Bond Index Methodologies

April 18, 2018

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Overview and basic assumptions

Index Administration

This report provides details of the methodologies used to compile the ICE BofAML Bond Indices (the report provides details of the methodologies used to compile the defined by IOSCO report provides details of the methods) by ICE Data Indices, LLC (IDI) and are constructed based on a defined set of rules which spell out all pertinent details of how an Index is compiled. The rules for compiling an Index are established when the Index is first created and specify the criteria for selecting constituent securities. The rules also establish the methodologies for weighting, valuing and rebalancing the constituents. Detailed rule documents are publicly available on our systems.[1]

Annual rules review

Potential rule changes are considered on an annual basis. An initial set of proposed changes under consideration is published in April. Investor clients are encouraged to comment on the proposals by way of an online survey. At the end of a three-month commentary period, final decisions are announced in July and adopted changes, if any, are generally implemented at the September month end rebalancing.

Custom Indices that are based off standard Indices affected by these rule changes automatically pick up the new rules of the standard Indices from which they are derived unless the sponsor of the Index notifies us in advance of their desire to modify the rules for their custom Index.

IDI, at its sole discretion, reserves the right to issue rule changes apart from this annual cycle in the event that such a change is deemed necessary in order to deal with extraordinary circumstances including, but not limited to, changes in data availability.

Limitations

All of the ICE BofAML Bond Indices produced by IDI may be subject to potential limitations in terms of the number of qualifying constituents and diversification. In some cases this is by design. For example, the ICE BofAML Current 2-Year US Treasury Index will always have a single constituent security. In other cases, there can be a decline in the pool of qualifying constituents due to changes in issuance trends and other factors that can affect the underlying market measured by the index. In addition, some indices are designed to measure smaller subdivisions of larger indexes. As an example, many of our indices have a standard set of sub-indices that segment the larger index by maturity and/or rating as well as other factors. In some cases, one or more of the sub-indices may be thinly populated, but by publishing the entire set we allow for a complete representation of the broader index across key factors.

It may occur that a particular sub-index may not have any qualifying constituents for a period of time. During any period in which there are no qualifying constituents for a given index we suspend its publication. Publication of that index is resumed when it once again is populated with at least one qualifying security; however, its index value is reset to 100 at the point of resumption.

Other limitations may include the ability of the Benchmark to operate in illiquid or fragmented markets.

IDI seeks to manage and mitigate these limitations through the Benchmark design, review and oversight process.

Expert Judgment

“Expert Judgment” refers to the exercise of discretion by an Administrator or Submitter with respect to the use of data in determining a Benchmark. Expert Judgment includes extrapolating values from prior or related transactions, adjusting values for factors that might influence the quality of data such as market

[1] Public website: www.mlIndex.ml.com
Institutional client website: www.markets.ml.com

events or impairment of a buyer or seller's credit quality, or weighting firm bids or offers greater than a particular concluded transaction.

While IDI mostly relies on input data obtained from its sources, on certain occasions, where decisions relating to the pricing of a Benchmark are required to maintain the integrity of the values and ensure that the Benchmark continues to operate in line with the methodology, IDI may apply Expert Judgment. Where it is required in a Benchmark determination, it may only be applied by suitably experienced and qualified staff Members on the IDI team. Using their expertise and knowledge, and the information available to them, they will make an assessment of what input data or security evaluation would be most appropriate to use to correctly reflect the Benchmark objective.

Ultimately any exercise of Expert Judgment is overseen by the Governance Committee of IDI, which ensures that the published Methodologies have been followed.

Exceptional market conditions and corrections

IDI retains the right to delay the publication of the index level. Furthermore, IDI retains the right to suspend the publication of the level of the index if it believes that circumstances prevent the proper calculation of the index.

If evaluated prices are not available, the index will not be recalculated unless IDI decides otherwise.

Reasonable efforts are made to ensure the correctness and validity of data used in index calculations. Where errors have occurred in the determination or calculation of an index, the decision to make a restatement will be assessed on a case by case basis. Such decision will take account of the significance; impact; age; and scale of the error.

In the event that there is a market-wide event resulting in evaluated prices not being available, IDI will determine its approach on a case by case basis, taking into account information and notifications provided by Interactive Data. Market-wide events include, but are not limited to, the following:

- Technological Problems / Failures
- Natural Disaster or Other BCP-Related Event

IDI will communicate any issues with publication of the indices during the day through the regular client communication channels; in addition, IDI may also contact clients directly; post a notice on the IDI website; send a message via the market data portal, or use other such forms of communication.

Rebalancing

Unless otherwise specified, the Indices are rebalanced on the last calendar day of the month, based on information available up to and including the third business day before the last business day of the month (the "lock-out date"). No changes are made to constituent holdings other than on month end rebalancing dates.

Accrued interest and cash

With the exception of US securitized products (MBS, CMBS, CMO and ABS), accrued interest is calculated assuming next-day settlement. Accrued interest for US securitized products assumes same-day settlement. Cash flows from bond payments that are received during the month are retained in the Index until the end of the month and then are removed as part of the rebalancing. Cash does not earn any reinvestment income while it is held in the Index.

Called securities

Securities that are announced as called are removed from the Indices at the next rebalancing provided this occurs on or before the third business day before the last business day of the month.

Default treatment

Defaulted securities are excluded from the Indices at the next rebalancing following the default event, provided this occurs on or before the third business day before the last business day of the month.

Securities are considered in default based on their individual legal terms. A rating of "D" by a major rating agency is not a consideration for default status.

Payments-in-kind

Payments "in-kind" (additional face amount of the same securities) are treated as if the additional amounts had been immediately sold at the Index price that day. The proceeds are treated as a cash payment for purposes of calculating total return.

No re-entry once removed for lack of pricing

If a bond that is a constituent of one or more of the Indices is removed due to lack of pricing that bond will not qualify for entry into any Index at a later date even if adequate pricing subsequently becomes available.

At least 18 months to final maturity at issuance to qualify

With the exception of government bills (other than Brazil bills) and US ABS and CMBS, a security must have at least 18 months to final maturity at the time of issuance in order to qualify for inclusion in the Indices.

Special treatment for particular security types

144a for life

Unless otherwise specified, 144a-for-life securities qualify for inclusion in the Indices. In cases where both a 144a and RegS identifier are issued, the 144a identifier is used for USD-denominated bonds and the RegS identifier is used for all other currencies.

Perpetual securities

The first call date is used as the assumed final maturity for perpetual bonds when determining qualification with respect to maturity criteria of a given Index. For example, a perpetual bond with a call date in less than five years is included in the 1-5 year Index and excluded from the 5+ year Index; whereas a regular callable bond with a fixed final maturity in 30 years that is callable within 5 years is excluded from the 1-5 year Index and included in the 10+ year Index.

Fixed-to-floating rate securities

Fixed-to-floating rate securities qualify for inclusion in the fixed-rate Indices provided the security is callable within the fixed rate period. The last date on the call schedule that falls within the fixed rate period is used as the assumed final maturity for purposes of determining inclusion in maturity sub-Indices. Securities that are not called on or before the coupon transition date qualify for the floating-rate Indices.

Fixed-to-variable rate securities

Fixed-to-variable rate securities (eg, such as a security that resets to a spread off a current 5 year swap rate) provided they are callable within the initial fixed rate period. The first call date is used as the assumed final maturity for purposes of determining inclusion in maturity sub-Indices.

Contingent capital securities (cocos)

Contingent capital securities (cocos) qualify only for the stand-alone Contingent Capital Securities Index (ticker COCO), its sub-Indices and any blended Index that includes a Contingent Capital Index/sub-Index as a component. For purposes of Index qualification we define a contingent capital security as a security having a conversion feature with a mechanical trigger at a specified capital level that typically transforms the debt into common equity or writes it down. Other capital securities, where conversion can be

mandated by a regulatory authority but which have no specified trigger, are not treated as contingent capital securities and qualify for inclusion in the corporate Indices.

Securitized corporate securities

Securitized corporate securities, such as pass-through trust certificates, EETCs and similar hybrid securitized debt, do not qualify for inclusion in any investment grade or high yield corporate Index.

Synthetic security indices

US Constant Maturity STRIP Index Series

Each Index tracks the performance of a single synthetic US Treasury STRIP purchased at the beginning of the month, held for one month, and then sold at the end of the month with the proceeds rolled into a new instrument. Therefore, on the purchase date, the bond has a maturity exactly equal to the stated maturity of the Index, and at the point it is sold it is one month short of the Index stated maturity.

The synthetic STRIP has a zero coupon, a purchase yield equal to the yield of the corresponding point on the coupon STRIP curve, and a purchase price which is derived from the purchase yield. The coupon STRIP curve is fitted from the observed prices of all outstanding US Treasury coupon STRIPs. Each day thereafter, the instrument is priced by discounting its cash flow at the current day's coupon STRIP curve, while taking account of the passage of time. At the end of the month, the security is sold and the proceeds are rolled into a new instrument with a maturity equal to the stated maturity of the Index.

Deposit Rate Constant Maturity Index Series

Each Index tracks the performance of a synthetic asset paying a short-term deposit rate to a stated maturity. The Index is based on the assumed purchase at par of a synthetic instrument having exactly its stated maturity and with a coupon equal to that day's fixing rate. That issue is assumed to be sold the following business day (priced at a yield equal to the current day fixing rate) and rolled into a new instrument.

The following example illustrates the calculation of a Libor constant maturity Index over a period of three days using the US Dollar 1-Month Deposit Offered Rate Constant Maturity Index (ticker LUS1) on January 8, 2008, as an example. On January 7, a new instrument is purchased at par, with a coupon equal to the quoted Libor rate, 4.441%. On January 8, we calculate the current market price of that security based on a yield equal to the new quoted Libor rate of 4.411%. Using the current day "market price" and a starting value of par, we calculate price return, in this case 0.002%. Income return is accrued on a 30/360 basis and equals 0.012%. That instrument is then assumed to be sold and a new security is created, again priced at par and with a coupon equal to the quoted Libor rate for January 8 of 4.411%. On January 9, we repeat the process. Security 2 is sold at the current market price and a new instrument is purchased at par. Therefore, the average maturity of a 3-month deposit rate Index is always three months, a 1-month deposit rate Index is always one month, and an overnight Index is always one day.

Tradeable Swap Index Series

Each Index tracks the performance of a funded investment that combines a short term asset earning a 1-month deposit bid rate with a par or zero coupon interest rate swap, of an equal notional value, where the Index pays floating and receives fixed. The tenor of the swap is matched to the stated maturity of the Index on the day the position is established. The two instruments are held for one month at which point the swap is rolled into a new maturity and the cash is reinvested.

Valuation of the par or zero coupon swap

The swap is priced using discount functions derived from the par or zero coupon swap curve. Observed rates that form the basis for constructing the par coupon swap curve include a combination of closing

futures prices and mid-market closing swap rates. All swap calculations assume regular settlement (i.e., T+2 for USD and EUR and T+0 for GBP).

Valuation of the short term cash asset

Cash, in an amount equal to the notional value of the swap, is invested in a short term asset earning the 1-month deposit bid rate. The coupon for the short term asset is equal to the yield of the ICE BofAML 1-Month Deposit Bid Rate Constant Maturity Index for the corresponding currency on the day it is purchased and the maturity is set to the settlement date associated with the next rebalancing date. The short term asset is priced at par and accrues interest daily using the same settlement date as the corresponding swap (i.e., T+2 for USD and EUR and T+0 for GBP).

Rebalancing procedures

The Index is rebalanced on the last business day of the month. If the last calendar day of the month falls on a non-business day, the Index value for that date is equal to the Index value on the last business day. On the rebalancing day, cash is invested in a new asset earning the current day 1-month deposit bid rate, the old swap position is unwound and a new swap position is established so that the fixed leg of the swap once again matches the stated maturity of the Index.

Yield/spread boundary conditions

We follow a two-step process to address securities that are very close to their call dates or have extreme values, both negative and positive:

1. If the YTW is negative, the calculated workout date is within 30 days and the bond is continuously callable, YTW will be recalculated using a workout date 60 days from the current date. Yield, spread, duration and convexity to worst will all be based on this second calculation. No further recalculation is done if the second YTW result is also negative.

2. If any yield calculations (to worst, to maturity, effective), after adjustments that may have taken place in step 1, fall outside of a +100%/-10% range they will be adjusted to the closest boundary (-10% or +100%). Likewise, if any spread (to worst, OAS vs Govt, OAS vs Swap and Asset Swap Spread) falls outside of a +10,000bp/-1,000bp range it will be adjusted to -1,000bp or +10,000bp. No changes will be made to the corresponding duration or convexity calculations for bonds that have yield and/or spread adjustments applied based on this rule.

