\ return) * (FX\ Appreciation) + H * \frac{Forward\ Value - FX_{end}}{FX_{beg}}$$

$$= (1 + local\ return) * (FX\ Appreciation) + H * \frac{Forward\ Value - FX_{beg}}{FX_{beg}} - H * \frac{FX_{end} - FX_{beg}}{FX_{beg}}$$

Therefore,

$$currency\ return = H * \frac{Forward\ Value - FX_{beg}}{FX_{beg}} + (1 + local\ return - H) * (FX\ Appreciation) \quad (8)$$

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 20
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**

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 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 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 approximation 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 Bloomberg 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 Appreciation in this article. However, because Bloomberg 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 Bloomberg 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. Bloomberg 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, Bloomberg assumes that the FX forward contract is unwound using a prorated forward rate. A 30-day contract is assumed for every month regardless of the actual number of days in a month.[111]

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

A: 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.

$$H(projected\ end-of-month\ MV\ per\ unit\ of\ local\ currency\ at\ beginning\ of\ the\ month) = (1+\frac{yield}{2})^{(\frac{1}{6})}$$

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. The two index series use a slightly different method of interpolating the intra-month forward rate for intra-month hedged index statistics.

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.

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

[111] 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-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.

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

Currency Returns and Hedging for Series-B Indices

Returns for Bloomberg Series-B inflation-linked and government indices are also available in foreign currency and hedged versions. For Series-B indices, Bloomberg uses a current value methodology. This method hedges only the market value in each of the currencies at the beginning 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.[112]

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)

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.

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

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

[112] Bloomberg Indices use Refinitiv: WM/Reuters Closing Spot and Forward Rates mid values at 4pm London time for both Series-L and Series-B indices. If the last calendar day of a month is a non-business day, the FX rates correspond to the previous business day.

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 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, the currency hedge is marked to market 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 level.

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 (i.e., 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

$$Local\ Return = LR = \frac{TRI_{L,e}}{TRI_{L,s}} - 1$$

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

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

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

$$Hedge\ Return = FR - CR$$

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

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

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

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

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

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

$$MTD\ Curreny\ Return\ on\ Unhedged\ Portion = (1 + MTD\ LR) \times MTD\ CR$$

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

$$MTD\ Hedge\ Return = FR + Hedge\ Reversal\ Return - MTD\ CR$$

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

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

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.

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

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.[113]

Formulae for Monthly Calculation: Multi-Currency Index

$$Unhedged\ Index\ Return = \frac{TRI_{M,e}}{TRI_{M,b}} - 1$$

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

$$Hedged\ Index\ Return = Unhedged\ Index\ Return + Hedge\ Return =$$

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

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

Where:

[113] 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).

b – Start date

e — End date

$TRI_{M,e}$ — Unhedged 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

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

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

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

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

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

$$MTD\ Hedged\ Index\ Return = MTD\ Unhedged\ Index\ Return + MTD\ Hedge\ Return$$

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

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: Detailed Discussion of Excess Return Computations

The fixed income community generally gauges the compensation for holding risky assets by measuring performance of spread product asset classes relative to the treasury asset class. 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 of these more precise methods, 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 weigh 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 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 Bloomberg 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, Bloomberg 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, Bloomberg first buckets the universe of treasuries that correspond to a bond's currency denomination[114] into half-year duration buckets starting at zero. Treasuries are bucketed based on their beginning-of-month duration values 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

[114] 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.

buckets. The excess return for the security is then calculated as the difference between its total return and the interpolated return.[115]

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

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

The simplicity of this approximation might lead one to ask why this should not be adopted as the official Bloomberg 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) $$ER_P = \sum_i w_i ER_i \approx \frac{\sum_i w_i s_i}{12} - \sum_i w_i D_i \Delta s_i$$

[115] Published excess return is set to zero for all Aaa-rated EUR treasuries.

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 D_P^{MW} is the market weighted average portfolio spread duration, s_P^{MW} is the market weighted average portfolio OAS, and Δs_P^{DDW} is the dollar duration weighted average portfolio OAS change.

$$D_P^{MW} = \sum_i w_i D_i$$

(3) $$s_P^{MW} = \sum_i w_i s_i$$

$$\Delta s_P^{DDW} = \frac{\sum_i w_i D_i \Delta s_i}{\sum_i w_i D_i}$$

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

(4) $$ER_P = \frac{s_P^{MW}}{12} - D_P^{MW} \Delta s_P^{DDW}$$

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 timeframes longer than one month. But whereas excess returns cannot be compounded, total returns can. Since Bloomberg 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 measured in the Bloomberg benchmark indices by sector and region.

US Aggregate Index Components

US Treasury, US Agency, US Credit/Corporate (Investment Grade), US CMBS, US Fixed- and Floating-Rate ABS[116] Indices

- **Source**: Bloomberg's evaluated pricing service ("BVAL")
- **Quote Convention/Inputs**: Dollar price
- **Timing**: 4pm New York; 2pm on early close unless otherwise noted; Prior to January 14, 2021, 3pm pricing snap was used for all bonds except taxable munis
- **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 Bloomberg's evaluated pricing service, BVAL.

All US Treasury bonds, including off-the-run bonds, are priced daily on the bid side by BVAL. These Treasury marks serve as the foundation for the pricing of benchmark curves for many other asset classes in Bloomberg Indices quoted relative to Treasuries.

US Agency bonds and US Credit/ Corporate bonds are priced by BVAL.

Corporates 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 and are subsequently marked on the bid side.

US ABS and CMBS securities are marked daily by BVAL on the bid side.

US MBS Index

- **Source**: BVAL
- **Quote** Convention: Dollar price
- **Timing**: 4pm New York; 2pm on early close unless otherwise noted; Prior to January 14, 2021, 3pm pricing snap was used
- **Frequency**: Daily
- **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 securities 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. The US MBS Index used to also track Hybrid ARM pools, but this sector was retired on June 1, 2017, and the index now only contains fixed-rate securities.

US MBS Pricing Methodology

Prices for index-eligible MBS generics are calculated using a

The index is formed by grouping the universe of about 1 million individual TBA deliverable fixed-rate MBS pools into approximately 5,500 cohorts. These cohorts are based on agency,

[116] 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.

weighted average of the underlying pools' prices

program, coupon, and origination year based on WALA. From this larger set of cohorts, security type, maturity, and liquidity criteria are applied to determine which qualify for the inclusion in the index. Beginning July 2019, the index separates the Freddie 45- and 55-day delay Freddie generics to reflect UMBS initiative.

