# DBIQ Emerging Market USD Liquid Balanced Index

## Summary

The DBIQ Emerging Markets USD liquid index tracks the performance of a basket of the most liquid EM USD Sovereign bonds. For each of the countries, a maximum of 3 bonds are selected for the index. The index selects, from the eligible bonds, those with the relative widest Z spread[1] from each country. This is the bond that has the highest likely excess return compared to a swap curve among a group of eligible bonds from the same country with similar risks and very high correlation. This Z Spread method is an effective and simple way to pick up relative values amongst bonds with different maturities from the same country.

While emerging market countries generally present higher volatility, the index is designed in a dynamically rebalanced manner such that it is able to diversify risks. On an annual basis the index reweights to diversify the allocation across all countries. All countries with two or more bonds included in the index have an equal weight, countries with one bond are allocated half this weight. An optimum rebalancing frequency is chosen to retain diversity and minimize the rebalancing cost.

The index is subject to rebalancing as described:

- The Annual Rebalancing occurs at the end of February which reselects all countries, bonds and resets the market values across the countries.
- The Quarterly Rebalancing occur at the end of May, August and November and reselects bonds for each country selected in the Annual Rebalancing.
- The Monthly Rebalancing provides for reinvesting coupons and cash positions or, where a Default and/or Outstanding Buy Back event occurs, the removal of bonds.

For each rebalancing event an Index Selection Day occurs five business days prior to the rebalancing. On this date the new membership list is identified. Following a selection date DBIQ will publish the membership list.

On a daily basis the occurrence of Default and Outstanding Buy Back events is monitored.

## Index Suite

The index is calculated and published to Bloomberg in the following versions:

| Index Name | Return Type | Currency | Bloomberg Ticker |
|---|---|---|---|
| DBIQ Emerging Market USD Liquid Balanced Index | TR | USD | DBLQBLTR |

*Source: DBIQ*

## Key Index Information

| Index Inception Date | Index Live Date | Index Business Day |
|---|---|---|
| 28-Feb-1999 | 12-Sep-2007 | All weekdays |

[1] http://www.investopedia.com/terms/z/zspread.asp

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Deutsche Bank

### Index Selection Day

1. Annual index selection day close of – 5th New York City business day preceding the last New York City business day of February

2. Quarterly index selection day close of – 5th New York City business day preceding the last New York City business day of May, August and November

3. Monthly index selection day close of – 5th New York City business day preceding the last New York City business day of January, March, April, June, July, September, October and December

### Index Rebalancing Day

1. Annual index rebalancing day – Last calendar day of February

2. Quarterly index rebalancing day – Last calendar day of May, August and November

3. Monthly index rebalancing day – Last calendar day of January, March, April, June, July, September, October and December

## Index Owner and Index Administrator

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The Index Administrator has implemented and maintains the DBIQ User Guidance and Administrator Handbook Overview (the "Overview"), which sets out a summary of the policies, procedures and controls implemented by the management of the Index Administrator to promote sound business practices for the lifecycle management of the Index Owner's proprietary benchmarks by the Index Administrator. The Overview also includes the Index Administrator's policy related to quality of benchmarks and input data management. Additional issues related to governance, controls, benchmark classification and risk controls, periodic reviews and conflicts of interest are also addressed.

The Overview is available on the DBIQ homepage under the following URL (the "DBIQ Website"):

https://index.db.com

## Index Publication

The level of each Index on each relevant Index Business Day shall be published:

1) On the DBIQ Website; and

2) Where applicable, on Bloomberg under the Bloomberg ticker in respect of such Index as set out in Table 1 above.

Any such publication may be restricted by means determined as appropriate for such purpose by the Index Administrator in its sole and absolute discretion including, but not limited to, password protection on the DBIQ Website restricting access to a limited set of persons in accordance with arrangements agreed between the Index Administrator and such person. The Index Administrator may, at any time and without notice, change the frequency or method publication of an Index, as the case may be. The Index Administrator accepts no legal liability to any person for publishing or not continuing to publish for any period of time and level in respect of an Index at any particular place or any particular time.