Sinking fund securities

To-maturity calculations (yield, duration and convexity) are calculated to the “average life” based on the sinking fund schedule. To-worst calculations are based on a comparison of the average life yield and the yield to all early redemption dates, if any. For example, if the yield to call is 3% and the yield to average life is 4%, the YTW will be 3% and the spread to worst will be calculated to the call date. If the yield to call is 5% and the yield to average life is 4%, the YTW will be 4% and the spread to worst will be calculated to the average life date.

Calculation formulas

Calculating Index values

The daily closing Index value is a function of the prior month-end Index value and the current month-to-date return:

$$IV_n = IV_0 \times (1 + TRR_n)$$

where:

IV_n = closing Index value on day *n*

IV_0 = closing Index value on prior month-end

TRR_n = month-to-date Index total return on day *n*

The month-to-date return of an Index (TRR_n) is equal to the sum of the individual constituent returns times their respective beginning of month weights:

$$TRR_n = \sum_{i=1}^{k} BiTRR_n \times BiWgt_0$$

where:

TRR_n = Index month-to-date total return on day *n*

$BiTRR_n$ = month-to-date total return on day *n* of bond *i*

$BiWgt_0$ = beginning of month weight of bond *i*

Periodic returns between any two dates can be derived from the beginning and end of period Index values. Since Index values represent closing levels, period returns will include market movement on the end of period date but exclude market movement on the beginning of period date. Therefore, to capture returns for the month of June, divide the June 30 Index value by the May 31 Index value:

$$TRR = \frac{IV_n}{IV_0} - 1$$

where:

TRR = periodic total return

IV_n = closing Index value on the end of period date

IV_0 = closing Index value on the beginning of period date

Annualized returns are derived from period total returns:

$$AnnTRR_n = (1 + TRR_n)^{365/d} - 1$$

where:

$AnnTRR_n$ = annualized total return for period *n*

TRR_n = periodic total return for period *n*

d = number of actual days in period *n*

Rules for calculating Index values on holidays

- Weekdays on which WM Company/Reuters does not publish closing FX rates are treated as "Global Holidays".
- No Indices are published on Global Holidays unless a Global Holiday falls on the last calendar day of the month.
- All Indices are published on global business days and the last calendar day of every month.
- If the last calendar day of a month falls on a Global Holiday, prices are updated in all local markets that are open. Prices in all markets that are closed are rolled from the prior business day and accrued interest is calculated for the new settlement date.
- If the last calendar day of the month falls on a weekend, all prices are rolled from the last business day and accrued interest is calculated for the new settlement date.

Calculating bond total returns in local currency terms

Month-to-date total returns are calculated daily for each bond in its currency of denomination (i.e., local total return). Cash flows from bond payments that are received during the month are retained in the Index as a separate line item until the end of the month and then are removed as part of the rebalancing. Cash does not earn any reinvestment income while it is held in the Index. With the exception of US mortgage pass-through and US structured products (ABS, CMBS and CMOs), accrued interest is calculated assuming next calendar day settlement (including when the next calendar day is a non-business day). Accrued interest for US mortgage pass-through and US structured products is calculated assuming same-day settlement.

$$BTRR_n = \frac{\left(P_n + AI_n\right) - \left(P_0 + AI_0\right) + C \times \left(1 + \frac{r}{d}\right)^t}{P_0 + AI_0}$$

where:

$BTRR_n$ = individual bond month-to-date total return on day n

P_n = current day price

P_0 = prior month-end price

AI_n = current day accrued interest

AI_0 = prior month-end accrued interest

C = coupon payments received during the period (including capital payments at current market value)

r = reinvestment rate (currently zero)

t = number of days between the receipt of the cash flow and day n

d = day count convention for reinvestment asset

Calculating inflation-linked security total returns in local currency terms

Month-to-date total returns for inflation-linked securities are calculated daily for each bond in its currency of denomination (i.e., local total return). Inflation-linked returns include the impact of the change in inflation factor over time. Cash flows from bond payments that are received during the month are retained in the Index as a separate line item until the end of the month and then are removed as part of the rebalancing. Cash does not earn any reinvestment income while it is held in the Index. Accrued interest is calculated assuming next calendar day settlement (including when the next calendar day is a non-business day).

$$BTRR_n = \frac{f_n\left(P_n + AI_n + C * \left(1 + \frac{r}{d}\right)^t\right) - f_0(P_0 + AI_0)}{f_0(P_0 + AI_0)}$$

where:

$BTRR_n$ = individual bond month-to-date total return on day *n*

f_n = *current day inflation factor*

f_0 = *prior month-end inflation factor*

P_n = current day price

P_0 = prior month-end price

AI_n = current day accrued interest

AI_0 = prior month-end accrued interest

C = coupon payments received during the period (including capital payments at current market value)

r = reinvestment rate (currently zero)

t = number of days between the receipt of the cash flow and day *n*

d = day count convention for reinvestment asset

Calculating convertible security total returns in local currency terms

Month-to-date total returns are calculated daily for each bond in its currency of denomination (i.e., local total return). Convertible returns include the impact of conversions/redemptions which occur during the month. Cash flows from bond payments that are received during the month are retained in the Index as a separate line item until the end of the month and then are removed as part of the rebalancing. Cash does not earn any reinvestment income while it is held in the Index. Accrued interest is calculated assuming next calendar day settlement (including when the next calendar day is a non-business day).

$$BTRR_n = \frac{(1 - f_n)(P_n + AI_n) + C * \left(1 + \frac{r}{d}\right)^t}{(P_0 + AI_0)} - 1$$

$$C = I_c + AI_c + R_c$$

where:

$BTRR_n$ = individual bond month-to-date total return on day *n*

f_n = *percentage reduction in face on day n*

P_n = current day price

P_0 = prior month-end price

AI_n = current day accrued interest

AI_0 = prior month-end accrued interest

C = cash received during the period including coupon payments as well as capital payments at current market value

I_c = interest/dividend payments received during the period

AI_c = current day redemption accrued, defined as the percentage change in face times accrued interest paid, if any

R_c = current day principal cash, defined as the percentage change in face times the redemption price

r = reinvestment rate (currently zero)

t = number of days between the receipt of the cash flow and day *n*

d = day count convention for reinvestment asset

US mortgage pass-through total return formula

$$TRR = \frac{\left(\left(P_n + AI_n\right) - \left(P_0 + AI_0\right) + \left[\frac{C}{12} \times \left(1 + \frac{r}{d \times 100}\right)^t\right]\right)}{P_0 + AI_0} + \left(1 - f\right) \times \frac{\left[\left(100 \times \left(1 + \frac{r}{d \times 100}\right)^t\right) - \left(P_n + AI_n\right)\right]}{P_0 + AI_0}$$

$$f = \left(1 - SPP\right) \times \left(1 - SMM\right)$$

$$SMM = 1 - \left(1 - \frac{CPR}{100}\right)^{1/12}$$

$$SPP = \left(\frac{\frac{WAC_0}{1200}}{\left(1 + \frac{WAC_0}{1200}\right)^{WAM_0} - 1}\right)$$

where:

TRR = month to date total return

P_n = current day price (assuming cash settlement)

P_0 = prior month-end price (assuming cash settlement)

AI_n = current day accrued interest (assuming cash settlement)

AI_0 = prior month-end accrued interest (assuming cash settlement)

C = net coupon stated in percentage terms

r = reinvestment rate stated in percentage terms (currently zero)

d = day count for reinvestment asset

t = time to/since cash flow payment date (settlement date minus cash flow payment date)

SPP = schedule principal payment percentage

SMM = single monthly mortality

CPR = most recently reported constant prepayment rate

WAC_0 = weighted average gross coupon rate as of the previous month stated in percentage terms

WAM_0 = remaining maturity (in terms of number of months) as of the previous month

US mortgage pass-through cash settlement price calculation

US mortgage pass-through cash settle prices are derived from the current month regular (forward) settlement price up to the date before the roll date using the following formula:

$$P_c = \left[\left(P_r + AI_r\right) \times \left(\frac{1}{\left(1 + \frac{r}{d \times 100}\right)^n} \right) \right] - AI_c$$

where:

P_c = cash settle price

P_r = regular (forward) settle price for current month settlement

AI_c = cash settle accrued interest

AI_r = regular (forward) settle accrued interest for current month settlement

r = 1-month Libid stated in percentage terms

n = number of days between cash settle date and regular (forward) settle date

d = number of days in the year based on Libor daycount convention (360)

US mortgage pass-through cash settle prices are derived from the next month regular (forward) settlement price on the roll date through the end of the month using the following formula:

$$P_c = \left[\left(\frac{C}{12} + 100 \times \left(1 - f_e\right) \right) \times \left(\frac{1}{\left(1 + \frac{r}{d \times 100}\right)^{n_1}} \right) \right] + \left[\left(P_r + AI_r\right) \times f_e \times \left(\frac{1}{\left(1 + \frac{r}{d \times 100}\right)^{n_2}} \right) \right] - AI_c$$

where:

P_c = cash settle price

P_r = regular (forward) settle price for next month settlement

AI_c = cash settle accrued interest

AI_r = regular (forward) settle accrued interest for next month settlement

r = 1-month Libid stated in percentage terms

n_1 = number of days between cash settle date and the next month cash flow payment date

n_2 = number of days between cash settle date and regular (forward) settle date

C = net coupon stated in percentage terms

f_e = estimated factor based on most recently reported actual CPR

d = number of days in the year based on Libor daycount convention (360)

US ABS, CMBS and CMO total return formula

$$TRR = \frac{(P_n + AI_n) - (P_0 + AI_0) + (P_{CF} + I_{CF})\left(1 + \frac{r}{d \times 100}\right)^t}{(P_0 + AI_0)} - \frac{(1 - f)(P_n + AI_n)}{(P_0 + AI_0)}$$

where:

TRR = individual bond month-to-date total return

P_n = current day price (assuming cash settlement)

P_0 = prior month-end price (assuming cash settlement)

AI_n = current day accrued interest (assuming cash settlement)

AI_0 = prior month-end accrued interest (assuming cash settlement)

I_{CF} = interest cash flow received

P_{CF} = principal cash flow received

f = end of period factor divided by the beginning of period factor

r = reinvestment rate (currently zero)

t = number of days between the receipt of the cash flow and day *n*

d = day count convention for the reinvestment asset

Converting returns into another base currency unhedged

Unhedged returns are converted into a given base currency using the following formulas:

$$CRR = \frac{FX_n}{FX_0} - 1$$

$$TRR_{converted} = \left[\left(1 + TRR_{local}\right) \times \left(1 + CRR\right)\right] - 1$$

where:

CRR = currency return

FX_n = end-of-period FX rate (stated in terms of the number of units of the base currency per one unit of the currency of denomination of the bond)

FX_0 = beginning-of-period FX rate (stated in terms of the number of units of the base currency per one unit of the currency of denomination of the bond)

$TRR_{converted}$ = total return of the bond converted into the base currency unhedged

TRR_{local} = local total return of the bond

Converting returns into another base currency hedged

Currency hedged Index returns assume a rolling 1-month forward hedge where forward contracts are purchased in an amount equal to the full market value of the Index (including accrued interest) at the beginning of the month. In addition to the formulas used to calculated unhedged converted returns, hedged returns require the following additional formulas:

$$CRUTRR = CRR \times (1 + TRR_{local})$$

$$FCR = \frac{FWD_0}{FX_0} - 1$$

$$HR = HPct \times (FCR - CRR)$$

$$TRR_{hedged} = TRR_{local} + CRUTRR + HR$$

$$HIV_n = HIV_0 \times (1 + TRR_{hedged})$$

Where:

CRUTRR = currency return on unhedged local total return

FCR = forward contract return

FWD_0 = beginning-of-period forward rate (stated in terms of the number of units of the base currency per one unit of the currency of denomination of the bond)

HR = hedge return

HPct = percentage hedged

TRR_{hedged} = total return hedged into the base currency

HIV_n = closing hedged Index value on day *n*

HIV_0 = closing hedged Index value on prior month-end

Sample hedged return calculation

The following example illustrates the December 2005 hedged return calculation for the ICE BofAML Euro Government Index (EG00) hedged into CHF

EG00 Hedged Index Value 30-Nov-05: 301.565
EG00 Local Total Return December 2005: 1.061%

EUR/CHF FX Rates:

1-mo Forward Rate 30-Nov-05 = 1.547892
Spot Currency Rate 30-Nov-05 = 1.549907
Spot Currency Rate 31-Dec-05 = 1.554588

Currency Return

= (End Spot Rate / Begin Spot Rate) – 1
= (1.554588 / 1.549907) -1
= 0.302%

Converted Return (unhedged)

= [(1 + Local Total Return) * (1 + Currency Return)] -1
= [(1 + 1.061%) * (1 + 0.302%)] -1