Specified pools have particular characteristics that differentiate them from more generic pools. Specified pool buyers know exactly which mortgage pools they are buying and will generally pay a higher premium over generic pools. For this reason, specified pools are excluded from the index pricing process.

The index prices assume same-day settlement using either estimated or actual paydowns throughout the month, depending on the day. The index reflects an estimate of paydowns starting on the first business day of the month and the actual paydowns after the 16th business day of the month.

For every underlying non-specified pool that maps to an index cohort, BVAL provides a T+0 price. The price of an index cohort is then calculated using an outstanding balance weighted average of the pool prices in that cohort.[117]

Other US Indices

US Corporate High Yield Index

- **Source**: BVAL
- **Quote Convention/Inputs:** Dollar prices
- **Timing**: 4pm New York; 2pm on early close unless otherwise noted; Prior to January 14, 2021, 3pm pricing snap was used
- **Frequency**: Daily
- **Settlement**: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

New issues entering the US High Yield Index are marked on the offer side for their first month-end and are subsequently marked on the bid side by BVAL. Prior to June 1, 2017, new bonds entering the index were marked on the bid side.

US Municipal Bond Index

- **Source**: BVAL
- **Quote** Convention/Inputs: Bid side dollar prices
- **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 daily by BVAL.

[117] US MBS Index Pricing Methodology and Source Changes.

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, Romanian leu, Russian ruble, Slovakian koruna, and Czech koruna) and are mainly priced by BVAL. 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 (Series-L and Series-B), and Pan-European Government-Related, Securitised[118] (Fixed Coupon) and Corporate Indices

- **Source**: BVAL
- **Quote** Convention/Inputs: Dollar price
- **Timing**: 4:15pm London; 12pm 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 euro treasuries and UK gilts are priced daily by BVAL on the mid side. These prices serve as the foundation for the indices' curve generation.

All other securities are priced daily by BVAL on the bid side. Securities that are due to enter the index at month-end are marked on the offer side.

Pan-European ABS FRN Index

- **Pricing Source**: BVAL
- **Quote Convention/Inputs**: Bid side dollar prices
- **Timing**: 4:15pm London
- **Frequency**: Daily
- **Settlement**: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Bonds are priced daily by BVAL. The prepayment/default and call assumptions are based on the Bloomberg proprietary credit model ("BCM"). The principal and interest cash flow projections are modelled by Bloomberg.

Other Pan-European Indices

Pan-European High Yield Corporate Index

- **Sources**: BVAL
- **Quote Convention/Inputs**: Bid side prices, new issues on the offer side

[118] Securitised sectors include ABS, Pfandbriefe and other covered bonds.

- **Timing**: 4:15pm London; 12pm 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 bonds are priced daily by BVAL.

Euro and Sterling Treasury Bills Indices

- **Sources**: BVAL
- **Quote Convention/Inputs**:
  - Euro treasury bills: Mid side prices (bid side prior to 21 October 2011)
  - Sterling treasury bills: Bid side prices
- **Timing**: 4:15pm London; 12pm 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

All bonds are priced daily by BVAL.

Pan-European Corporate FRN Index

- **Sources**: BVAL; SIX Swiss Exchange for CHF-denominated bonds
- **Quote Convention/Inputs**: Bid side prices
- **Timing**: 4:15pm London; 12pm 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 bonds are priced daily by BVAL (except CHF-denominated bonds).

Other Pan-European Local Currency Indices

- **Sources**: BVAL: Croatian kuna, Czech koruna, Danish krone, Hungarian forint, Norwegian krone, Polish zloty, Romanian Leu, Russian ruble, Swedish krona; SIX Swiss Exchange: Swiss franc
- **Quote Convention/Inputs**: Bid side prices
- **Timing**:
  - 4:15pm London; 12pm on early close unless otherwise noted; 5pm CET for Swiss franc
- **Frequency**: Daily

- **Settlement**: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All bonds are priced daily by BVAL (except CHF-denominated bonds).

Asian-Pacific Indices

Bloomberg 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. Except JPY corporates, the indices are priced by BVAL, and returns for all are calculated by Bloomberg.

Japanese Government Bond Index

- **Source**: BVAL
- **Quote Convention/Inputs**: Mid side[119]
- **Timing**: 3pm Tokyo
- **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 BVAL

All securities are priced daily by BVAL. These prices serve as the foundation for curve generation, as well as pricing and analytics for many other asset classes within the Bloomberg Japanese Aggregate Index.

Other JPY-Denominated Corporate, Government-related and Securitized Indices

- **Sources**: Japan Securities Dealers Association ("JSDA") for corporates, BVAL for all other bonds
- **Quote Convention/Inputs**: Bid side prices
- **Timing**: 3pm Tokyo
- **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 corporate bonds is JSDA Reference Prices published by JSDA (Japan Securities Dealers Association). However, since JSDA Reference Prices are mid prices, the indices use bid prices calculated based on these. Other JPY-denominated bonds are priced by BVAL.

Other Asian-Pacific Aggregate Components

- **Source**: BVAL
- **Quote Convention/Inputs**: Bid side prices

[119] Prior to December 2010, bid side was used.

- **Timing**: (all local time below)
  - Australian dollar, New Zealand dollar: 5pm Sydney
  - Hong Kong dollar, Indonesian rupiah, Malaysian ringgit, Singapore dollar, South Korean won, Thai baht: 5pm Tokyo
  - Chinese renminbi: Shanghai 5pm
- **Frequency**: Daily
- **Settlement**: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

Bonds in the index are priced daily by BVAL.

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.

- **Source**: BVAL
- **Quote Convention/Inputs**: Bid side dollar prices, new issues at offer (except Indian rupee, which uses only bid)
- **Timing**:
  - Argentina, Brazil, Chile, Colombia, Mexico, Peru: 4pm New York
  - Croatia, Czech Republic, Egypt, Hungary, Israel, Nigeria, Poland, Romania, Russia, South Africa, Turkey: 4:15pm London
  - China: 5pm Shanghai
  - Indonesia, Malaysia, Philippines, South Korea, Taiwan, Thailand: 5pm Tokyo
  - India: 12pm London
- **Frequency**: Daily
- **Settlement**: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All bonds are priced by BVAL on a daily basis. Certain emerging market bonds (e.g., 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	5pm Sydney	Bid
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