## Index Rules and Calculations

## Annual Selection for Rebalancing

The annual rebalancing has three phases. First, an extraneous to the index phase, the potential countries are observed, second the eligible countries and bonds are selected and third the weights are set.

Phase 1 – Country Identification

The list of Emerging Market Countries, is completed on an annual basis by the DBIQ Management Team, (refer to DBIQ Handbook on index.db.com). This is published by DBIQ at the same time as the Annual Selection. As of March 2017, the index has 29 eligible emerging market countries: Argentina, Brazil, Chile, Colombia, Croatia, Dominican Republic, El Salvador, Hungary, Indonesia, Kazakhstan, Lebanon, Lithuania, Mexico, Pakistan, Panama, Peru, Philippines, Poland, Qatar, Romania, Russia, Serbia, Slovenia, South Africa, South Korea, Sri Lanka, Turkey, Ukraine and Venezuela.

Phase 2 – Bond Selection

Phase 2 initially identifies the eligible bond pool, from this the final bonds are selected based on the relative Z-Spreads of each bond.

1. The eligible bond pool is identified by applying the filters detailed in "Underlying Membership" for each country in the Emerging Markets Country List. Liquidity is determined from the primary pricing source, Interactive Data (IDC). Lack of price from this source precludes entry to the index.
2. The country of issue for each bond is identified. The unique list of countries is identified, this is the list of countries that will be included for that year. A country with no bonds selected at the Annual rebalancing will be excluded for the remainder of the year
3. The index aims to select 3 bonds per country.
    a. If 3 or fewer bonds are in the eligible bond pool all eligible bonds are selected
    b. If more than 3 bonds are in the eligible bond pool the bonds with the highest rebalancing adjusted Z-Spread are selected. This is calculated by
        i. Each bond from the country has its Z-Spread calculated
        ii. For each bond that is not currently a member of the index the adjusted Z-Spread is calculated by decreasing it by a rebalancing adjustment threshold. The threshold has been set at 10% for the rebalancing period starting from 1-Mar-2009. The threshold can only be revised at the Annual Rebalancing and has remained at 10% since 1-Mar-2009

iii. For each bond that is currently in the index the adjusted Z-Spread is the original calculate value
iv. The bonds are ranked based on the adjusted Z-Spread, highest first
v. The top three bonds are selected, in the event of a tie the lowest maturity is selected

Phase 3 Weight Calculation

On an annual basis the index reweights to diversify the allocation across all countries. From and including the February 2018 rebalancing all countries with two or more bonds included in the index have an equal weight, countries with one bond are allocated half this weight. Prior to the February 2018 rebalancing the target weight for each country was equal no matter the number of bonds included in each country.

The target weight for countries that have two or more bonds is calculated as;

$$TWcountry(c,r) = \frac{2}{(2 * TN2(r) + TN1(r))}$$

The target weight for countries that have one bond is calculated as;

$$TWcountry(c,r) = \frac{1}{(2 * TN2(r) + TN1(r))}$$

Where
TWcountry(c,r) = Target weight for country c on annual rebalancing r
TN2(r) = Total number of countries that have two or more bonds selected during annual rebalancing
TN1(r) = Total number of countries that have one bond selected during annual rebalancing

The final weights are calculated on the index rebalancing day.