= 1.366%

Currency Return on Unhedged Local Total Return

= Currency Return * (1 + Local Total Return)
= 0.302% x (1 + 1.061%)
= 0.305%

Forward Contract Return

= (Begin 1-mo Forward Rate/Begin Spot Rate) – 1
= (1.5479892 / 1.549907) – 1
= -0.130%

Hedge Return

= %hedge * (Forward Contract Return – Currency Return)
= 1.00 x (-0.130% – 0.302%)
= -0.432%

Converted Return (Hedged)

= Local Total Rtn + Currency Rtn on Unhedged Local Total Rtn + Hedge Rtn
= (1.061%) + (0.305%) + (-0.432%)
= 0.934%

Hedged Index Value 31-Dec

= Hedged Index Value 30-Nov x (1 + MTD Hedged Return 31-Dec)
= 301.565 x (1 + 0.934%)
= 304.381

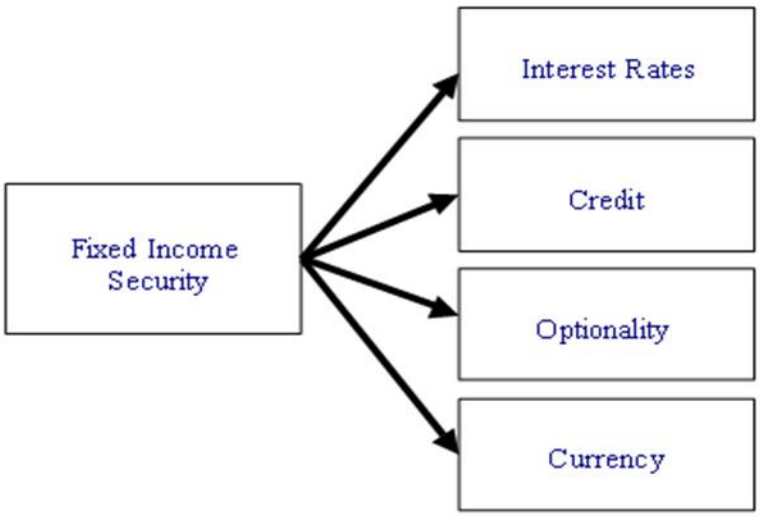
Note: small differences in the above calculations may result from rounding.

Return attribution methodology

A decision to purchase a bond brings with it many different types of risk. A corporate bond, for example, holds the obvious exposure to the credit worthiness of the issuer. But it also contributes to the aggregate interest rate exposure of the portfolio. On top of that, inclusion of a call, put or sinking fund feature may mean an additional element of optionality risk. And finally, depending on the currency of denomination of the cash flows, there may be foreign exchange risk to contend with as well. This complicates the bond selection process, as a particular issue under consideration may look very attractive from one risk perspective (eg, the issuer and spread), but go counter to the desired risk profile of the portfolio in other respects (eg, duration, currency, etc.). As a result, the portfolio manager is constantly working to make the individual positions in the portfolio fit together like an intricate jigsaw puzzle so as to achieve a portfolio profile that, in the aggregate, is aligned with both market views and tolerance levels for each of the major sources of risk.

Performance measurement – the periodic comparison of portfolio returns to those of a selected benchmark Index – provides an excellent macro level view of results, but offers little by way of explanation as to how those results were achieved. Performance attribution is a critical portfolio management technique in which each of the major sources contributing to overall portfolio performance is identified. Performance attribution requires a model for determining how much of a bond's return is affected by key risk factors.

Chart 1: Sources of risk in fixed income securities



Decomposing asset returns by source

Return attribution is a process by which the total return of a bond, portfolio, or Index is decomposed into a series of primary risk/return factors. The Index return attribution model has identified six key factors[2], summarized in Table 1, each of which isolates the degree to which changes in a specific market variable contributed to the total return of a bond. The starting point for the attribution process is the bond's beginning price, accrued interest, spread and implied volatility. There are a number of ways to define spread – we use option-adjusted spread[3] (OAS) as the basis for the model as it allows us to measure bonds with and without embedded options (eg, call, put, or sink features) in common and consistent terms. We then calculate a series of theoretical prices for the bond by sequentially changing a single pricing assumption while holding all other variables constant until we get to the ending price. A more detailed explanation of the step by step derivation of the factor prices is provided below.

Factor 1: Coupon

Coupon Return measures the contribution to total return of the stated coupon currently in effect. Price is held constant and accrued interest is recalculated to the end of period date. The change in price (always zero since price is held constant) plus the change in accrued interest along with coupons received during the period, if any, divided by the beginning price plus accrued interest is the Coupon Return. An obvious limitation to the explanatory power of Coupon Return is that it does not reflect the automatic change in price that occurs with the passage of time as premium and discount bonds converge to par while approaching maturity. This can amount to a significant portion of price movement for any bond priced at a steep premium or discount – particularly zero coupon and deferred interest bonds. Factor 2, Amortization/Roll, captures the impact of par convergence, thereby allowing for a more complete measure of the net interest return of a bond.

Factor 2: Amortization/Roll

Amortization[4]/Roll return measures the degree to which a bond's price changed simply due to the passage of time. The settlement date is changed to the end of the measurement period, and a theoretical price is derived using the beginning of period OAS, yield curve and implied volatility. The difference between the theoretical Amortization/Roll price and the beginning price divided by the beginning price plus accrued interest is the Amortization/Roll return. Shifting settlement date forward will affect the price of a bond in three ways:

1. Cash flows are closer to their maturity, which means that associated present values converge toward par.
2. Since the cash flows are closer to maturity, the corresponding discount rates are taken from a slightly shorter point on the yield curve. Therefore, in a normal yield curve environment cash flows are discounted at progressively lower rates, while the reverse is true in an inverted yield curve environment.
3. In the case of bonds with embedded options, the change in settlement date will affect the time value of the option.

Together, Coupon and Amortization/Roll Return measure the net interest return of a bond.

[2] For US mortgage backed securities, one additional factor, "MBS Principal Paydown", is required. Refer to Table 1 for more detail on the US Mortgage attribution model

[3] Option-adjusted spread is the number of basis points that the fair value government spot curve is shifted in order to equate a bond's discounted cash flows with its market price. See "Option-adjusted spreads" for more detail.

[4] We have abbreviated the Factor 2 label as "Amortization/Roll" return. This attribution factor, however, includes the accretion of discount as well as amortization of premium bonds.

Factor 3: Curve Shift

Curve Shift return measures the degree to which a bond's price changed as a result of shifts in the general level of interest rates. To establish the amount that the yield curve has shifted, we take an average of the yield changes along the fair value government par coupon curve from year 2 to year 30 (see "Fair value yield curves"). This shift factor is then added to the beginning yield curve and a theoretical Curve Shift price is derived using the beginning OAS and implied volatility along with the shifted yield curve. The difference between the theoretical Curve Shift price and the theoretical Amortization/Roll price divided by the beginning price plus accrued interest is the Curve Shift return.

Factor 4: Curve Reshape

Curve Reshape return measures the degree to which a bond's price changed as a result of changes in the shape of the fair value government yield curve. A theoretical Curve Reshape price is derived using the beginning OAS and implied volatility along with the actual ending yield curve. The difference between the theoretical Curve Reshape price and the theoretical Curve Shift price divided by the beginning price plus accrued interest is the Curve Reshape return.

Factor 5: Volatility Change

Volatility Change return measures the degree to which a bond's price changed as a result of changes in implied volatility. A theoretical Volatility Change price is derived using the beginning OAS along with the actual ending yield curve and implied volatility. The difference between the theoretical Volatility Change price and the theoretical Curve Reshape price divided by the beginning price plus accrued interest is the Volatility Change return.

Factor 6: Spread Change

Spread Change return measures the degree to which a bond's price changed as a result of changes in its spread to the government curve. In theory, the theoretical Spread Change price is derived using the actual ending yield curve, OAS and implied volatility. Since it is the last factor, however, we can eliminate this step as the theoretical price calculated in this manner will equal the actual ending price of the bond. Thus, the difference between the actual ending price of the bond and its theoretical Volatility Change price divided by the beginning price plus accrued interest is the Spread Change return.

Table 1: Description of the Index Return Attribution Model

Return Factor	Description	Calculation Methodology
Coupon	The return attributed to that portion of the nominal coupon earned or received during the period.	Coupons received during the period plus the change in accrued interest divided by the starting price plus accrued interest (other than US MBS, ABS and CMBS, also equal to total return minus price return).
MBS Principal Paydown[3]	The return of a mortgage security attributed to the receipt of scheduled and unscheduled principal payments at par.	Paydown return equals par minus the ending price plus ending accrued interest divided by the starting price plus accrued interest times the percentage of outstanding principal repaid during the period.
Amortization/Roll	The portion of price return attributed to the passage of time. This includes the amortization of premium bonds and the accretion of discount bonds along with the effect on the present value of a bond's cash flows as they "roll down the yield curve".	Calculate the Option-Adjusted Spread[1] (OAS) of the bond at the beginning of the measurement period. Next, change settlement to the end of period date, and using the beginning yield curve, OAS and implied volatility solve for price. The difference between the "Amortization/Roll" price and the beginning price divided by beginning price plus accrued interest is the Amortization/Roll return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows for the new settlement date, but based on the old yield curve and volatility assumptions.)
Curve Shift	The impact on a bond's price resulting from general changes in the level of interest rates defined as the average parallel shift in the government fair value yield curve[2].	Price is recalculated using the beginning OAS and implied volatility along with the starting yield curve plus the parallel shift amount. The parallel shift amount is equal to the average change in the fair value government par coupon curve (from 2 to 30 years). The difference between the "Curve Shift" price and the "Amortization/Roll" price divided by beginning price plus accrued interest is the Curve Shift return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows based on the old volatility assumptions and the starting yield curve plus parallel shift amount.)

Table 1: Description of the Index Return Attribution Model

Return Factor	Description	Calculation Methodology
Curve Reshape	The impact on a bond's price resulting from changes in the shape of the fair value government par coupon yield curve[2].	Price is recalculated using the beginning OAS and implied volatility along with the actual ending yield curve. The difference between the "Curve Reshape" price and the "Curve Shift" price divided by beginning price plus accrued interest is the Curve Reshape return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows based on the old volatility assumptions and the ending yield curve).
Volatility Change	The impact on the price of a security resulting from changes in implied volatility.	Price is recalculated using the beginning OAS along with the ending yield curve and implied volatility. The difference between the "Volatility Change" price and the "Curve Reshape" price divided by beginning price plus accrued interest is the Volatility Change return. (Note: For U.S. Mortgages, the prepayment model is used to generate a new set of projected cash flows based on the ending yield curve and new volatility assumptions.)
Spread Change	The change in price resulting from changes in spread.	The difference between the actual ending price and the "Volatility Change" price divided by beginning price plus accrued interest is the Spread Change return.
Total Return	The sum of all of the above return factors. (Note: Since the above factors do not take currency into account, the sum of these factors is equal to the local currency return.)	Ending Price plus accrued interest minus beginning price plus accrued interest, plus any coupon payment and/or principal paydown received during the period, divided by beginning price plus accrued interest.

1 Option-adjusted spread is the number of basis points that the fair value government spot curve is shifted in order to equate a bond's discounted cash flows with its market price. See "Option-adjusted spread" for more detail.

2 The German government fair value curve is used as the baseline for purposes of attributing returns for all EUR-denominated bonds. The U.S. Treasury fair value curve excludes all on the run notes and bonds. See "Fair value yield curves" for more detail.

3 MBS Principal Paydown applies to US mortgage back securities.

Excess return methodology

Excess return is a measure of relative value that neutralizes the interest rate and yield curve risk of a bond, thereby isolating that portion of its performance that is attributed solely to credit and optionality risks. Excess return is equal to a bond's total return minus the total return of a risk-matched basket of governments or interest rate swaps. There are two main components to excess return:

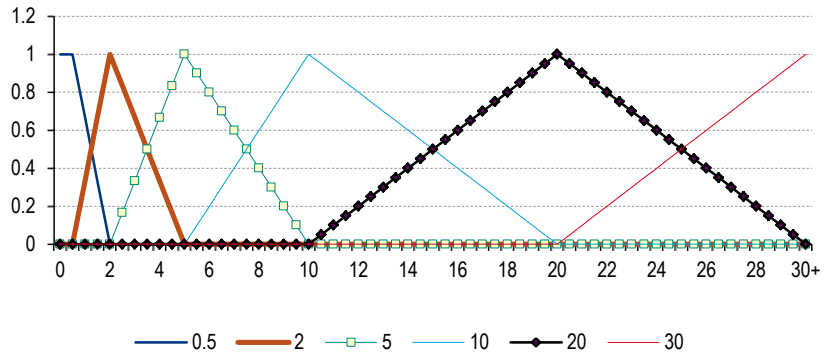
1. the additional interest income that accrues to the security during the period as a result of a higher starting yield relative to duration-matched governments or swaps, and
2. the effect of any change in spread during the period on the relative price movement of the security versus risk-matched governments or swaps.