Currency Name	Currency Code	Sector	Timing	Bid/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
Canadian dollar	CAD	All	4pm Toronto	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
Japanese yen	JPY	Government	3pm Tokyo	Mid
Japanese yen	JPY	Non-government	3pm Tokyo	Bid
New Zealand dollar	NZD	All	5pm Sydney	Bid
Norwegian krone	NOK	All	4:15pm London	Bid (new issues at ask)
Swedish krona	SEK	All	4:15pm London	Bid (new issues at ask)
Swiss franc	CHF	All	5pm CET/4pm London	Bid (new issues at ask)
United States dollar	USD	Treasuries	4pm New York	Bid (Series-L)/Mid (Series-B)
United States dollar	USD	Agencies, high grade corporates, MBS, CMBS, ABS	4pm New York	Bid (new corp issues at ask)
United States dollar	USD	High yield corporates, corporate FRN	4pm New York	Bid
United States dollar	USD	Municipals	4pm New York	Bid

Figure 2
Non-G10 Currencies (Nominal Bonds): Price Timing and Conventions

Currency Name	Currency Code	Sector	Timing	Bid/Mid
Argentine peso	ARS	Treasuries	4pm New York	Bid (new issues at ask)
Brazilian real	BRL	Treasuries	4pm New York	Bid (new issues at ask)
Chilean peso	CLP	Treasuries	4pm New York	Bid (new issues at ask)
Chinese yuan	CNY	Treasuries	5pm Shanghai	Bid (new issues at ask)
		Non-treasuries		Bid
Offshore renminbi	CNH	All	5pm Shanghai	Bid
Colombian peso	COP	Treasuries	4pm New York	Bid (new issues at ask)
Croatian kuna	HRK	Treasuries	4:15pm London	Bid (new issues at ask)
Czech koruna	CZK	Treasuries	4:15pm London	Bid (new issues at ask)
Danish krone	DKK	All	4:15pm London	Bid (new issues at ask)
Egyptian pound	EGP	Treasuries	4:15pm London	Bid (new issues at ask)
Hong Kong dollar	HKD	Treasuries	5pm Tokyo	Bid (new issues at ask)
Hungarian forint	HUF	Treasuries	4:15pm London	Bid (new issues at ask)
Indian rupee	INR	Treasuries	12pm London	Bid (new issues at ask)
Indonesian rupiah	IDR	Treasuries	5pm Tokyo	Bid (new issues at ask)
Israeli shekel	ILS	Treasuries	4:15pm London	Bid (new issues at ask)
Korean won	KRW	Treasuries	5pm Tokyo	Bid (new issues at ask)
		Non-treasuries		Bid
Malaysian ringgit	MYR	Treasuries	5pm Tokyo	Bid (new issues at ask)
Mexican peso	MXN	Treasuries	4pm New York	Bid (new issues at ask)
New Taiwan dollar	TWD	Treasuries	5pm Tokyo	Bid (new issues at ask)
New Turkish lira	TRY	Treasuries	4:15pm London	Bid (new issues at ask)
Nigerian naira	NGN	Treasuries	4:15pm London	Bid (new issues at ask)
Peruvian nuevo sol	PEN	Treasuries	4pm New York	Bid (new issues at ask)

Currency Name	Currency Code	Sector	Timing	Bid/Mid
Philippine peso	PHP	Treasuries	5pm Tokyo	Bid (new issues at ask)
Polish zloty	PLN	Treasuries	4:15pm London	Bid (new issues at ask)
Romanian leu	RON	Treasuries	4:15pm London	Bid (new issues at ask)
Russian ruble	RUB	Treasuries	4:15pm London	Bid (new issues at ask)
		Non-treasuries		Bid
Singapore dollar	SGD	All	5pm Tokyo	Bid
South African rand	ZAR	Treasuries	4:15pm London	Bid (new issues at ask)
		Non-treasuries		Bid
Thai baht	THB	Treasuries	5pm Tokyo	Bid (new issues at ask)

Figure 3
Convertible Bonds: Price Timing and Conventions

Currency Name	Currency Code	Timing	Bid/Mid
British pound sterling	GBP	4:15pm London	Bid
Euro	EUR	4:15pm London	Bid
South African rand	ZAR	4:15pm London	Bid
Swedish krona	SEK	4:15pm London	Bid
Swiss franc	CHF	4:15pm London	Bid
UAE dirham	AED	4:15pm London	Bid
United States dollar	USD	4pm New York	Bid

All Bloomberg Convertible Indices are priced daily by BVAL.

Inflation-Linked Indices

Bloomberg government inflation-linked bond indices track multiple local currency inflation markets (euro, pound sterling, Swedish krona, Danish krone, Polish zloty) and are priced by BVAL.

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")

- Source: BVAL
- Quote Convention/Inputs: Mid side prices, and local market quote conventions
- Timing: Please refer to Figure 4
- Frequency: Daily
- Settlement:
  - UGILB, WGILB, EMGILB Indices: local market settlement conventions for all calculations.
  - Series-L: Next-day settlement for all dates except month-end, which is first calendar date of following month

Methodology

All inflation-linked government bonds are priced daily on the mid side

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.

Figure 4
Inflation-Linked Bond Indices: Timing

Currency Name	Currency Code	Timing	Bid/Mid	Universal GILB	World GILB	Global ILB (Series-L)	EMGILB
Argentine peso	ARS	3pm New York	Mid	✓			✓
Australian dollar	AUD	5pm Sydney	Mid	✓	✓	✓	
Brazilian real	BRL	3pm New York	Mid	✓			✓
British pound sterling	GBP	4:15pm London	Mid	✓	✓	✓	
Canadian dollar	CAD	4pm New York	Mid	✓	✓	✓	
Chilean peso	CLP	3pm New York	Mid	✓			✓
Colombian peso	COP	3pm New York	Mid	✓			✓
Danish krone	DKK	4:15pm London	Mid	✓	✓	✓	
Euro	EUR	4:15pm London	Mid	✓	✓	✓	
Israeli shekel	ILS	4:15pm London	Mid	✓			✓
Japanese yen	JPY	3pm Tokyo	Mid	✓	✓	✓	
Korean won	KRW	5pm Tokyo	Mid	✓			✓
Mexican peso	MXN	3pm New York	Mid	✓			✓
New Zealand dollar	NZD	5pm Sydney	Mid	✓	✓	✓	
New Turkish lira	TRY	4:15pm London	Mid	✓			✓
Polish zloty	PLN	4:15pm London	Mid	✓			✓
South African rand	ZAR	4:15pm London	Mid	✓			✓
Swedish krona	SEK	4:15pm London	Mid	✓	✓	✓	
Thai baht	THB	5pm Tokyo	Mid	✓			✓
United States dollar	USD	4pm New York	Mid	✓	✓	✓	