## Quarterly Selection for Rebalancing

Phase 1 – Bond Selection

On each quarterly selection date the eligible bond pool is first identified, from this the final bonds are selected based on the relative Z-Spreads of each bond. The steps are;

1. The eligible bond pool is identified by applying the filters detailed in "Underlying Membership" for each country currently in the index. Liquidity is determined from the primary pricing source, Interactive Data (IDC). Lack of price from this source precludes entry to the index.
2. The index aims to select 3 bonds per country.
    a. If 3 or fewer bonds are in the eligible bond pool all eligible bonds are selected
    b. If more than 3 bonds are in the eligible bond pool the bonds with the highest rebalancing adjusted Z-Spread are selected. This is calculated by
        i. Each bond from the country has its Z-Spread calculated
        ii. For each bond that is not currently a member of the index the adjusted Z-Spread is calculated by decreasing it by a rebalancing adjustment threshold. The threshold has been set at 10% for the rebalancing period starting from 1-Mar-2009. The threshold can only be revised at the Annual Rebalancing and has remained at 10% since 1-Mar-2009
        iii. For each bond that is currently in the index the adjusted Z-Spread is the original calculate value

iv. The bonds are ranked based on the adjusted Z-Spread, highest first
v. The top three bonds are selected, in the event of a tie the lowest maturity is selected

Phase 2 Weight Calculation

On 1st June, September and December, within each country, market values are distributed based on the "Quarterly Rebalancing Calculation" rules to balance exposure among bonds and limit turnover at the same time.

## Monthly Selection for Rebalancing

Phase 1 Bond Review

On a monthly selection date the membership is reviewed for bonds that are subject to Outstanding Buy Back Events and Default Events.

Any bond subject to an Outstanding Buy Back Event is removed and subject to a replacement selection as detailed in Phase 2

Where a bond is subject to a Default Event all bonds from that country are identified and removed from the index on the rebalancing date.

Phase 2 Replacement Selection

For each country that has a bond being removed due to an Outstanding Buy Back Event the replacement selection is completed. The replacement selection is completed on a country basis, as such the total number of bonds being replaced is identified, and this is between 1 and 3.

The eligible bond pool is first identified, from this the final bonds are selected based on the relative Z-Spreads of each bond. The steps are;

1. The number of replacement bonds required is identified
2. The eligible bond pool is identified by applying the filters detailed in "Underlying Membership" for the country. Liquidity is determined from the primary pricing source, Interactive Data (IDC). Lack of price from this source precludes entry to the index.
3. Bonds that are currently in the index and appear in the eligible bond pool are removed
4. The index aims to select a number of bonds equal to those required.
    a. If the number of replacement bonds required or fewer bonds are in the eligible bond pool all eligible bonds are selected
    b. If more than number of replacement bonds required are in the eligible bond pool the bonds with the highest rebalancing adjusted Z-Spread are selected. This is calculated by
        i. Each bond has its Z-Spread calculated
        ii. The bonds are ranked based on the adjusted Z-Spread, highest first
        iii. The number of bonds equal to the number of replacement bonds required are selected, in the event of a tie the lowest maturity is selected

Phase 3 Weight Calculation

The market values are distributed based on the "Monthly Rebalancing Calculation" rules to balance exposure among bonds and limit turnover at the same time.

## Daily Monitoring

On a daily basis the occurrence of Outstanding Buy Back and Default events are monitored.

**Outstanding Buy Back Event Review**

An Outstanding Buy Back Event occurs when a bond has a partial tender/call/redemption such that the notional outstanding drops equal to or more than 70% of its outstanding. The drop must occur in a single occasion. From the date the outstanding reduction is identified the bond is held as cash at the tender/call/redemption price if available and if not the bond price as of that day. A bond removed will not be eligible for selection at any subsequent rebalancing should its outstanding remain greater than $500mln

**Default Event Review**

A Default Event occurs when any one of these conditions is met:

- S&P, Moody’s or Fitch Rating Agencies declaring a bond in default
- S&P, Moody’s or Fitch Rating Agencies declaring a Country in default
- ISDA providing notice of credit event for Country
- EMTA – Emerging Market Trading Association considering the bond defaulted, trading flat of accrued

This will result in the removal of the country at month end

An announcement will be made as soon as practically possible when the decision to consider a bond, and therefore a country, in default, is final

Treatment of the defaulted bond(s) for Calculation purposes;