The hedge basket is comprised of fair value governments (or swaps) that together are key rate duration-matched to the bond at six key nodes: the 6-month, 2-year, 5-year, 10-year, 20-year and 30-year points on the curve. The hedge basket is also matched to the bond's currency of denomination. For example, a sterling-denominated corporate bond is compared to UK Gilts or sterling interest rate swaps.

Calculating key rate durations

The key rate duration calculation is similar to calculating effective duration but the par coupon yield curve is shifted at only one node at a time while the other five nodes are held unchanged. The shift amounts for the points on the curve in between the node that is shifted and the preceding and subsequent nodes are linearly interpolated (Chart 2). The sum of a bond's six key rate durations will, in most cases, closely match its effective duration.

Chart 1: Shifting the curve at each key rate duration node



Creating fair value government and swap hedge securities

The governments (or swaps) used to construct the hedge basket are synthetic securities that are derived from the par coupon fair value government (or swap) yield curve in each market[5]. At the beginning of each month (ie, the last calendar day of the preceding month), a series of synthetic securities are created for 6-month, 2-year, 5-year, 10-year, 20-year and 30-year points on the curve. On that day, each synthetic security is priced at par, has a coupon and yield equal to the corresponding rate (in semi-annual terms) for the comparable maturity point on the fair value curve, and has an interest accrual date equal to the beginning of period date. Since these are initially par coupon securities priced exactly at the par coupon fair value curve, 100% of the hedge security's key rate duration exposure will fall on the node that corresponds to its maturity on the start date.

Weighting the key rate duration-matched basket

At the beginning of each month (i.e., the last calendar day of the preceding month), a key rate duration-matched basket of fair value synthetic government (or swap) securities is created for each Index constituent. Each par coupon government (or swap) in the hedge basket (and the residual cash position) has key rate duration exposure at only one of the six nodes, whereas a constituent bond will typically have exposure at several nodes. The key rate duration of each hedge security, times its percentage weight, equals the constituent bond key rate duration for that corresponding node. For example, on November 30, 2013, the USD-denominated AIG 4.125% 2/24 issue had an 8.043 key rate duration exposure to the 10-year node (Table 2). That exposure was matched by allocating 89.041% of the government hedge basket to the 10-year fair value US Treasury security, which had an 9.032 key rate duration at that node (9.032 x 89.041% = 8.043). The sum of the hedge basket key rate durations and the AIG key rate durations both equal 8.552, which also matches the AIG effective duration.

Table 2: AMER INTL GRP 4.125 2/24 excess return hedge basket as of November 30, 2013

		Fair value par coupon government bond hedge basket							
KRD node	AIG KRD	Cash	6mo	2yr	5yr	10yr	20yr	weight	Wgt KRD
Cash	0.000	0.000						-1.729%	0.000
6mo	0.010		0.418					2.472%	0.010
2yr	0.071			1.912				3.735%	0.071
5yr	0.256				4.808			5.334%	0.256
10yr	8.043					9.032		89.041%	8.043
20yr	0.172						14.971	1.146%	0.172
Total	8.552								8.552

[5] Euro and euro legacy currency denominated securities are compared to synthetic fair value governments based on the German government curve. The U.S. Treasury fair value curve excludes the current and previous on-the-run notes and bonds from its sample population. All markets exclude callable governments from the sample population. See "Fair value yield curves" for more detail.

Calculating excess return

Over the course of the month, the fair value government (or swap) securities roll down the curve and are priced by discounting their cash flows at the corresponding spot rates that are derived from the par coupon fair value yield curve. A total return is then calculated for each security in the hedge basket and multiplied by its beginning weight. The sum of the weighted hedge security total returns is subtracted from the constituent bond total return to arrive at the excess return. In the AIG example discussed previously, the 10-year fair value government bond began the month with a maturity of exactly 10-years and a price of 100.00. At the end of the month it had a remaining maturity of 9 years and 11 months, and was priced by discounting its cash flows using the December 31, 2013 spot curve. That produced a -2.079% total return for that security. The product of the hedge security returns and their respective weights equaled -1.949%. The AIG total return was -1.245%, leaving an excess return of +0.704%.

Table 3: AMER INTL GRP 4.125 2/24 excess return for December 2013

Term	Start value 30-Nov-13	End value[1] 31-Dec-13 (PV of cash flows)	Weight 30-Nov	Hedge basket total return
Cash			-1.73%	0.01%
6 mo	100	100.017272	2.47%	0.02%
2yr	100	99.828209	3.74%	-0.17%
5yr	100	98.668987	5.33%	-1.33%
10yr	100	97.921493	89.04%	-2.08%
20yr	100	98.15202	1.15%	-1.85%
Hedge basket total return				-1.95%
AMER INTL GRP 4.125 2/24 total return				-1.25%
AMER INTL GRP 4.125 2/24 excess return				0.70%

[1] Ending value is based synthetic bond cash flows discounted at the December 31, 2013 fair value government spot curve

The month-to-date excess return of an Index is equal to the weighted average of the individual excess returns of its constituents based on beginning of period weights.

$$ER_{Index} = \sum_{i=1}^{k} ER_i W_i$$

where:

ER_{Index} = excess return of the Index

ER_i = excess return of Index constituent bond *i*

W_i = beginning of month weight of Index bond *i*

k = the number of bonds in the Index

For annualized excess return the annualized total return of the hedge basket is subtracted from the annualized total return of the Index/bond.

Fair value yield curves

Government nominal yield curves

Fair value government spot yield curves are derived from a universe of bond prices using government Index constituents. Specifically, the zero discount function is parameterized as a linear combination of a family of exponential functions. When a coupon bond is stripped as a set of coupon and principle payments, each cash flow is discounted using this parameterized discount function and the optimal fit is obtained by minimizing the sum of the squares of the differences of the individual bond theoretical and actual prices:

$$obj = \min \sum_i \Delta P_i^2$$

$$\Delta P_i = P_i - \sum_j C_{ij} df_j$$

Where:

P_i = the actual bond price,

C_{ij} = the bond cash flows

df_j = the discount function

The goodness of fit and stiffness of the curve can be adjusted by increasing or decreasing the number of exponential basis functions and the exponent parameter.

A closer look at the fitted values of long and short bond prices using this method shows that, while long and short bond price discrepancies are comparable, the fitted bond yield discrepancy deteriorates rapidly towards zero maturity, creating instability on the front of the fitted yield curve. That is due to the fact that the price of a very short duration bond is minimally sensitive to yield changes. For example, a 10bp move for a bond with only 3 months to maturity amounts to 0.025 price change, whereas the same move would translate into a 1.50 price change for a 15 year duration bond. Therefore any adjustment to the front end of the curve does not improve the objective function by much and therefore the method will do a better job fitting long yields than short yields.

For that reason, we modify the formula and look at both price and yield discrepancies, using a method that increases the weight of short duration bonds and improves the stability of the front end as follows:

$$obj = \min \sum_i \Delta P_i^2 + \Delta y_i^2$$

This can be restated as follows:

$$obj = \min \sum_i \Delta P_i^2 (1 + \Delta y_i^2 / \Delta P_i^2) = \min \sum_i \Delta P_i^2 w_i$$

$$w_i = 1 + \frac{1}{risk_i^2}$$

Where risk is the dollar risk of the bond (dP_i/dy_i)

Notes on security selection:

1. The US Treasury fair value curve excludes the current and previous on-the-run issues, any notes or bonds that are the cheapest to deliver for a futures contract, 30-year bonds with less than 10 years remaining term to maturity and 10-year bonds with less than 5 year remaining term to maturity.
2. The euro government fair value curve is comprised of all Index qualifying German government bonds.
3. All markets exclude callable governments from the sample population.

Government real yield curves

Real yield curves are derived from inflation-linked bonds using the same principle that a single curve is used to discount all bonds' cash flows, all of which are stated in real terms. The real curve is bootstrapped from the observed market prices. As a result, the curve will exactly match the real yields of the observed inflation-linked securities and there will be no rich/cheap spreads. A bootstrap approach is used largely due to the fact there are comparatively fewer observed securities to work with than in the nominal bond markets. While the resulting curve accurately prices the bonds, it is not useful for purposes of comparing richness or cheapness of the observed securities.

Corporate fair value curves

Our corporate spread curve model assumes that spread and spread duration are the two factors driving bond price movement. This greatly simplifies the relationship of a bond's price versus characteristics such as coupon, maturity, amortization, call schedule etc. Unlike other methods where price is directly modeled against the curve, and only bullet bonds can be used, our approach may use all bonds in a given Index universe. This is important in markets where a significant portion of outstanding bonds have embedded options.

We use the Nelson-Siegel model to build the corporate spread curves. It is a four-parameter formula that can account for the many shapes observed in the curvature of term structures. While this approach was originally applied to building traditional rate-maturity curves, we borrow the model and simply apply it to fitting OAS-duration curves.

The universe of bonds is pre-screened from the relevant Index universe (eg, US corporates, AA-rated). While ratings are updated only monthly for purposes of selecting constituents for rating sub-Indices, they are updated daily for purposes of determining observations for rating category corporate spread curves. Next, the median OAS and the average of deviates (the absolute difference of the OAS and median OAS) are calculated. A spread outside the band of four-times the average of deviates is excluded from the fitting. Finally, the parameters are adjusted to achieve an optimal solution by minimizing the sum of the square of the differences between the bonds and the fitted curve. The bonds are duration-weighted for purposes of calculating the best fit. In addition, depending on the curve, the bonds may be additionally market-weighted, or equal-weighted.

Once the OAS-duration curve is fit, it is just a matter of overlaying it on the underlying government curve to generate the resulting spot and par-coupon corporate yield curves. Since the corporate par curve is a function of maturity, an iterative process is applied to guarantee the resulting par curve is consistent with the OAS-duration curve. The iterative process adjusts the corporate par coupon rate at each maturity point to match the OAS-duration curve.

Option-adjusted spread

Fixed rate corporate and government bonds

Option-adjusted spread is the number of basis points that the fair value government spot curve is shifted in order to match the present value of discounted cash flows to the bond's price. For securities with embedded options, such as call, sink or put features, a log normal short interest rate model is used to evaluate the present value of the securities potential cash flows. In this case, the OAS is equal to the number of basis points that the short interest rate tree must be shifted in order to match discounted cash flows to the bond's price.

Floating rate and fixed-to-floating rate corporate bonds

For floating rate and fixed-to-floating rate securities with embedded options (e.g., call, put, etc.), OAS is assumed to follow a Gaussian (normal) distribution based on a given spread volatility that is derived from the actual historical spread volatility (monthly spread volatility for currency-rating buckets is based on data from July 1998 with a 90% exponential decay – ie, a 5 year half-life) for the bond's peer group (summary rating category buckets within each currency of denomination). This randomized spread is added to the government interest rate tree to discount projected cash flows (based on the floating Index forward curve). The OAS is equal to the number of basis points that the short interest rate tree plus the randomized spread must be shifted in order to match discounted cash flows to the bond's price.

Mortgage pass-through securities and CMOs

For US mortgage pass-through securities, interest rate/prepayment models are used to generate projected cash flows and forward curves (256 scenarios). OAS is the number of basis points that is added to the semi-annually compounded forward one-month rate curve to discount the corresponding cash flows for each scenario to arrive at a present value for each scenario. OAS is calculated in order to match the average of present values of all scenarios to the bond's price.

Structured products (ABS and CMBS)

For US structured products, a projected cash flow is generated (single scenario) using the pricing speed (provided by IDC). OAS is the number of basis points that is added to the semi-annually compounded forward one-month rate curve in order to match the present value of cash flows to the bond's price.

Floating rate ABS

For US floating rate ABS, yield is calculated based on the assumption that the current index rate will be constant over the remaining life of the bond. OAS is the number of basis points that is added to the semi-annually compounded forward one-month rate curve in order to match the present value of cash flows to the bond's price. For the OAS calculation, projected cash flows are based on the forward rate curve. Therefore, the coupon rate will vary over the remaining life of the bond.

Composite rating algorithm

Index constituent composite ratings are updated once a month as part of the rebalancing process. Composite rating changes take effect on the last calendar day of the month based on information available up to and including the rebalancing lock-out date (the third business day prior to the last business day of the month). Rating upgrades or downgrades occurring after that day will not be considered in the current month rebalancing and will get incorporated at the following month's rebalancing.

For example, assuming there are no Global Holidays in between, if August 31 fell on a Friday the rebalancing lock-out date would occur on August 28. Therefore, a bond that was downgraded to below investment grade on August 28 would transition from the investment grade Index to the high yield Index at the August 31 rebalancing. Conversely, if the bond was downgraded on August 29, it would remain in the investment grade Index for the month of September and transition to high yield at the September 30 rebalancing.