Appendix 5: Bloomberg Fixed Income Classification System and Codes

Class 1	Class 2	Class 3	Class 4	Class Code
Treasury	Treasury	Treasury	Treasury	A
Government-Related	Agencies	Government Guarantee	Government Guarantee	BAA
		Government Owned No Guarantee	Government Owned No Guarantee	BAB
		Government Sponsored	Government Sponsored	BAC
	Local Authorities	Local Authorities	Local Authorities	BB
	Sovereign	Sovereign	Sovereign	BC
	Supranational	Supranational	Supranational	BD
Corporate	Industrial	Basic Industry	Chemicals	CAAA
			Metals & Mining	CAAB
			Paper	CAAC
		Capital Goods	Aerospace & Defense	CABA
			Building Materials	CABB
			Diversified Manufacturing	CABC
			Construction Machinery	CABD
			Packaging	CABE
			Environmental	CABF
		Consumer Cyclical	Automotive	CACA
			Leisure	CACB
			Gaming	CACC
			Home Construction	CACD
			Lodging	CACE
			Retailers	CACF
			Restaurants	CACH
			Consumer Cyclical Services	CACI
		Consumer Non-Cyclical	Consumer Products	CADB
			Healthcare	CADD
			Pharmaceuticals	CADE
			Supermarkets	CADF
			Tobacco	CADG
			Food & Beverage	CADH
		Energy	Independent	CAEA
			Integrated	CAEB
			Oil Field Services	CAEC
			Refining	CAED
			Midstream	CAEE
		Technology	Technology	CAF
		Transportation	Airlines	CAGA
			Railroads	CAGB
			Transportation Services	CAGC
		Communications	Cable & Satellite	CAHA
			Media & Entertainment	CAHB
			Wirelines	CAHC

Class 1	Class 2	Class 3	Class 4	Class Code
			Wireless	CAHD
		Other Industrial	Other Industrial	CAZ
	Utility	Electric	Electric	CBA
		Natural Gas	Natural Gas	CBB
		Other Utility	Other Utility	CBZ
	Financial Institutions	Banking	Banking	CCA
		Brokerage, Asset Managers, Exchanges	Brokerage, Asset Managers, Exchanges	CCB
		Finance Companies	Finance Companies	CCC
		Insurance	Life	CCDA
			P&C	CCDB
			Health Insurance	CCDE
		REITS	Apartment	CCEA
			Healthcare	CCEB
			Office	CCEC
			Retail	CCED
			Other	CCEZ
		Other Financial	Other Financial	CCZ
Securitized	MBS Pass-Through	Agency Fixed-Rate	GNMA 30y	DAAA
			GNMA 15yr	DAAB
			Conventional 30y	DAAC
			Conventional 20y	DAAD
			Conventional 15y	DAAE
	ABS	Credit Card	Credit Card	DBA
		Auto	Auto	DBB
		Stranded Cost Utility	Stranded Cost Utility	DBE
		Whole Business	Whole Business	DBF
		Residential Mortgages	Residential Mortgages	DBG
		Student Loans	Student Loans	DBH
		ABS Other	ABS Other	DBZ
	CMBS	Non-Agency CMBS	Non-Agency CMBS	DCA
		Agency CMBS	Agency CMBS	DCB
	Covered	Mortgage Collateralized	Pfandbriefe	DDAA
			Jumbo Pfandbriefe	DDAB
			Non-Pfandbriefe	DDAC
		Public Sector Collateralized	Pfandbriefe	DDBA
			Jumbo Pfandbriefe	DDBB
			Non-Pfandbriefe	DDBC
		Hybrid Collateralized	Hybrid Collateralized	DDCA
		Other	Pfandbriefe	DDZA
			Non-Pfandbriefe	DDZB

Appendix 6: 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.
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 Bloomberg Inflation-Linked and Series-B Indices.
Class 1-4	Four-pillar (Treasury, Government-Related, Corporate and Securitized) classification of securities by issuer sector/industry in Bloomberg Indices launched in 2005 and backfilled historically. There are up to four levels of granularity within each pillar.
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 Index	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 Bloomberg 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 is 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 the indices' global 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 (e.g., 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 Bloomberg 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 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 the indices' 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.
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 Bloomberg 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. It is calculated as the difference between the OAD of the Returns Universe and Projected 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	Bloomberg 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 Bloomberg 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 Bloomberg MSCI ESG Fixed Income Indices.
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. Bloomberg fixed income benchmark indices are licensed by a number of ETF providers.
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 documentation is received and reflects 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.
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.
Fiscal Strength Weighted	Alternative weighting methodology for Bloomberg 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 Bloomberg Indices, adjustments made to the par amount outstanding of bonds for holdings of central governments that are publicly available. US nominal and inflation-linked Treasuries held by the US government in SOMA accounts are adjusted in flagship Bloomberg Series-L indices. Other SOMA holdings, as well as Bank of England and Bank of Japan holdings are not adjusted in flagship indices, and are instead reflected in Float Adjusted 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 index platform.
Forward Value	In the indices' 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 1-month forward exchange rates sourced from Refinitiv at 4pm London time for purposes of currency return and market value calculations in Bloomberg Indices.
GDP Weighted	Alternative weighting methodology for Bloomberg 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 the POINT® and Bloomberg platforms 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 (e.g., yield curve risk) and those specific to a particular asset class (e.g., prepayment risk in securitized products).
Government Guaranteed Agency	Classification within the Bloomberg Indices' scheme that includes issues that carry direct guarantees of timely payment of interest and principal from central governments or from government agencies that have direct guarantees from central government. Government ownership is not a factor, although most entities will be government owned.
Government Owned No Guarantee Agency	Classification within the Bloomberg Indices' scheme that includes issuers that are 50% or more owned by central governments but issue debt that carries no guarantee of timely repayment. This includes direct ownership by 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.
Government Sponsored Agency	Classification within the Bloomberg Indices' scheme that includes issuers that are less than 50% central 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 the index currency hedging rules.
Hybrid Performance Attribution (HPA) Model	Multi-currency attribution model with daily outperformance calculation and compounding available through the POINT® and Bloomberg platforms. 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 for a security that can be CUSIP, ISIN, deal acronym or index-assigned identifier for bonds without a CUSIP.
Inception Date	Historical start date of a published Bloomberg 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 Advisory Council (IAC)	The council through which Bloomberg consults Stakeholders (typically annually) on such themes as benchmark construction and potential changes to broad market benchmarks.
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 Projected Universes. 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 Projected Universe only. An index flag value of NOT_IND indicates a bond is not included in an index.
Index ID	Unique numeric identifier for each published Bloomberg 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 Index ID.