- The daily price provided by IDC until month end
- The bond accruing flat from Default determination
- Should a Coupon have been treated as paid in the index, but the payment in fact was missed, it will be subtracted at month end when the country is removed

## Bond Selection

**Underlying Membership Pool**

The "Underlying Membership" can be generated by applying the index criteria described below

- Bond Sector

  Bonds should be issued by sovereign or quasi-sovereign entities

- Market Issue

  For liquidity reasons, the following market types are excluded:

  - Domestic Issue
  - 144As
  - Private placements
  - Brady bonds and
  - Restructured bonds

- Bond Type

  The following bond types are specifically excluded:

- Callable bonds
- Putable bonds
- Sinkers
- Floating/variable coupon bonds
- Zero coupon/zero coupon step-up bonds
- Bonds without known cash flows
- Convertibles
- Inflation- and other index-linked bond
- Bonds cum or ex-warrant
- Floating rate notes with coupon cap
- Perpetual bonds
- Accrued only bonds

- Amount Outstanding

  All bonds must have at least $ 500 million amount outstanding at rebalancing and has not been subject to a Buy Back Event

- Liquidity

  Determined from the primary pricing source, Interactive Data (IDC). Lack of price from this source precludes entry to the index.

- Rating

  Rating is not a criterion for inclusion

- Time to Maturity

  Time to maturity is calculated using the day count convention of the bond and is calculated from the rebalancing date to the maturity date.

  All bonds must have a remaining time to maturity of at least 3 years on the rebalancing day.

  Bonds are removed from the index at the next rebalancing when their time to maturity falls below 3 years

- Default

  No bond from the country is subject to a Default Event

## Index Level Calculation

DBIQ Emerging Markets Liquid Balanced Index is produced for all calendar days using a t+0 settlement convention.

*Bond Price*

Interactive Data Corporation (IDC), provides independent pricing used in the calculation of the Index

Mid prices are used to calculate index end of day (EOD) levels

Bid and ask spread prices are used to deduct transaction cost at each quarter

*Coupon Re-investment*

Intra-month coupon payments are held as cash until the end of the month. The cash holding is then reinvested in the entire index proportionally based on the assigned weights.

*Bond Return Calculation*

As a local return index with only fixed coupon non-sinking bonds, the bond return can be expressed as the sum of the price and coupon returns. All returns are calculated month-to-date

- Price Return

Price return reflects the component of a bond's total return that is due just to the movement in the clean price of the bond.

$$R_{CLEAN}(i,t) = \frac{P_{CLEAN}(i,t) - P_{CLEAN}(i,r)}{P_{CLEAN}(i,r) + AI(i,r)}$$

Where

| | |
|---|---|
| t | = Index calculation day |
| $r$ | = Last calendar day of last month |
| $R_{CLEAN}(i,t)$ | = Clean price return from r to t for bond i |
| $P_{CLEAN}(i,t)$ | = Clean mid-price on evaluation day, t for bond i |
| $P_{CLEAN}(i,r)$ | = Clean mid-price on r for bond i |
| $AI(i,r)$ | = Accrued interest on r for bond i |

- Coupon Return

Coupon return reflects the component of a bond's total return that is the interest payments only. It takes into account both changes in the accrued interest and any coupon payments.

$$R_{CPN}(i,t) = \frac{[AI(i,t) - AI(i,r) + Coupon(i,t)]}{P_{CLEAN}(i,r) + AI(i,r)}$$

Where

| | |
|---|---|
| t | = Index calculation day |
| $r$ | = Last calendar day of last month |
| $R_{CPN}(i,t)$ | = Coupon return from r to t for bond i |
| $AI(i,t)$ | = Accrued interest on valuation day for bond i |
| $AI(i,r)$ | = Accrued interest on r for bond i |
| $Coupon(i,t)$ | = Sun of coupons paid from but excluding r and to and including t for bond i |
| $P_{CLEAN}(i,r)$ | = Clean mid-price on r for bond i |