Composite ratings are the simple averages of ratings from Moody's, S&P and Fitch. The composite rating is calculated by assigning a numeric equivalent to the ratings in each agency's scale (Table 4). The average of the numeric equivalents for each agency that rates a bond is rounded to the nearest integer and then converted back to an equivalent composite rating using the scale in Table 4. If only two of the designated agencies rate a bond, the composite rating is based on an average of the two. Likewise, if only one of the designated agencies rates a bond, the composite rating is based on that one rating. Provisional or estimated ratings are excluded from the composite rating calculation.

Table 4: Ratings scale for calculating composite rating

Numeric	Composite	Moody's	S&P	Fitch
1	AAA	Aaa	AAA	AAA
2	AA1	Aa1	AA+	AA+
3	AA2	Aa2	AA	AA
4	AA3	Aa3	AA-	AA-
5	A1	A1	A+	A+
6	A2	A2	A	A
7	A3	A3	A-	A-
8	BBB1	Baa1	BBB+	BBB+
9	BBB2	Baa2	BBB	BBB
10	BBB3	Baa3	BBB-	BBB-
11	BB1	Ba1	BB+	BB+
12	BB2	Ba2	BB	BB
13	BB3	Ba3	BB-	BB-
14	B1	B1	B+	B+
15	B2	B2	B	B
16	B3	B3	B-	B-
17	CCC1	Caa1	CCC+	CCC+
18	CCC2	Caa2	CCC	CCC
19	CCC3	Caa3	CCC-	CCC-
20	CC	Ca	CC	CC
21	C	C	C	C
22	D		D	D

Sample calculations

The following examples demonstrate the composite rating calculation for several Index constituents as of August 31, 2008 (rebalancing lock-out date = August 26, 2008):

- *Coventry Health, CVH 5.95% March 15, 2017*
  Moody's: Ba1 = 11
  S&P: BBB = 9
  Fitch: BBB- = 10
  $(11+9+10)/3=10 \Rightarrow BBB3$
- *Tyson Foods, TSN 6.60% April 1, 2016*
  Moody's: Ba1 = 11
  S&P: BBB- = 10
  Fitch: BB+ = 11
  $(11+10+11)/3=10.667 \Rightarrow 11 \Rightarrow BB1$

Rating hierarchy for asset classes

While our composite rating is generally derived from individual bond ratings, in some cases other ratings are used as an alternative. Table 5 lists the rating types, in order of priority, used for each issuer group to calculate the composite rating. For example, if a government guaranteed security has a bond rating from at least one of the three designated agencies, then its composite rating will be based on the bond rating(s). If the bond is not rated by any of the three agencies, then issuer ratings from the three agencies are used as an alternative. On the other hand, corporate bonds only use bond ratings.

Table 5: Hierarchy of rating types used by asset class

Issuer group	Composite rating based on
Sovereigns (i.e., sovereign debt denominated in the issuer's local currency)	Local currency long term sovereign debt rating
Foreign Sovereigns (i.e., sovereign debt denominated in a foreign currency)	Foreign currency long term sovereign debt rating
Quasi-Governments (i.e., Agency, Local Authority, Government Sponsored/Guaranteed, Supranational)	1) Bond rating
	2) Senior unsecured debt issuer rating (foreign currency issuer rating is used for bonds denominated in a currency other than the local currency of the issuer's country of domicile). Note: issuer rating is used only for unsubordinated debt.
US Agency MBS and CMOs	Ginnie Mae collateral: US local currency long-term debt sovereign rating
	Fannie Mae & Freddie Mac collateral: senior unsecured debt issuer rating
Covered bonds	Bond rating
US Municipals	Bond rating
ABS and CMBS	Bond rating
Corporate bonds	Bond rating
Preferreds	Bond rating

Subordination types

Subordination types indicating payment ranking are assigned to all corporate, quasi-government and securitized/collateralized securities in the Index universe. Table 6 lists the subordination types along with notes on the conventions followed.

Table 6: Subordination type classifications

Code	Description	Notes
Non-Bank sector corporate and collateralized		
SECR	Secured	Senior secured, collateralized and covered
SENR	Senior	Senior unsecured; unsubordinated
SUB	Subordinated	Ranking below senior debt; senior subordinated
JSUB	Junior subordinated	Ranking below other subordinated debt
Bank sector corporate		
SECR	Secured	Senior secured, collateralized
SENR	Senior	Senior unsecured; unsubordinated
LT2	Lower Tier 2	Includes legacy lower tier 2 debt and Basel III tier 2
UT2	Upper Tier 2	Includes only legacy upper tier 2 debt
T1	Tier 1	Includes legacy tier 1 debt and Basel III alternative tier 1
AT1	Additional Tier 1	Contingent capital securities
Securitized		
SSEN	Securitized senior	Senior tranche of a securitized deal
SSUB	Securitized subordinated	Subordinated tranche of a securitized deal
SMEZ	Securitized mezzanine	Mezzanine tranche of a securitized deal

Country designation

Unless otherwise noted the standard country designation used in Indices is country of risk. The methodology for determining country of risk is as follows:

- Sovereign debt (both local and foreign currency debt): the country of risk is the same as the issuing country
- Agency and Local Authority debt: the country of risk is the country in which the obligor resides
- Supranational debt: the country of risk is “Supranational”
- Collateralized and securitized asset classes: the country of risk is based on the location of the underlying collateral
- Corporate debt: the country of risk is based on the physical location of the issuer’s operating headquarters with the following exceptions:
    - Holding company issuers are assigned a country of risk based on the location of the majority of operating assets. If no single country represents a majority of operating assets, or if this cannot be determined, the country or risk is the issuer’s operating headquarters
    - Bank branch issues are assigned the country of risk of the parent entity
- Securities with a guarantee are assigned the guarantor’s country of risk
- For indirect corporate and government issuers such as Sukuks and loan participation notes, the country of risk is based on the obligor
- Convertible securities are assigned the country of risk of the underlying equity. The equity country of risk is assigned in the same manner as Corporate debt as described above.

Sector classification schema

The Indices use a four-tier classification schema. The schema classifies constituent securities at four levels: asset class (level 1), group (level 2), category (level 3) and sub-category (level 4).

Quasi-Government vs Corporate issuer classifications

To better clarify the distinction between a Corporate and a Quasi-Government issuer we use the following definition for Government Agency, one of the five categories that roll up into the Quasi-Government sector. Government ownership, whether in whole or in part, is not a consideration in this definition.

An Agency is an entity that meets the following conditions:

- It is an entity that exclusively serves an explicit public policy purpose, where profitability is not the sole concern, though profit-maximization is not precluded ; and
- It was created by a specific statute and at the behest of a government, even if subsequent legislation has allowed for its transformation into a stockholder owned company or other private entity.

Treatment of central bank debt

Debt issued by central banks will be assigned to the Agency sector except in cases where the central bank is acting as the primary issuing agent for the central government, in which case it will be classified as Sovereign/Foreign Sovereign.

The table below contains the entire sector classification schema. The name of each sector is followed by its corresponding four character code in parentheses.

Table 7: ICE BofAML Index sector classification schema

Level 1 – Asset class	Level 2 – Group	Level 3 – Category	Level 4 – Sub-category
Sovereign (SOV)	Sovereign (SOV)	Sovereign (Sov)	Sovereign (Sov)
Quasi & Foreign Government (QGVT)	Quasi & Foreign Government (QGVT)	Agency (Agcy)	Agency (Agcy)
		Foreign Sovereign (FSov)	Foreign Sovereign (FSov)
		Government Guaranteed (Guar)	Government Guaranteed (Guar)
		Local-Authority (LGvt)	Local-Authority (LGvt)
		U.S. Taxable Municipal (TaxM)	Pre-Refunded (TPre)
			Taxable ETM (TEtm)
			Taxable GO - Local (TGol)
			Taxable GO - State (TGos)
			Taxable Revenue - Airport (TAir)
			Taxable Revenue - Education (TEdu)
			Taxable Revenue - Health (THlt)
			Taxable Revenue - Hospitals (THos)
			Taxable Revenue - Industrial Development Revenue (TIdr)
			Taxable Revenue - Leasing COPS & Appropriations (TLea)
			Taxable Revenue - Misc (TMis)
			Taxable Revenue - Multi-Family Housing (TMhn)
			Taxable Revenue - Pollution Control (TPcr)
			Taxable Revenue - Power (TPow)
			Taxable Revenue - Single Family Housing (TShn)
			Taxable Revenue - Tax (TTax)
			Taxable Revenue - Tobacco (TTob)
			Taxable Revenue - Toll & Turnpike (TTol)
			Taxable Revenue - Transportation (TTrn)
			Taxable Revenue - Utilities - Other (TUtl)

Table 7: ICE BofAML Index sector classification schema

Level 1 – Asset class	Level 2 – Group	Level 3 – Category	Level 4 – Sub-category
			Taxable Revenue - Water & Sewer (TWtr)
		Supranational (Supr)	Supranational (Supr)
Securitized/Collateralized (COLL)	Covered (COVR)	Covered Bonds (Cvrd)	Mortgage Covered Bonds (CovM)
			Other Covered Bonds (CovO)
			Public Loan Covered Bonds (CovP)
	Securitized (SEC)	Asset Backed (ABS)	ABS Automobile (ABau)
			ABS Credit Cards (ABcc)
			ABS Home Equity Loans (ABhe)
			ABS Manufactured Housing (ABmh)
			ABS Miscellaneous ABS (ABmi)
			ABS Utilities (ABut)
		Collateralized Mortgage Obligation (CMO)	CMO Other (CMOT)
			PAC (PAC)
			PAC Z (PACZ)
			Sequential (SEQL)
			Sequential Z (SEQZ)
			Structured IO (STIO)
			Structured PO (STPO)
			Support Z (SUPZ)
			Trust IO (TRIO)
			Trust PO (TRPO)
		Commercial Mortgage Backed (CMBS)	Commercial Mortgage Backed (CMBS)
		Mortgage Backed (MBS)	Mortgage Backed (MBS)
Corporate (CORP)	Financial (FNCL)	Banking (Bank)	Banking (Bank)
		Financial Services (FinS)	Brokerage (Brkg)
			Cons/Comm/Lease Financing (CFin)
			Investments & Misc Financial Services (Invs)
		Insurance (Insr)	Insurance Brokerage (InsB)
			Life Insurance (InsL)
			Monoline Insurance (InsG)
			Multi-Line Insurance (InsM)
			P&C (InsP)
			Reinsurance (InsR)
	Industrials (INDU)	Automotive (Auto)	Auto Loans (AuLn)
			Auto Parts & Equipment (AuPt)
			Automakers (Autm)
		Basic Industry (Basc)	Building & Construction (Bldg)
			Building Materials (BldM)
			Chemicals (Chem)
			Forestry/Paper (Papr)
			Metals/Mining Excluding Steel (Metl)
			Steel Producers/Products (Stee)
		Capital Goods (CapG)	Aerospace/Defense (Aero)
			Diversified Capital Goods (DCap)
			Machinery (Mach)
			Packaging (Pack)
		Consumer Goods (Cons)	Beverage (Bevg)
			Food - Wholesale (FWhl)
			Personal & Household Products (ConP)
			Tobacco (Toba)
		Energy (Enrg)	Energy - Exploration & Production (EnEx)
			Gas Distribution (GasD)
			Integrated Energy (EngI)
			Oil Field Equipment & Services (OilE)
			Oil Refining & Marketing (OilR)
		Healthcare (Hcar)	Health Facilities (HFac)
			Health Services (Hlth)
			Managed Care (MCar)
			Medical Products (HDev)
			Pharmaceuticals (Phar)
		Leisure (RnR)	Gaming (Game)
			Hotels (Hotl)