Index Name	All indices published by Bloomberg 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 Bloomberg 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 Bloomberg can run an index turnover report for Bloomberg 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 Level	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.
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 Bloomberg 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.
LEHM	Bloomberg page that allows users to access index returns and statistics, grouped by regional and sector categories, as well as historical data for Bloomberg benchmark indices that have been tickerized. Bloomberg terminals must be permissioned for the LEHM functionality by the index team.
Liability Driven Investing ("LDI")	Investment strategy designed to match a specific investor's liability stream or future cash flow obligation. LDI Index Series are a standard benchmark LDI index offering for US investors. Bloomberg 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 Bloomberg index construction, "Long" sub-indices include securities with at least 10 years to final maturity.
MBS Generic	Within Bloomberg 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 Bloomberg sector indices with respect to swaps. The purpose of mirror indices is to track the performance of high grade indices (e.g., 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 Bloomberg 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 Bloomberg 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 Bloomberg 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 Bloomberg 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.
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 Bloomberg US MBS Index pricing and methodology.
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 Bloomberg 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 Bloomberg index.
Returns (Backwards) Universe/ Projected (Forward) Universe	For each index, Bloomberg maintains two universes of securities: the Returns (Backward) and Projected (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 Projected 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 Projected 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 the more granular, nested classification scheme that is currently in use, and forms 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 Capital (Series-B) indices, such as the World Government Inflation-Linked ("WGILB") Index, after the two index families were merged under a single " 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 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.
Stakeholder	Subscribers and other persons or entities who own contracts or financial instruments that reference a benchmark or otherwise use the Indices.
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 performance of a systematically defined, tradable index strategy.
Structured Note	Fixed income instrument with an embedded derivative component. These are not index eligible.
Submission	Prices, estimates, values, rates or other information that is provided by a Submitter to Bloomberg for the purposes of determining a benchmark. This excludes data soured from regulated markets or exchanges with mandatory post-trade transparency requirements.
Subscriber	A person or entity that purchases benchmark determination services from Bloomberg.
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 the indices' 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.
Third-Party Index/Source	Refers to non-Bloomberg indices or data attributes/analytics sourced from outside the Bloomberg index database.
Ticker	Broad issuer-level identifier used in Bloomberg 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 SEC, 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 Bloomberg 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 Bloomberg Indices, Yankees were recognized as a separate sector until July 2000, when all Yankee corporates were absorbed into their respective industry and sector classifications.

Appendix 7: Glossary of Terms – 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.
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 the mortgage prepayment model and serves as the basis for index analytics such as duration. It is expressed as an annual rate (e.g., 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 factors are used for a number of asset classes in the 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	International Securities Market Association (ISMA, formerly AIBD) 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 ISMA. 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 (e.g., 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. Bloomberg 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")	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 the indices) will make the theoretical value of the cash flows equal to the market price of the instrument.
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. The indices use 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 the indices) 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.
Projected OAD	Index-level OAD based on the Projected Universe of an index. Each bond contributes based on its current market value.
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. These 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. These 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.
Vega	A measure of a security's sensitivity to implied volatility. The indices use 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.

Appendix 8: Glossary of Terms – 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 Bloomberg flagship indices for nominal and inflation-linked US Treasuries. It reflects the current amount outstanding of a bond in the Projected 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 [(Ending Price + Accrued Interest) * 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 RU Market Value - 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 [(Price BOM + Accrued BOM) * Outstanding BOM] * (1+ 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 [(Ending Price + Ending Accrued) * RU Security Amount 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.

Appendix 9: Index Governance and Index Methodology Considerations

Benchmark Governance, Audit and Review Structure

BISL uses two primary committees to provide overall governance and effective oversight of its benchmark administration activities:

- The Product, Risk & Operations Committee ("PROC") provides direct governance and is responsible for the first line of controls over the creation, design, production and dissemination of benchmark indices, strategy indices and fixings administered by BISL, including the Indices. The PROC is composed of Bloomberg personnel with significant experience or relevant expertise in relation to financial benchmarks. Meetings are attended by Bloomberg Legal & Compliance personnel. Nominations and removals are subject to review by the BOC, discussed below.
- The oversight function is provided by Bloomberg's Benchmark Oversight Committee ("BOC"). The BOC is independent of the PROC and is responsible for reviewing and challenging the activities carried out by the PROC. In carrying out its oversight duties, the BOC receives reports of management information both from the PROC as well as Bloomberg Legal & Compliance members engaged in second level controls.

On a quarterly basis, the PROC reports to the BOC on governance matters, including but not limited to client complaints, the launch of new benchmarks, operational incidents (including errors & restatements), major announcements and material changes concerning the benchmarks, the results of any reviews of the benchmarks (internal or external) and material stakeholder engagements.

Internal and External Reviews

BISL's index administration is also subject to Bloomberg's Compliance function which periodically reviews various aspects of its businesses in order to determine whether it is adhering to applicable policies and procedures, and assess whether applicable controls are functioning properly. In addition, Bloomberg may from time to time appoint an independent external auditor with appropriate experience and capability to review adherence to benchmark regulation. The frequency of such external reviews will depend on the size and complexity of the operations and the breadth and depth of the Index use by stakeholders.

Index Advisory Council (IAC)

IACs are composed of key market participants and other influential individuals to assist BISL in setting index priorities, to discuss potential rules changes and to provide ideas for new products. IACs are generally constituted on an annual basis. While potential benchmark changes are discussed through this process, all feedback received is non-binding and all final decisions on benchmark index rules are made by the PROC (subject to BOC review) after the review period has ended.

Data Providers and Data Extrapolation

Bloomberg indices are rules-based, and their construction is designed to consistently produce index levels without the exercise of discretion. Except as otherwise described in this methodology document, the indices are produced without the interpolation or extrapolation of input data.

In addition, BISL seeks to avoid contributions of input data that may be subject to the discretion of the source of such data and instead seeks to use input data that is readily available and/or

distributed for a number of non-index or benchmark-creation purposes. Accordingly, the indices require no 'contributors' to produce and no codes of conduct with any such sources are required.

Index and Data Reviews

BISL will review the indices (both the rules of construction and data inputs) on a periodic basis, not less frequently than annually, to determine whether they continue to reasonably measure the intended underlying market interest, the economic reality or otherwise align with their stated objective. More frequent reviews may result from extreme market events and/or material changes to the applicable underlying market interests.