- Total Local Return

The total Local return of a bond is the simple arithmetic sum of the relevant component returns listed above.

$$R_{TOTAL}(i,t) = R_{CLEAN}(i,t) + R_{CPN}(i,t)$$

Where

| | |
|---|---|
| t | = Index calculation day |
| $R_{TOTAL}(i,t)$ | = Total local return from r to t for bond i |
| $R_{CLEAN}(i,t)$ | = Clean price return from r to t for bond i |
| $R_{CPN}(i,t)$ | = Coupon return from r to t for bond i |

*Index Return Calculation*

The month-to-date index level return is the weighted average bond return. The weight for each bond is determined using the market value of the last calendar day of the previous month.

$$R(t) = \frac{\sum\{MV(i,r) \times R_{TOTAL}(i,t)\}}{\sum MV(i,r)}$$

The index level is calculated as

$$IL(t) = IL(r) \times [1 + R(t) + C(t)]$$

Where:

| | |
|---|---|
| t | = Index calculation day |
| $r$ | = Last calendar day of last month |
| $R(t)$ | = Month-to-date index return, i.e. return from r to t |
| $MV(i,r)$ | = Market value of bond i on r |
| $R_{TOTAL}(i,t)$ | = Total month-to-date return for bond i |
| $IL(t)$ | = Index level on day t |
| $IL(r)$ | = Index level on r |
| $C(t)$ | = Bid/ask cost on day t, on non-rebalancing days this is 0 |

## Index Rebalancing Calculation

On every rebalancing date the month end market value for bonds currently in the index is calculated as

$$MV_{END}(i,r) = (P_{CLEAN}(i,r) + AI(i,r)) \times N(i,r')$$

For bonds entering the index, the month end market value is 0.

$$MV_{END}(i,r) = 0$$

Where,

| | |
|---|---|
| r' | = Last calendar day month preceding rebalancing day r |
| $MV_{END}(i,r)$ | = Month end market value of bond i on rebalancing date r |
| $P_{CLEAN}(i,r)$ | = Clean mid-price on r for bond i |
| $AI(i,r)$ | = Accrued interest on r for bond i |
| $N(i,r')$ | = Notional of bond i on the last rebalancing day r' |

### Annual Rebalancing Calculation

On Index inception date, the market value was set to 100 Million USD for all countries and was equally distributed among all constituents of the country.

The calculation is based on two steps, first the proposed market value is calculated, and from this the final market value is calculated. The final market value calculation is found in Weight Calculation.

The weight and cost calculation is applied as per below

$$MVcountry_{NEW}(c,r) = \sum MV_{END}(i,r) * TWcountry(c,r)$$

$$MV_{NEW}(i,r) = \sum MVcountry_{NEW}(c,r) / n(b)$$

Where,

| | |
|---|---|
| $MV_{END}(i,r)$ | = Month end market value of current member bond i on rebalancing date r |
| $MVcountry_{NEW}(c,r)$ | = Total MV assigned to country c on r for the new month |
| $MV_{NEW}(i,r)$ | = Proposed market value assigned to bond i in country c on r for the new month |
| $n(b)$ | = Number of bonds in the country c |

### Quarterly Rebalancing Calculation

On the last calendar day of May, August and November the market value for each bond is calculated as follows. The calculation is based on two steps, first the proposed market value is calculated, and from this the final market value is calculated. The final market value calculation is found in Weight Calculation. The proposed market value calculation for each bond is calculated based on the following rules;

1. For each country where the membership remains the same as last month:

   The market value for all bonds will remain the same, being set as equal to the quarter-end market value.

$$MV_{NEW}(i,r) = MV_{END}(i,r)$$

Where,

$MV_{END}(i,r)$ = Month end market value of bond i on rebalancing date r

$MV_{NEW}(i,r)$ = Proposed market value assigned to bond i on rebalancing date r

2. For a country where only one bond will be included:
   Market value of the bond will be capped to the average market value of bonds from the country currently in the index.