Table 7: ICE BofAML Index sector classification schema

Level 1 – Asset class	Level 2 – Group	Level 3 – Category	Level 4 – Sub-category
			Recreation & Travel (Leis)
			Theaters & Entertainment (Thea)
		Media (Medi)	Advertising (MedS)
			Cable & Satellite TV (MedC)
			Media - Diversified (MedD)
			Media Content (MedB)
			Printing & Publishing (Prnt)
		Real Estate (REst)	Housing Association (Hous)
			RealEstate Dev & Mgt (ReDM)
			REITs (REIT)
		Retail (Retl)	Department Stores (Dept)
			Discount Stores (Disc)
			Food & Drug Retailers (FRet)
			Restaurants (Rest)
			Specialty Retail (Spec)
		Services (Serv)	Environmental (Evir)
			Support-Services (Supp)
		Technology & Electronics (Tech)	Electronics (Elec)
			Software/Services (SWar)
			Tech Hardware & Equipment (Comp)
		Telecommunications (Tcom)	Telecom - Satellite (TSat)
			Telecom - Wireless (TWis)
			Telecom - Wireline Integrated & Services (TInt)
		Transportation (Move)	Air Transportation (Airl)
			Rail (Rail)
			Transport Infrastructure/Services (Trin)
			Trucking & Delivery (Truc)
	Utility (UTIL)	Utility (Util)	Electric-Distr/Trans (EleD)
			Electric-Generation (EleG)
			Electric-Integrated (EleI)
			Non-Electric Utilities (UtlN)
U.S. Tax-Exempt Municipals (MUNI)	Refunded (REFD)	Refunded (Refd)	ETM (Etm)
			Pre-Refunded (Pref)
	GO (GO)	GO - State (Gost)	GO - State (Gost)
		GO - Local (Golo)	GO - Local (Golo)
	Revenue (REV)	Revenue - Airport (Airp)	Revenue - Airport (Airp)
		Revenue - Education (Edu)	Revenue - Education (Edu)
		Revenue - Health (Heal)	Revenue - Health (Heal)
		Revenue - Hospitals (Hosp)	Revenue - Hospitals (Hosp)
		Revenue - Pollution Control (Pcr)	Revenue - Pollution Control (Pcr)
		Revenue - Industrial Development Revenue (Idr)	Revenue - Industrial Development Revenue (Idr)
		Revenue - Leasing COPS & Appropriations (Leas)	Revenue - Leasing COPS & Appropriations (Leas)
		Revenue - Single Family Housing (Shng)	Revenue - Single Family Housing (Shng)
		Revenue - Multi-Family Housing (Mhng)	Revenue - Multi-Family Housing (Mhng)
		Revenue - Tax (Taxr)	Revenue - Tax (Taxr)
		Revenue - Tobacco (Tob)	Revenue - Tobacco (Tob)
		Revenue - Toll & Turnpike (Toll)	Revenue - Toll & Turnpike (Toll)
		Revenue - Transportation (Trns)	Revenue - Transportation (Trns)
		Revenue - Power (Powr)	Revenue - Power (Powr)
		Revenue - Utilities - Other (Utly)	Revenue - Utilities - Other (Utly)
		Revenue - Water & Sewer (Watr)	Revenue - Water & Sewer (Watr)
		Revenue - Misc (Misc)	Revenue - Misc (Misc)
Preferred Securities (PFD)	Pfd-Quasi Government (PQGV)	Pfd-Quasi Government (Pqgv)	Pfd-Quasi Government (Pqgv)
	Pfd-Financial (PFNC)	Pfd-Banking (Pban)	Pfd-Banking (Pban)
		Pfd-Financial Services (Pfin)	Pfd-Financial Services (Pfin)
		Pfd-Insurance (Pins)	Pfd-Insurance (Pins)
	Pfd-Industrials (PIND)	Pfd-Automotive (Paut)	Pfd-Automotive (Paut)

Table 7: ICE BofAML Index sector classification schema

Level 1 – Asset class	Level 2 – Group	Level 3 – Category	Level 4 – Sub-category
		Pfd-Basic Industry (Pbas)	Pfd-Basic Industry (Pbas)
		Pfd-Capital Goods (Pcap)	Pfd-Capital Goods (Pcap)
		Pfd-Consumer Goods (Pcon)	Pfd-Consumer Goods (Pcon)
		Pfd-Energy (Penr)	Pfd-Energy (Penr)
		Pfd-Healthcare (Phca)	Pfd-Healthcare (Phca)
		Pfd-Leisure (Plei)	Pfd-Leisure (Plei)
		Pfd-Media (Pmed)	Pfd-Media (Pmed)
		Pfd-Real Estate (Pres)	Pfd-Real Estate (Pres)
		Pfd-Retail (Prtl)	Pfd-Retail (Prtl)
		Pfd-Services (Psrv)	Pfd-Services (Psrv)
		Pfd-Technology & Electronics (Ptec)	Pfd-Technology & Electronics (Ptec)
		Pfd-Telecommunications (Ptco)	Pfd-Telecommunications (Ptco)
		Pfd-Transportation (Ptra)	Pfd-Transportation (Ptra)
	Pfd-Utility (PUTI)	Pfd-Utility (Puti)	Pfd-Utility (Puti)
Convertible (CVT)	Cvt-Financial (CFNC)	Cvt-Banking (Cbnk)	Cvt-Banking (Cbnk)
		Cvt-Financial Services (Cfns)	Cvt-Brokerage (Cbrk)
			Cvt-Cons/Comm/Lease Financing (Cccl)
			Cvt-Investments & Misc Financial Services (Cinv)
		Cvt-Insurance (Cins)	Cvt-Insurance Brokerage (Cinb)
			Cvt-Life Insurance (Cinl)
			Cvt-Monoline Insurance (Cing)
			Cvt-Multi-Line Insurance (Cinm)
			Cvt-P&C (Cinp)
			Cvt-Reinsurance (Cinr)
	Cvt-Industrials (CIND)	Cvt-Automotive (Caut)	Cvt-Auto Loans (Caul)
			Cvt-Auto Parts & Equipment (Caup)
			Cvt-Automakers (Catm)
		Cvt-Basic Industry (Cbas)	Cvt-Building & Construction (Cbld)
			Cvt-Building Materials (Cblm)
			Cvt-Chemicals (Cchm)
			Cvt-Forestry/Paper (Cpap)
			Cvt-Metals/Mining Excluding Steel (Cmet)
			Cvt-Steel Producers/Products (Cstl)
		Cvt-Capital Goods (Ccap)	Cvt-Aerospace/Defense (Caer)
			Cvt-Diversified Capital Goods (Cdcp)
			Cvt-Machinery (Cmac)
			Cvt-Packaging (Cpac)
		Cvt-Consumer Goods (Ccon)	Cvt-Beverage (Cbev)
			Cvt-Food - Wholesale (Cfoo)
			Cvt-Personal & Household Products (Cprd)
			Cvt-Tobacco (Ctob)
		Cvt-Energy (Cenr)	Cvt-Energy - Exploration & Production (Ceap)
			Cvt-Gas Distribution (Cpip)
			Cvt-Integrated Energy (Ceni)
			Cvt-Oil Field Equipment & Services (Cosr)
			Cvt-Oil Refining & Marketing (Corm)
		Cvt-Healthcare (Chca)	Cvt-Health Facilities (Chfc)
			Cvt-Health Services (Chsr)
			Cvt-Managed Care (Cmca)
			Cvt-Medical Products (Cmpr)
			Cvt-Pharmaceuticals (Cpha)
		Cvt-Leisure (Crnr)	Cvt-Gaming (Cgam)
			Cvt-Hotels (Chot)
			Cvt-Recreation & Travel (Crec)
			Cvt-Theaters & Entertainment (Cent)
		Cvt-Media (Cmed)	Cvt-Advertising (Cadv)
			Cvt-Cable & Satellite TV (Cctv)
			Cvt-Media - Diversified (Cmdd)
			Cvt-Media Content (Cmco)
			Cvt-Printing & Publishing (Cpub)

Table 7: ICE BofAML Index sector classification schema

Level 1 – Asset class	Level 2 – Group	Level 3 – Category	Level 4 – Sub-category
		Cvt-Real Estate (Cres)	Cvt-Housing Association (Chou)
			Cvt-RealEstate Dev & Mgt (Cred)
			Cvt-REITs (Crei)
		Cvt-Retail (Cret)	Cvt-Department Stores (Cdpt)
			Cvt-Discount Stores (Cdis)
			Cvt-Food & Drug Retailers (Cfre)
			Cvt-Restaurants (Crst)
			Cvt-Specialty Retail (Cspr)
		Cvt-Services (Csrv)	Cvt-Environmental (Cenv)
			Cvt-Support-Services (Csup)
		Cvt-Transportation (Cmov)	Cvt-Air Transportation (Cair)
			Cvt-Rail (Crai)
			Cvt-Transport Infrastructure/Services (Ctra)
			Cvt-Trucking & Delivery (Ctrk)
		Cvt-Technology & Electronics (Ctec)	Cvt-Electronics (Cele)
			Cvt-Software/Services (Cswa)
			Cvt-Tech Hardware & Equipment (Chwa)
		Cvt-Telecommunications (Ctcm)	Cvt-Telecom - Satellite (Ctsa)
			Cvt-Telecom - Wireless (Ctwi)
			Cvt-Telecom - Wireline Integrated & Services (Ctin)
	Cvt-Utility (CUTI)	Cvt-Utility (CUTI)	Cvt-Electric-Distr/Trans (Celd)
			Cvt-Electric-Generation (Celg)
			Cvt-Electric-Integrated (Celi)
			Cvt-Non-Electric Utilities (Celn)
Derivative (Drvt)	Swap (Swap)	Interest rate Swap (Irsw)	Interest rate Swap (Irsw)
		Inflation Swap (Infs)	Inflation Swap (Infs)
CASH (CASH)	CASH (CASH)	CASH (CASH)	CASH (CASH)

Price sources and timing

Table 8: Primary sources for ICE BofAML index constituent valuations[6]

Market	Primary price source	Timing
US and Canada:		
US agency, foreign government, corporate, ABS, CMBS, CMO, taxable municipals, high yield	ICE Data Services	3:00pm ET
US Treasury	ICE Data Services	3:00pm ET
US mortgages	BofAML traders	3:00pm ET
US preferred	ICE Data Services	4:00pm ET
US tax exempt municipals	ICE Data Services	3:00pm ET
Canada sovereign	Statpro	3:00pm ET
C$ non-sovereign high grade and high yield	Statpro	3:00pm ET
Europe:		
Euro high grade and high yield	ICE Data Services	4:15pm London
Sterling high grade and high yield non-Gilt	ICE Data Services	4:15pm London
UK Gilts	Tradeweb (mid)	4:15pm London
All other Europe	ICE Data Services	4:15pm London
Japan & Australia		
JGBs	JSDA	5:00pm local
Japan credit	JSDA and ICE	5:00pm local

[6] The price sources were selected and assessed based on the quality of the data, service and ability to produce the inputs needed to meet the objective of the index. Methodologies or processes employed by the data source may be requested directly from the provider.

All A$ indices	ICE Data Services	5:00pm Sydney
Other debt markets:		
Brazil	Statpro	4:15pm local
Mexico	Statpro	2:30pm local
Nigeria	Statpro	4:00pm local
Israel	Statpro	5:00pm local
Peru and Romania	Statpro	3:00pm local
Chile, Colombia, Egypt	ICE Data Services	3:00pm local
Morocco	ICE Data Services	4:00pm local
All other local debt markets	ICE Data Services	local market close
External (USD and EUR) emerging market sovereign and credit	ICE Data Services	USD 3pm ET; EUR 4:15pm London
Swaps and FX:		
All nominal and IL swaps	BofAML traders (mid)	USD 3:00pm ET; EUR/GBP 4:00pm London
Deposit rates	ICE Data Services	local market close; 11:00am London (ICE)
Spot and forward FX rates	The WM Company (mid)	4:00pm London

Note: all valuations are bid unlesss otherwise indicated

Glossary

Table 9: Index glossary

Field name	Definition
# of Issues	See Number of Issues.
$ Market value (USD terms)	The full market value of the Index constituent securities converted into USD terms. It does not include cash payments received during the month and retained by the Index. See Market Value ex Cash.
% Excess Return vs. AAA Muni	The total return percentage of a bond minus the total return percentage of a risk-matched basket of Muni AAA GOs. The Muni AAA GO basket is comprised of synthetic securities derived from the fair value Muni AAA GO yield curve. The hedge basket is key rate duration-matched to the bond at six nodes: 6-month, 2-year, 5-year, 10-year, 20-year and 30-year. The excess return of an Index is equal to the average of its constituent security excess returns, weighted by their full market values as of the beginning of the period.
% Excess Return vs. Governments	See Excess Return % vs Govts.
% Excess Return vs. Muni	See % Excess Return vs. AAA Muni.
% Excess Return vs. Swap	See Excess Return % vs Swaps.
% Hedged	The percentage of the Index full market value at the beginning of the measurement period that is hedged into a given base currency using currency forwards, with 100% indicating fully hedged returns and 0% indicating unhedged returns. See Hedge Return Percentage.
% Market value	The sum of the full market values of all bonds within a given segment of the Index divided by the sum of the full market values of all bonds in the entire Index, including cash payments received during the period and retained by the Index. See % Weight.
% of	The full market value, including cash payments received and retained, of a selected Index divided by the full market value of another selected Index. (Note: if the first Index is a sub-Index whose constituents are completely contained within the second Index (ie, its parent), then the "% of" field shows the sub-Index share of the parent Index. If some or all of the first Index's constituents are not constituents of the second Index, the "% of" calculation simply shows the relative size of the two Indices.)
% Price return	See Price Return Percentage.
% Total return	See Total Return Percentage.
% Weight	The full market value of a constituent bond (excluding any cash payments paid during the month) divided by the sum of the full market values of all constituent securities in an Index including all cash payments received during the month and retained by the Index.
Accrued Interest	For a bond, the accrued interest in percentage terms times the face value of the bond. For an Index, the sum of accrued interest values for all constituent securities.
Accrued Interest %	The interest earned on a bond, but not yet paid or received, through the settlement date stated as a percent of face value.
Accrued Interest Value	See Accrued Interest.