Criteria for data inputs include reliable delivery and active underlying markets. Whether an applicable market is active depends on whether there are sufficient numbers of transactions (or other indications of price, such as indicative quotes) in the applicable constituents (or similar underlying constituent elements) that a price (or other value, as applicable) may be supplied for such constituent(s).

Other than as set forth in this methodology, there are no minimum liquidity requirements for index constituents and/or minimum requirements or standards for the quantity or quality of the input data. However, there are often amount outstanding minimums which function as a proxy for liquidity.

The review will be conducted by product managers of the indices in connection with the periodic rebalancing of the indices or as otherwise appropriate.

Any resulting change to this methodology deemed to be material (discussed below) will be subject to the review of the PROC under the oversight of the BOC, each of which committees shall be provided all relevant information and materials it requests relating to the change. Details regarding the PROC and BOC are described above.

Material changes will be reflected and tracked in updated versions of this methodology.

BISL's index administration is also subject to Bloomberg's Compliance function which periodically reviews various aspects of its businesses in order to determine whether it is adhering to applicable policies and procedures, and assess whether applicable controls are functioning properly.

Material changes related to the Bloomberg indices will be made available in advance to affected stakeholders whose input will be solicited. The stakeholder engagement will set forth the rationale for any proposed changes as well as the timeframe and process for responses. BISL will endeavour to provide at least two weeks for review prior to any material change going into effect. In the event of exigent market circumstances, this period may be shorter. Subject to requests for confidentiality, stakeholder feedback and BISL's responses will be made accessible upon request.

In determining whether a change to the Indices is material, the following factors shall be taken into account:

- The economic, financial and/or operational impact of the change;
- Whether the change affects the original purpose of the Index; and/or
- Whether the change is consistent with the overall objective of the Index and the underlying market interest it seeks to measure.

Restatement Policy

Bloomberg makes every effort to provide accurate calculation of its indices. However, to the extent a material error in index level is uncovered following its publication and dissemination, a notification will be sent to index clients alerting them of such error and the expected date of a revised publication, if warranted. Bloomberg considers the following factors to determine whether to restate. Not all conditions need to be present to warrant a restatement, and certain

factors may be more determinative that others depending on the circumstances of the given error.

A. The relative importance of the data field impacted by the error;

B. When the error occurred and when it was discovered;

C. The number of indices and sub-indices affected;

D. Whether the impacted indices are linked to tradable products;

E. The magnitude of the error;

F. The burden of restatement on client re-processing relative to the impact of the error;

G. The impact of the restatement on analytical tools.

General Methodology Considerations

Limitations of the Indices

Though the indices are designed to be representative of the markets they measure or otherwise align with their stated objective, they may not be representative in every case or achieve their stated objective in all instances. They are designed and calculated strictly to follow the rules of this methodology, and any index level or other output is limited in its usefulness to such design and calculation.

Markets can be volatile, including those market interests which the indices intend to measure or upon which the indices are dependent in order to achieve their stated objective. For example, illiquidity can have an impact on the quality or amount of data available to BISL for calculation and may cause the Indices to produce unpredictable or unanticipated results.

In addition, market trends and changes to market structure may render the objective of the indices unachievable or to become impractical to replicate by investors.

In particular, the indices measure global fixed income markets. As with all fixed income investing, the indices are exposed to interest rate risk. The value of bonds fluctuates with the changes in the interest rate policies established by central banks and the natural movement of rates over time. Bonds with optionality will also be impacted by interest rate volatilities. Most fixed income securities often trade at a spread to the base interest rate curve. The level of the spread reflects the additional premium an investor requires for taking the additional credit risk, liquidity risk, and other risks. The change of the spread, which reflects primarily the change in perceived risk of a security, comes from both common forces, affecting all bonds with similar characteristics, and information specific to a particular issuer. As the indices are designed to measure those markets, its indices could be materially impacted by market movements, thus significantly impacting the use or usefulness of the fixings for some or all users.

In addition, certain subindices may be designed to measure smaller subsets of the indices such as specific sectors, maturities, or credit quality bands. Some of these subindices have very few qualifying constituents and may have none for a period of time. During such period, the subindex will continue to be published at its last value, effectively reporting a 0% return, until new constituents qualify. If no constituents are expected to qualify (due to changes in issuance trends and other factors), the subindex may be discontinued. In such an event, this discontinuation will be announced to index users.

Third Parties

BISL does not use any third parties in:

1. data collection or analysis (other than market data vendors and/or others performing simple data aggregation or data delivery services);
2. computation or calculation of the official index levels; or
3. dissemination of the indices (other than any redistribution of official index levels).

In the event it does determine to use third parties in the performance of such roles, BISL will provide details of their function in this methodology and establish appropriate controls in its internal procedures.

Expert Judgment

BISL may use expert judgment with regards to the following:

- Index restatements
- Extraordinary circumstances during a market emergency
- Data interruptions, issues, and closures

When expert judgment is required, BISL undertakes to be consistent in its application, with recourse to written procedures outlined in this Methodology and internal procedures manuals. In certain circumstances exercises of expert judgment are reviewed by senior members of BISL management and Bloomberg Compliance teams, and are reported to the PROC. BISL also maintains and enforces a code of ethics to prevent conflicts of interest from inappropriately influencing index construction, production, and distribution, including the use of expert judgment.

Reinvestment of Dividends and Coupons

Dividends play no role in this methodology, and are therefore not accounted for by the indices. Treatment of coupon payments is as described above.

Appendix 10: Environmental, Social and Governance Disclosures

A. Bloomberg Indices

EXPLANATION OF HOW ESG FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY	
Item 1. Name of the benchmark administrator.	Bloomberg Index Services Limited ("BISL")
Item 2. Type of benchmark	Fixed Income Corporate
Item 3. Name of the benchmark or family of benchmarks.	Bloomberg Indices
Item 4. Does the benchmark methodology for the benchmark or family of benchmarks take into account ESG factors?	□ Yes X No There are sub-families with ESG objectives, which have ESG statements below, but the parent Bloomberg Indices do not pursue ESG objectives.
Item 5. If the response to Item 4 is positive, please list below those ESG factors that are taken into account in the benchmark methodology. Please explain how those ESG factors are used for the selection, weighting or exclusion of underlying assets.	
a) List of environmental factors considered:	N/A
b) List of social factors considered:	N/A
c) List of governance factors considered:	N/A
Item 6. Data and standards used.	N/A
a) Data input. Describe whether the data are reported, modelled or, sourced internally or externally. Where the data are reported, modelled or sourced externally, please name the third party data provider.	N/A
b) Verification of data and guaranteeing the quality of those data. Describe how data are verified and how the quality of those data is ensured.	N/A
c) Reference standards Describe the international standards used in the benchmark methodology.	N/A
Information updated on:	24 April 2020