$$MV_{NEW}(j,r) = \sum MV_{END}(i,r)/n(i)$$

Where,

$MV_{END}(i,r)$ = Month end market value of bond i on rebalancing date r

$MV_{NEW}(j,r)$ = Proposed market value assigned to bond j on rebalancing date r

$n(i)$ = Number of bonds currently in the country

3. For a country where there are joiners and leavers from the last months membership:
   Market value of the bonds from the country that are leaving will be distributed equally to the bonds joining from the same country.

$$MV_{NEW}(j,r) = \sum MV_{END}(l,r)/n(j)$$

Where,

$MV_{END}(l,r)$ = Month end market value of leaving bond i on rebalancing date r

$MV_{NEW}(j,r)$ = Proposed market value assigned to joining bond j on rebalancing date r

$n(j)$ = Number of joiners in the country

Bonds remaining in the index have the quarter-beginning market value set equal to the quarter-end market value

$$MV_{NEW}(s,r) = MV_{END}(s,r)$$

Where,

$MV_{NEW}(s,r)$ = Month end market value of remaining bond s on rebalancing date r

$MV_{END}(s,r)$ = Proposed market value assigned to remaining bond s on rebalancing date

4. For a country where there are only leavers from the last months membership (if only one bond will remain rule 2 applies):

Equally distribute market value from the leaving bond of the respective country to the remaining bonds of the same country.

$$MV_{NEW}(s,r) = MV_{END}(s,r) + \sum MV_{END}(l,r)/n(s)$$

Where,

| | |
|---|---|
| $MV_{END}(l,r)$ | = Month end market value of leaving bond i on rebalancing date r |
| $MV_{NEW}(s,r)$ | = Proposed market value assigned to remaining bond s on rebalancing date |
| $MV_{END}(s,r)$ | = Month end market value of remaining bond s on rebalancing date r |
| $n(s)$ | = Number of remaining bonds in a country |

5. For a country where there are only joiners from the last months membership:
   Equally distribute total market value from the existing bond(s) of the country to all bonds of that country that will be in the index in the new rebalancing period

$$MV_{NEW}(j,r) = \sum MV_{END}(s,r) / n(j+s)$$
$$MV_{NEW}(s,r) = \sum MV_{END}(s,r) / n(j+s)$$

Where,

| | |
|---|---|
| $MV_{END}(s,r)$ | = Month end market value of remaining bond s on rebalancing date r |
| $MV_{NEW}(j,r)$ | = Proposed market value assigned to joining bond j on rebalancing date r |
| $MV_{NEW}(s,r)$ | = Proposed market value assigned to remaining bond s on rebalancing date |
| $n(j+s)$ | = Total number of bonds in the country after rebalance |

**Monthly Rebalancing Calculation**

The calculation is based on two steps, first the proposed market value is calculated, and from this the final market value is calculated. The final market value calculation is found in Weight Calculation.

1. For each country where the membership remains the same as last month:

   The market value for all bonds will be remain the same, being set as equal to the month-end market value.

$$MV_{NEW}(i,r) = MV_{END}(i,r)$$

Where,

| | |
|---|---|
| $MV_{END}(i,r)$ | = Month end market value of bond i on rebalancing date r |
| $MV_{NEW}(i,r)$ | = Proposed market value assigned to bond i on rebalancing date r |

2. For a country where only one bond will be included:
   Market value of the bond will be capped to the average market value of bonds from the country currently in the index.

$$MV_{NEW}(j,r) = \sum MV_{END}(i,r) / n(i)$$

Where,

| | |
|---|---|
| $MV_{END}(i,r)$ | = Month end market value of bond i on rebalancing date r |
| $MV_{NEW}(j,r)$ | = Proposed market value assigned to bond j on rebalancing date r |
| $n(i)$ | = Number of bonds currently in the country |