Table 9: Index glossary

Field name	Definition
Asset Swap	An asset swap is a swap of a bond's fixed coupon for a floating rate coupon pegged to a short-term reference deposit rate. For a bond, asset swap spread is the spread over the forward swap curve that equates the present value of the floating rate instrument to the present value of the bond's cash flows where the cash flows of both instruments are discounted using the swap. The price of a bond with embedded options, such as call or put features, is adjusted to strip away the option value. Asset swap spread is calculated in semi-annual terms, regardless of the bond coupon frequency, as the fixed cash flows are always swapped against semi-annual floating payments. The reference basis for the short-term deposit rate is defined by market convention, with a 3-month rate used for USD while 6-month is used for EUR, GBP, etc. In addition, the swap is calculated on a par basis, meaning that a cash position is added to (removed from) a discount (premium) bond to adjust its price to 100. For an Index, the average of its constituent security asset swap spreads, weighted by full market value. All bond spreads are limited to a 10,000bp/-1,000bp range.
Base currency	The base currency that is used for purposes of calculating returns (which may be hedged or unhedged) and for conversion of bond/Index valuations such as face value, full market value, etc.
Beginning Index Value	The total return Index value (stated in local, converted unhedged or converted hedged terms) at the beginning of the measurement period. See Total Return Index Value.
Bond Ticker	See Ticker.
Calculation [method]	The basis on which yield and risk measures have been calculated. Conventional uses the bond's actual cash flow frequency as the basis for calculations. Semi-annual yield calculations assume a semi-annual compounding frequency. Semi-annual risk calculations (duration, convexity, etc.) are calculated by discounting the bond's actual cash flows using the semi-annual yield.
Cash	For a bond, cash is the amount received during the month from coupon payments plus interest on coupon payments received at the applicable reinvestment rate, if any, stated as a percentage of face value. For an Index it is the sum of the cash position (cash percentage times face value) for all constituent securities converted into a given base currency. (Note: when determining the weight of a constituent in an Index, cash is not included as part of the constituent's full market value, but it is included in the Index full market value.)
Cash Value	See Cash.
Change in Govt OAS	The change in the Govt OAS during the period. For an Index, this includes the impact of rebalancing changes that occur during the period. See Govt OAS.
Change in Govt OAS (incl. rebalancing impact)	See change in Govt OAS.
Change in Libor OAS	The change in the Libor OAS during the period, inclusive of the impact of rebalancing changes that occur during the period. See Libor OAS.
Change in Libor OAS (incl. rebalancing impact)	See change in Libor OAS.

Table 9: Index glossary

Field name	Definition
Change in Spread to Worst	The change in Spread to Worst during the period, inclusive of the impact of rebalancing changes that occur during the period. See Spread to Worst vs Govt.
Composite Rating	For a constituent bond, composite rating is the simple average of the Moody's, S&P and Fitch bond ratings. For an Index it is the average of its constituent security composite ratings, weighted by full market value.
Contribution to Modified Duration	The modified duration to maturity of a bond, or group of bonds, times its weight in a given Index. See Mod Dur to Maturity.
Contribution to modified duration to worst	The modified duration to worst of a bond, or group of bonds, times its weight in a given Index. See Mod Dur to Worst.
Convexity to Maturity	The second derivative of a security's price with respect to its yield divided by the security's price, where it is assumed that the bond will be redeemed at its final maturity date without regard to any embedded options such as call or put features. When Convexity to Maturity is stated in conventional terms, the bond cash flows to its final maturity date are discounted using its conventional yield. When stated in semi-annual terms, the bond cash flows to its final maturity date are discounted using its semi-annual yield. For an Index it is the average of its constituent security convexities to maturity, weighted by full market value.
Convexity to Worst	The second derivative of a security's price with respect to its yield divided by the security's price. For bonds with embedded options, such as call or put features, Convexity to Worst is calculated to the redemption date that produces the lowest yield for bonds with call features or the highest yield for bonds with put features (the “workout date”). When Convexity to Worst is stated in conventional terms, the bond cash flows to the workout date are discounted using its conventional yield. When stated in semi-annual terms, the bond cash flows to the workout date are discounted using its semi-annual yield. For an Index it is the average of its constituent security convexities to worst, weighted by full market value.
Country of Risk	The International Organization for Standardization (ISO) country code of the issuer's country of risk. For corporate issuers the country of risk is based on the physical location of the issuer’s operating headquarters, with several exceptions (see “Country designation” for full description)
Country of Risk (Eurozone Grouped)	The Country of Risk where all Eurozone countries are combined in a single group under the EURC code. See Country of Risk.
Country of Risk (Eurozone itemized)	The Country of Risk where all Eurozone countries are shown individually. See Country of Risk.
Coupon	For a bond, its stated rate of interest; for an Index the average of its constituent security coupons, weighted by full market value.
Currency	The currency of denomination of the cash flows paid by a bond. Where used as a grouping category, Eurozone Grouped indicates that all euro legacy currencies are grouped under the EUR currency code while Eurozone Itemized indicates that euro legacy currencies are shown individually.
Currency of Denomination (Eurozone Grouped)	See Currency.

Table 9: Index glossary

Field name	Definition
Currency of Denomination (Eurozone Itemized)	See Currency.
Currency Return	See Currency return percentage.
Currency return percentage	For an Index, currency return percentage in a given base currency is equal to the difference between the Index total return percentage in local currency terms and its total return percentage in the selected base currency.
Cusip	The Committee on Uniform Securities Identification Procedures number assigned by the CUSIP Service Bureau for U.S. and Canadian companies. For a bond that does not have an official Cusip number, the Bloomberg bond ID number is shown. In addition, where used as an input, the field will also accept Bloomberg bond ID numbers.
Description	For a bond the issuer name; for an Index the official Index name.
Detail Composite Rating	See Composite Rating.
Effective Convexity	The second derivative of a security's price with respect to changes in the semi-annual par yield curve, divided by the security's price. For an Index it is the average of its constituent security effective convexities, weighted by full market value. See Effective Duration.
Effective Duration	Effective duration is the percentage change in the price of a bond given a parallel shift in the semi-annual par coupon government yield curve while keeping option-adjusted spread constant. A theoretical price is calculated by discounting the bond's cash flows using the shifted yield curve. An option pricing model is used to account for the impact of embedded options such as call or put features. For US mortgage-backed securities, prepayment and interest rate models are used to project security cash flows and the forward curve under multiple interest rate paths for the shifted yield curve scenario. For each interest rate path, the projected cash flows are discounted by the corresponding forward curve, plus the OAS derived from the base case, to arrive at a present value for the path. The average of the present values of all paths is the theoretical price for the scenario. For US ABS and CMBS securities, a single static set of cash flows are projected using an assumed pricing prepayment speed. For an Index, it is the average of its constituent security effective durations, weighted by full market value.
Effective Duration (OAD)	See Effective Duration.
Effective Yield	Effective yield is the yield of a hypothetical bullet bond created by stripping out the option value of a bond with embedded optionality such as a call or put features. For US ABS, CMBS and CMO securities, effective yields are based on a static set of cash flows generated using the assumed pricing prepayment speed. For US MBS, interest rate and prepayment models are used to project a set of future cash flows under a single interest rate scenario. The average life of the security is equal to the average time to each of the projected principal payments weighted by their future values. That average life is converted to a long-term equivalent PSA (ie, the PSA that will generate cash flows having the same average life) and the cash flows generated by the long-term equivalent PSA are used to derive the yield. For an Index, it is the average of its constituent security effective durations, weighted by full market value. All bond yields are limited to a +100%/-10% range.

Table 9: Index glossary

Field name	Definition
Effective Yield (OAY)	See Effective Yield.
Ending Index Value	The total return Index value (stated in local, converted unhedged or converted hedged terms) at the end of the measurement period. See Total Return Index Value.
Excess Return % vs Govts	The total return percentage of a bond minus the total return percentage of a risk-matched basket of governments. The government basket is comprised of synthetic securities derived from the fair value government yield curve corresponding to the currency of denomination of the bond. The hedge basket is key rate duration-matched to the bond at six nodes: 6-month, 2-year, 5-year, 10-year, 20-year and 30-year. The excess return of an Index is equal to the average of its constituent security excess returns, weighted by their full market values as of the beginning of the period.
Excess Return % vs Swaps	The total return percentage of a bond minus the total return percentage of a risk-matched basket of interest rate swaps. The swap basket is comprised of synthetic securities derived from the fair value swap yield curve corresponding to the currency of denomination of the bond. The hedge basket is key rate duration-matched to the bond at six nodes: 6-month, 2-year, 5-year, 10-year, 20-year and 30-year. The excess return of an Index is equal to the average of its constituent security excess returns, weighted by their full market values as of the beginning of the period.
Excess Return vs. Govt	See Excess Return % vs Govts.
Excess Return vs. Swap	See Excess Return % vs Swaps.
Excess Rtn % MTD	The month-to-date total return percentage of a bond minus the month-to-date total return percentage of a risk-matched basket of governments. See Excess Return % vs Govts.
Face Value	For a bond, the face value of the security held by the Index. For capitalization weighted Indices, the face value of a constituent is equal to the total amount outstanding of the bond issue. For Indices that use alternative weighting schemes, the face value of a constituent will differ from the total amount outstanding of the bond issue. The Face Value of an Index is equal to the sum of the face values of its constituent securities converted into a given base currency.
Full Market Value	Full market value in local currency terms. (Note 1: for bonds, full market value is equal to face value times price plus accrued interest; for Indices, full market value also includes cash payments received and retained by the Index during the period. Note 2: euro legacy bonds are converted into EUR terms.)

Table 9: Index glossary

Field name	Definition
Govt OAS	For a bond, the option-adjusted spread of the bond measured vs the underlying government yield curve corresponding to the bond's currency of denomination. Option-adjusted spread is the number of basis points that the fair value government spot curve is shifted in order to match the present value of discounted cash flows to the bond's price. For securities with embedded options, such as call, sink or put features, a log normal short interest rate model is used to evaluate the present value of the securities potential cash flows. In this case, the OAS is equal to the number of basis points that the short interest rate tree must be shifted in order to match discounted cash flows to the bond's price. For US mortgage-backed and CMO securities, interest rate/prepayment models are used to generate forward curves and project cash flows. OAS is the number of basis points that is added to the semi-annually compounded forward one-month rate curves to discount the corresponding cash flows for each scenario to arrive at a present value for each scenario. OAS is calculated in order to match the average of present values of all scenarios to the bond's price. For ABS and CMBS, a single interest rate scenario is used and the cash flows are generated using the pricing speeds. For an index, the average of its constituent security government option-adjusted spreads, weighted by full market value. All bond spreads are limited to a 10,000bp/-1,000bp range.
Hedge Return	See Hedge return percentage.
Hedge Return Percentage	For a bond or an Index, hedge return percentage in a given base currency is equal to the difference between the Index total return percentage fully hedged into a given base currency minus its unhedged total return percentage in that same base currency, times the percentage of the bond/Index currency exposure that has been hedged.
Inception Date	The date that the Index history begins. It is typically earlier than the date the Index was first published, which is referred to as the Launch Date. See Launch Date.
Income Return %	The return of a bond or Index attributed to its coupon (including both received and/or accrued coupons, but not including amortization of premiums or accretion of discounts). Income return percentage is equal to total return percentage minus price return percentage. See Total Return Percentage, Price Return Percentage.
Income Return (Local)	See Income Return %.
Index Name	The official name of the Index.
ISIN	The International Securities Identification Number (ISIN).
Issue Year	The year the security was issued.
Issuer Country	See Country of Risk.
Issuer State (U.S. munis)	The State in which a US municipal securities issuer is domiciled.
Launch Date	The date the Index was first published (not available for all Indices). It is typically later than the date the Index history begins, which is referred to as the Index Inception Date. See Inception Date.
Level 1 Asset Class	See Sector Level 1.
Level 2 Group	See Sector Level 2.
Level 3 Subgroup	See Sector Level 3.
Level 4 Detail	See Sector Level 4.