B) Bloomberg MSCI ESG Fixed Income Indices

EXPLANATION OF HOW ESG FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY		
Item 1. Name of the benchmark administrator.	Bloomberg Index Services Limited ("BISL")	
Item 2. Type of benchmark	Fixed Income Corporate Index Fixed Income Sovereign Index -- Combined ESG Factors	
Item 3. Name of the benchmark or family of benchmarks.	Bloomberg MSCI ESG Fixed Income Indices The index family includes three standard methodologies: SRI – Controversial business exclusion Sustainability – ESG-rating based selection ESG Weighted – ESG-rating based weighting	
Item 4. Does the benchmark methodology for the benchmark or family of benchmarks take into account ESG factors?	X Yes	□ No
Item 5. If the response to Item 4 is positive, please list below those ESG factors that are taken into account in the benchmark methodology. Please explain how those ESG factors are used for the selection, weighting or exclusion of underlying assets.		
a) List of environmental factors considered:	SRI/Sustainability: MSCI ESG Controversy score – exclusion Sustainability: MSCI ESG Rating – selection ESG Weighted: MSCI ESG Rating – weighting Note: some client customized indices use exclusions based on environmental factors such as: Fossil fuel tie Thermal coal revenue % Artic gas revenue% Artic oil revenue % Etc.	
b) List of social factors considered:	SRI/Sustainability: MSCI ESG Controversy score – exclusion Sustainability: MSCI ESG Rating – selection ESG Weighted: MSCI ESG Rating – weighting SRI: Adult entertainment (producer) - Exclusion Alcohol (producer) – Exclusion Gambling (operations and support) – Exclusion Tobacco (producer, retailer, supplier) – Exclusion Military weapons (conventional / controversial) – Exclusion Civilian firearms – exclusion Nuclear power (utility, mining, reactor design) – Exclusion GMOs - Exclusion	
c) List of governance factors considered:	SRI/Sustainability: MSCI ESG Controversy score – exclusion Sustainability: MSCI ESG Rating – selection ESG Weighted: MSCI ESG Rating – weighting	
Item 6. Data and standards used.		
a) Data input.	The starting universes of index constituents are the Bloomberg fixed income indices (Global IG and HY).	

Describe whether the data are reported, modelled or, sourced internally or externally. Where the data are reported, modelled or sourced externally, please name the third party data provider.	All ESG data used in the Bloomberg MSCI ESG indices is sourced externally. The Bloomberg MSCI ESG Index family uses MSCI ESG Ratings and business exclusion data. MSCI ESG Ratings were developed through over 40 years of experience through legacy companies collecting, cleaning, standardizing and modelling ESG data from thousands of sources to create a precision tool for a clear signal of ESG performance. Companies are rated on a 7-point 'AAA' to 'CCC' scale according to their exposure to industry-specific ESG risks and their ability to manage those risks relative to peers.
b) Verification of data and guaranteeing the quality of those data. Describe how data are verified and how the quality of those data is ensured.	Data is received from MSCI via secure transmission. BISL is a registered benchmark administrator who adheres to the rules and regulations set forth by BMR and subsequent governing body jurisdictions. BISL's index administration is also subject to Bloomberg's compliance function which periodically reviews various aspects of its business to ensure it is adhering to applicable policies and procedures, and to assess whether or applicable controls are functioning properly.
c) Reference standards Describe the international standards used in the benchmark methodology.	Bloomberg is a registered benchmark administrator adhering to rules and regulations set forth by BMR. All calculations, inputs, optimization constraints, and pricing are transparently documented in the Index Methodology.
Information updated on:	24 April 2020

C) Bloomberg SASB Fixed Income Indices[120]

EXPLANATION OF HOW ESG FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY*	
Item 1. Name of the benchmark administrator.	Bloomberg Index Services Limited ("BISL")
Item 2. Type of benchmark	Equity and Fixed Income Corporate Benchmarks – Combined ESG Factors
Item 3. Name of the benchmark or family of benchmarks.	Bloomberg SASB ESG Equity Indices: Bloomberg SASB US Large Cap ESG Ex-Controversies Select Price / Total Return Index Bloomberg SASB US Large Cap Growth ESG Ex-Controversies Select Price / Total Return Index Bloomberg SASB US Large Cap Value ESG Ex-Controversies Select Price / Total Return Index Bloomberg SASB US Large Cap Dividend Yield ESG Ex-Controversies Select Price / Total Return Index Bloomberg SASB US Large Cap ESG Select Price / Total Return Index Bloomberg SASB Fixed Income Indices: Bloomberg SASB US Corporate ESG Ex-Controversies Select Index Bloomberg SASB US Corporate ESG Select Index Bloomberg SASB US Corporate ESG Ex-Controversies Index Bloomberg SASB US Corporate ESG Index Bloomberg SASB Euro Corporate ESG Ex-Controversies Select Index

[120] For the Bloomberg SASB Equity Indices referred to below, see https://www.bloomberg.com/professional/product/indices/sasb-resources/.

Item 4. Does the benchmark methodology for the benchmark or family of benchmarks take into account ESG factors?	X Yes	□ No
Item 5. If the response to Item 4 is positive, please list below those ESG factors that are taken into account in the benchmark methodology. Please explain how those ESG factors are used for the selection, weighting or exclusion of underlying assets.		
a) List of environmental factors considered:	Selection, weighting or exclusion: Thermal Coal Extraction – exclusion All other index constituents are members of the base index on which the Bloomberg SASB indices are created: Bloomberg US Large Cap (B500), Bloomberg US Corporate (LUCA), Bloomberg Euro Corporate (LECP). Please see appendix for full description of the Bloomberg SASB Index Construction, including R-Factor score composition.	
b) List of social factors considered:	Selection, weighting or exclusion: Extreme Event Controversies – Exclusion Controversial Weapons – Exclusion Civilian Firearms – Exclusion Tobacco – Exclusion All other index constituents are members of the base index on which the Bloomberg SASB indices are created: Bloomberg US Large Cap (B500), Bloomberg US Corporate (LUCA), Bloomberg Euro Corporate (LECP).. Please see appendix for full description of the Bloomberg SASB Index Construction, including R-Factor score composition.	
c) List of governance factors considered:	Selection, weighting or exclusion: UNGC Violations – Exclusion All other index constituents are members of the base index on which the Bloomberg SASB indices are created: Bloomberg US Large Cap (B500), Bloomberg US Corporate (LUCA), Bloomberg Euro Corporate (LECP).. Please see appendix for full description of the Bloomberg SASB Index Construction, including R-Factor score composition.	
Item 6. Data and standards used.		
a) Data input. Describe whether the data are reported, modelled or, sourced internally or externally. Where the data are reported, modelled or sourced externally, please name the third party data provider.	The starting universes of index constituents for the Bloomberg SASB indices are determined by the Bloomberg "Base Indices": Equity: Bloomberg US Large Cap (B500) Fixed Income: Bloomberg US Corporate (LUCA), Bloomberg Euro Corporate (LECP). State Street Global Advisors (SSGA) provides the list of constituents that will be excluded from the Base index based on business involvement. SSGA additionally provides R-Factor (ESG)	