3. For a country where there are leavers and replacement bond(s):

Market value of the bonds from the country that are leaving will be distributed equally to the bonds joining from the same country.

$$MV_{NEW}(j,r) = \sum MV_{END}(l,r) / n(j)$$

Where,

| | |
|---|---|
| $MV_{END}(l,r)$ | = Month end market value of leaving bond i on rebalancing date r |
| $MV_{NEW}(j,r)$ | = Proposed market value assigned to joining bond j on rebalancing date r |
| $n(j)$ | = Number of joiners in the country |

Bonds remaining in the index are assigned same market value as month end market value.

$$MV_{NEW}(s,r) = MV_{END}(s,r)$$

Where,

| | |
|---|---|
| $MV_{NEW}(s,r)$ | = Month end market value of remaining bond s on rebalancing date r |
| $MV_{END}(s,r)$ | = Proposed market value assigned to remaining bond s on rebalancing date |

4. Where no replacement bond(s) are available for a country:

Equally distribute market value from the leaving bonds of the respective country to the remaining bonds of the same country. If only one bond remains rule 2 applies.

$$MV_{NEW}(s,r) = MV_{END}(s,r) + \sum MV_{END}(l,r) / n(s)$$

Where,

| | |
|---|---|
| $MV_{END}(l,r)$ | = Month end market value of leaving bond i on rebalancing date r |
| $MV_{NEW}(s,r)$ | = Proposed market value assigned to remaining bond s on rebalancing date |
| $MV_{END}(s,r)$ | = Month end market value of remaining bond s on rebalancing date r |
| $n(s)$ | = Number of remaining bonds in a country |

### Weight Calculation

The final market value reflects the bond weights. On every rebalancing date the market value for each bond i selected for the index for the next month can be calculated as:

If $MV_{NEW}(i,r) \le MV_{END}(i,r)$

$$MV(i,r) = MV_{NEW}(i,r)$$

Else

$$MV(i,r) = MV_{END}(i,r) + [MV_{NEW}(i,r) - MV_{END}(i,r)] \times [BID(i,r) / ASK(i,r)]$$

Where,

| | |
|---|---|
| $MV_{NEW}(i,r)$ | = Proposed market value assigned to bond i on rebalancing date |

$MV_{END}(i,r)$ = Month end market value of bond i on rebalancing date r

$MV(i,r)$ = Market value for bond i on rebalancing date r

$BID(i,r)$ = Dirty bid price for bond i on r

$ASK(i,r)$ = Dirty ask price for bond i on r

The notional outstanding is calculated as;

$$N(i,r) = [MV(i,r)/100] \times [P(i,r) + AI(i,r)]$$

Where,

$N(i,r)$ = Notional of the bond i on rebalancing date r

$MV_{NEW}(i,r)$ = Total MV assigned to bond i on rebalancing date r

$P(i,r)$ = Price of the bond i on rebalancing date r

$AI(i,r)$ = Accrued Interest of the bond i on rebalancing date r

**Cost Calculation**

Bid/Ask cost is applied to the incremental market value of bonds during an annual rebalancing, quarter rebalancing and event driven rebalancing. The cost for reinvesting coupon mid-quarter is ignored in the index calculation. The cost can be calculated as:

$$C(t) = \frac{\sum \max\{0, [MV(i,r) - MV_{END}(i,r)]\} \times [1 - BID(i,r)/ASK(i,r)]}{\sum MV(k,r)}$$

Where,

$C(t)$ = Cost for the index on the rebalancing day t

$MV(i,r)$ = Market value for bond i on rebalancing date r

$MV_{END}(i,r)$ = Month end market value of bond i on rebalancing date r

$MV_{END}(k,r)$ = Month end market value for each bond k that is currently in the index on rebalancing date r

$BID(i,r)$ = Dirty bid price for bond i on r

$ASK(i,r)$ = Dirty ask price for bond i on r

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