Table 9: Index glossary

Field name	Definition
Libor OAS	For a bond, the option-adjusted spread of the bond measured vs the underlying swap curve corresponding to the bond's currency of denomination. For an Index, the average of its constituent security Libor option-adjusted spreads, weighted by full market value. All bond spreads are limited to a 10,000bp/-1,000bp range.
Mac Dur to Maturity	See Macaulay Duration.
Macaulay Duration	For a bond, the weighted average time to maturity of its cash flows without consideration given to embedded options such as call, put and/or sink feature. For an Index, it is the average of its constituent security Macaulay durations, weighted by full market value.
Market Value Ex Cash	The sum of the market values of the constituent securities of an Index converted into a given base currency. Constituent security market values are equal to price plus accrued interest times face value. Market Value ex Cash does not include any coupon payments received during the period and retained by the Index.
Market Weighted Coupon	See Coupon.
Maturity	Generally Maturity is the final stated maturity of a constituent security. For fixed to floating rate securities it is the last call date during the fixed rate coupon period. For perpetual preferred securities it is 12/31/2200. For callable perpetual corporate securities it is the first call date. For US mortgage pass-through securities it is a date derived from the security's average life.
Mkt Wgt Coupon	See Coupon.
Mod Dur to Maturity	The percentage change in the price of a bond for a 100bp change in yield where it is assumed that the bond will be redeemed at its final maturity without regard to any embedded options such as call or put features. For an Index, it is the average of its constituent security modified durations to maturity, weighted by full market value. When duration to maturity is stated in conventional terms, the bond cash flows to maturity are discounted using its conventional yield. When stated in semi-annual terms, the bond cash flows to maturity are discounted using its semi-annual yield. For US ABS, CMBS and CMO securities, modified duration to maturity is based on a static set of cash flows generated using the assumed pricing prepayment speed. For US MBS, interest rate and prepayment models are used to project a set of future cash flows under a single interest rate scenario. The average life of the security is equal to the average time to each of the projected principal payments weighted by their future values. That average life is converted to a long-term equivalent PSA (ie, the PSA that will generate cash flows having the same average life) and the cash flows generated by the long-term equivalent PSA are used to derive the modified duration to maturity.

Table 9: Index glossary

Field name	Definition
Mod Dur to Worst	The percentage change in the price of a bond for a 100bp change in yield where it is assumed that bonds with embedded options, such as call or put features, will be redeemed on the redemption date that produces the lowest yield for bonds with call features or the highest yield for bonds with put features (the "workout date"). For an Index, it is the average of its constituent security modified durations to worst, weighted by full market value. When duration to worst is stated in conventional terms, the bond cash flows to the workout date are discounted using its conventional yield. When stated in semi-annual terms, the bond cash flows to the workout date are discounted using its semi-annual yield. For US ABS, CMBS and CMO securities, modified duration to worst is based on a static set of cash flows generated using the assumed pricing prepayment speed. For US MBS, interest rate and prepayment models are used to project a set of future cash flows under a single interest rate scenario. The average life of the security is equal to the average time to each of the projected principal payments weighted by their future values. That average life is converted to a long-term equivalent PSA (ie, the PSA that will generate cash flows having the same average life) and the cash flows generated by the long-term equivalent PSA are used to derive the modified duration to worst.
Modified Duration	The modified duration to maturity of a bond or Index stated in conventional terms. See Mod Dur to Maturity.
Modified Duration to Maturity	The modified duration to maturity of a bond or Index stated in conventional terms. See Mod Dur to Maturity.
Modified Duration to Maturity (Conventional)	The modified duration to maturity of a bond or Index stated in conventional terms. See Mod Dur to Maturity.
Modified Duration to Maturity (Semi-Annual)	The modified duration to maturity of a bond or Index stated in semi-annual terms. See Mod Dur to Maturity.
Modified Duration to Worst	The modified duration to worst of a bond or Index stated in conventional terms. See Mod Dur to Worst.
Modified Duration to Worst (Conventional)	The modified duration to worst of a bond or Index stated in conventional terms. See Mod Dur to Worst.
Modified Duration to Worst (Semi-Annual)	The modified duration to worst of a bond or Index stated in semi-annual terms. See Mod Dur to Worst.
Mortgage WAC	The weighted average coupon of the underlying mortgages that comprise a generic US mortgage pass-through security, weighted by their outstanding pool balances.
Mortgage WALA	The weighted average age of the underlying mortgages that comprise a generic US mortgage pass-through security, weighted by their outstanding pool balances.
Mortgage WAM	The weighted average maturity of the underlying mortgages that comprise a generic US mortgage pass-through security, weighted by their outstanding pool balances.
Number of Issues	The number of constituent securities in an Index or Index segment.
OAS vs Govt	See Govt OAS.
OAS vs Swap	See Libor OAS.
Option-adjusted spread (OAS)	See Govt OAS.
Par amount	See Face Value.

Table 9: Index glossary

Field name	Definition
Par Amount (USD terms)	See Face Value.
Par Weighted Coupon	The average of the Index constituent security coupons, weighted by face value.
Par Weighted Price	See Price.
Par Wgt Coupon	See Par Weighted Coupon.
Par Wgt Price	See Price.
Paydown Return	See Paydown Return %.
Paydown Return %	For US MBS, ABS and CMBS securities, paydown return percentage represents the percentage change in value of the security attributed to the scheduled and prepaid principal received during the period. The portion of principal paid down will not participate in any price appreciation/depreciation during the period, but instead realizes a gain or loss equal to the difference between the end of period market price and par times the portion of face value that was paid down. For an Index, it is the average of its constituent security paydown return percentages, weighted by their full market values at the beginning of the measurement period.
Price	The clean price of a bond stated as a percentage of face value. For an Index it is the average of its constituent security prices, weighted by face value.
Price Return (Local)	The Price Return Percentage during the measurement period in local currency terms. See Price Return Percentage.
Price Return Index Hedged	A value that is set to an arbitrary level (typically 100) at the inception date of the Index and thereafter is incremented or decremented by the hedged price return percentage of the Index in a given base currency. See Inception Date, Price Return Percentage Hedged.
Price Return Index Value	A value that is set to an arbitrary level (typically 100) at the inception date of the Index and thereafter is incremented or decremented by the price return percentage of the Index. See Inception Date, Price Return Percentage.
Price Return Percentage	The price return percentage of a bond is equal to its change in price during the measurement period divided by its full market value at the beginning of the measurement period. If price return percentage is stated in a base currency other than the bond's currency of denomination, it also includes the impact of changes in spot currency rates during the period. For an Index, it is the average of its constituent security price return percentages, weighted by their full market values at the beginning of the period.
Price Return Percentage Hedged	The price return percentage of a bond or Index stated in a given base currency where the currency exposure of the bond/Index is hedged with currency forward contracts. See Price Return Percentage.
Rating	See Composite Rating.
Redemption type	A flag that indicates the presence of any features of a bond that could affect its redemption date, such as a call or put feature.
Sector Level 1	The first level of the four tier BofAML bond Index sector classification schema. Level 1 designates the sector asset class.
Sector Level 2	The second level of the four tier BofAML bond Index sector classification schema. Level 2 designates the sector group.

Table 9: Index glossary

Field name	Definition
Sector Level 3	The third level of the four tier BofAML bond Index sector classification schema. Level 3 designates the sector category.
Sector Level 4	The fourth level of the four tier BofAML bond Index sector classification schema. Level 4 designates the sector sub-category.
Spread	See Govt OAS.
Spread Duration	For a bond, the percentage change in price for a 100bp change in option-adjusted spread (OAS). For an Index it is the average of its constituent security spread durations, weighted by full market value.
Spread to Worst vs Govt	For a bond, its yield to worst minus the yield at a point on the fair value government yield curve that corresponds to the bond's expected redemption date, where it is assumed that a bond with embedded options will be redeemed on the date that produces the lowest yield for bonds with call features or the highest yield for bonds with put features (the "workout date"). For US MBS, ABS, CMBS and CMO securities the average life is used in place of the expected redemption date. For an Index, the average of its constituent security spreads to worst, weighted based on full market value. See Yield to Worst. All bond spreads are limited to a 10,000bp/-1,000bp range.
Summary Composite Rating (AAA, AA, etc)	Generic composite rating categories that do not distinguish rating sub-categories. For example, the AA Summary Composite Rating category includes bonds with a composite rating equal to AA1, AA2 or AA3. See Composite Rating.
Ticker	For bonds, this field shows the issuer ticker; for Indices it is the four character BofAML reference ticker assigned to the Index.
Total Return (Converted)	The total return percentage of an Index times the percentage changes in spot currency rates where all constituent securities are converted into a common base currency. See Total Return Percentage.
Total Return (Local)	The total return percentage during the measurement period in local currency terms. See Total Return Percentage
Total Return Index Hedged	A value that is set to an arbitrary level (typically 100) at the inception of the Index and thereafter is incremented or decremented by the hedged total rate of return percentage of the Index in a given base currency. See Inception Date, Total Return Percentage Hedged.
Total Return Index Value	A value that is set to an arbitrary level (typically 100) at the inception of the Index and thereafter is incremented or decremented by the total return percentage of the Index. See Total Return Percentage.
Total Return Percentage	The Total Return Percentage of a bond is equal to the sum of its change in price, change in accrued interest, and cash flow payments received during the measurement period divided by its full market value at the beginning of the measurement period. If total return percentage is stated in a base currency other than the bond's currency of denomination, it is multiplied by in the percentage change spot currency rates during the period. For an Index, it is the average of its constituent security total return percentages, weighted by their full market values at the beginning of the period.
Total Return Percentage Hedged	The total return percentage of a bond or Index stated in a given base currency where the currency exposure of the bond/Index is hedged with currency forward contracts. See Total Return Percentage.

Table 9: Index glossary

Field name	Definition
Total Return Value	See Total Return Index Value.
TTR % MTD LOC	The month-to-date total return percentage in local currency terms. See Total Return Percentage.
Type	The ranking of the bond with regard to claims on issuer assets or earnings in the event of default.
Weight	See % Weight.
Weighting Method	The basis for determining the weights of constituent securities within an Index.
Years to Final Maturity	See Years to Maturity.
Years to Maturity	For a bond, the time from the current settlement date to its final stated maturity measured in years. For an Index, the average of its constituent security years to final maturity, weighted by full market value. For US MBS, ABS and CMBS constituents, years to maturity is equal to the security's average life.
Years to Maturity Average Life	See Years to Maturity.
Years to Workout	For a bond, the time from the current settlement date to the expected redemption date. For bonds with embedded options, such as call or put features, the expected redemption date is the date that produces the lowest yield for bonds with call features or the highest yield for bonds with put features. For an Index, the average of the constituent security years to workout weighted based on full market value.
Yield Ratio	The effective yield of a bond divided by the yield on the effective duration-matched point on the fair value government yield curve that corresponds to the currency of denomination of the bond. For an Index it is the average of its constituent security yield ratios, weight by full market value.
Yield to Maturity	For a bond, the percentage rate of return paid if the security is held to its maturity date without consideration given to any embedded options such as call or put features. When yield to maturity is stated in conventional terms, the bond cash flows to maturity are discounted using a yield based on the same coupon frequency of the bond. When stated in semi-annual terms, the bond cash flows to maturity are discounted using a semi-annual yield. For US MBS, ABS, CMBS and CMO securities, Yield to Maturity is equal to Effective Yield. For an Index, it is the average of its constituent security yields to maturity, weighted by full market value. All bond yields are limited to a +100%/-10% range.
Yield to Maturity (Conventional)	The yield to maturity of a bond or Index stated in conventional terms. See Yield to Maturity. All bond yields are limited to a +100%/-10% range.
Yield to Maturity (Semi-Annual)	The yield to maturity of a bond or Index stated in semi-annual terms. See Yield to Maturity. All bond yields are limited to a +100%/-10% range.

Table 9: Index glossary

Field name	Definition
Yield to Worst	For bonds with embedded options, yield to worst is the yield to the redemption date that produces the lowest result for bonds with call features or the highest result for bonds with put features. If the initially calculated yield to worst ("YTW") is negative, the calculated workout date is within 30 days and the bond is continuously callable, the YTW is recalculated using a workout date 60 days from the current date. When yield to worst is stated in conventional terms, the bond cash flows to the workout date are discounted using a yield based on the same coupon frequency of the bond. When stated in semi-annual terms, the bond cash flows to the workout date are discounted using a semi-annual yield. For US MBS, ABS, CMBS and CMO securities, Yield to Worst is equal to Effective Yield. For an Index, it is the average of the Yield to Worst of its constituent securities weighted by full market value. See Effective Yield. All bond yields are limited to a +100%/-10% range.
Yield to Worst (Conventional)	The yield to worst of a bond or Index stated in conventional terms. See Yield to Worst. All bond yields are limited to a +100%/-10% range.
Yield to Worst (Semi-Annual)	The yield to worst of a bond or Index stated in semi-annual terms. See Yield to Worst. All bond yields are limited to a +100%/-10% range.