	scores for index constituents, which determine the weight of constituents in the index. R-Factor scores are proprietary scores generated by SSgA from a composite framework of underlying ESG score providers (ISS-ESG, Sustainalytics, and Vigeo-EIRIS.) Bloomberg is not currently privy to the underlying data provided by each of the ESG Score providers. Please see below for an additional explanation of R-Factor.
b) Verification of data and guaranteeing the quality of those data. Describe how data are verified and how the quality of those data is ensured.	Data is received from State Street Global Advisors via secure transmission. BISL is a registered benchmark administrator who adheres to the rules and regulations set forth by BMR and subsequent governing body jurisdictions. BISL's index administration is also subject to Bloomberg's compliance function which periodically reviews various aspects of its business to ensure it is adhering to applicable policies and procedures, and to assess whether or applicable controls are functioning properly.
c) Reference standards Describe the international standards used in the benchmark methodology.	The Sustainability Accounting Standards Board (SASB) standards serve as the basis for the "ESG" component of the R-Factor score. Bloomberg is a registered benchmark administrator adhering to rules and regulations set forth by BMR. All calculations, inputs, optimization constraints, and pricing are transparently documented in the Index Methodology.
Information updated on:	April 21, 2020

Appendix Information:

The Bloomberg SASB ESG Equity and Fixed Income indices are designed to be socially responsible investment benchmarks derived from the Bloomberg size and style equity indices and the Bloomberg fixed income indices.

The policy benchmarks in the Bloomberg SASB ESG family use a tilting methodology to reallocate equity/issuer weights based on an ESG metric called R-Factor, which is designed to measure the performance of a company's business operations and governance as it relates to financially material ESG challenges facing the company's industry

The "Select" index variants are optimized to maximize exposure to the ESG score, while maintaining similar risk/return characteristics to the base indices.

Responsible investing requires a tool to measure the performance of a company's business operations and governance as it relates to financially material ESG challenges facing the company's industry. State Street Global Advisors' R-Factor TM is designed to be this mechanism. The score draws on data from multiple providers, and leverages widely accepted, transparent materiality frameworks to generate a unique ESG score for listed companies. It was designed to offer companies and investors greater transparency about which financially material ESG issues drive a company's score – and, ultimately, to help build more sustainable capital markets. At the core of R-FactorTM score is a mapping algorithm that uses metrics that are "financially material" across 77 industries and 17 regulatory regimes. The methodology was designed around a transparent analytical framework and the standards of the Sustainability Accounting Standards Board (SASB).

* For additional ESG disclosure data for our equity benchmarks, please visit the Bloomberg Indices website.

Disclaimer

BLOOMBERG, BLOOMBERG INDICES and Bloomberg Fixed Income Indices (the "Indices") are trademarks or service marks of Bloomberg Finance L.P. Bloomberg Finance L.P. and its affiliates, including Bloomberg Index Services Limited, the administrator of the Indices (collectively, "Bloomberg") or Bloomberg's licensors own all proprietary rights in the Indices. Bloomberg does not guarantee the timeliness, accuracy or completeness of any data or information relating to the Indices. Bloomberg makes no warranty, express or implied, as to the Indices or any data or values relating thereto or results to be obtained therefrom, and expressly disclaims all warranties of merchantability and fitness for a particular purpose with respect thereto. It is not possible to invest directly in an Index. Back-tested performance is not actual performance. Past performance is not an indication of future results. To the maximum extent allowed by law, Bloomberg, its licensors, and its and their respective employees, contractors, agents, suppliers and vendors shall have no liability or responsibility whatsoever for any injury or damages - whether direct, indirect, consequential, incidental, punitive or otherwise - arising in connection with the Indices or any data or values relating thereto - whether arising from their negligence or otherwise. This document constitutes the provision of factual information, rather than financial product advice. Nothing in the Indices shall constitute or be construed as an offering of financial instruments or as investment advice or investment recommendations (i.e., recommendations as to whether or not to "buy", "sell", "hold", or to enter or not to enter into any other transaction involving any specific interest or interests) by Bloomberg or a recommendation as to an investment or other strategy by Bloomberg. Data and other information available via the Indices should not be considered as information sufficient upon which to base an investment decision. All information provided by the Indices is impersonal and not tailored to the needs of any person, entity or group of persons. Bloomberg does not express an opinion on the future or expected value of any security or other interest and do not explicitly or implicitly recommend or suggest an investment strategy of any kind. Customers should consider obtaining independent advice before making any financial decisions. © 2021 Bloomberg. All rights reserved. This document and its contents may not be forwarded or redistributed without the prior consent of Bloomberg.

The BLOOMBERG TERMINAL service and Bloomberg data products (the "Services") are owned and distributed by Bloomberg Finance L.P. ("BFLP") except (i) in Argentina, Australia and certain jurisdictions in the Pacific islands, Bermuda, China, India, Japan, Korea and New Zealand, where Bloomberg L.P. and its subsidiaries distribute these products, and (ii) in Singapore and the jurisdictions serviced by Bloomberg's Singapore office, where a subsidiary of BFLP distributes these products.

Take the next step.
For additional information,
email indexhelp@bloomberg.net
or press the <HELP> key twice
on the Bloomberg Terminal*

bloomberg.com/indices

Beijing	**Hong Kong**	**New York**	**Singapore**
+86 10 6649 7500	+852 2977 6000	+1 212 318 2000	+65 6212 1000
Dubai	**London**	**San Francisco**	**Sydney**
+971 4 364 1000	+44 20 7330 7500	+1 415 912 2960	+61 2 9777 8600
Frankfurt	**Mumbai**	**São Paulo**	**Tokyo**
+49 69 9204 1210	+91 22 6120 3600	+55 11 2395 9000	+81 3 4565 8900