US Aggregate Zero Duration Index

The Bloomberg Barclays US Aggregate Zero Duration Index measures the return of the US Aggregate Index with its interest rate (duration) exposure fully hedged with a short position in four on-the-run (OTR) US Treasury bellwether securities. The interest rate hedge is rebalanced on a monthly basis to achieve the target zero duration interest rate exposure. The US Aggregate is a Bloomberg Barclays flagship US fixed income index and is designed to measure the broad, investment grade taxable US dollar-denominated bond market. Full details of the methodology and rules of the US Aggregate Index can be found in a separate index factsheet.

US Aggregate Zero Duration: Index Calculation Methodology

The return of the US Aggregate Zero Duration Index can be represented as the following:

$$US\ Aggregate\ Zero\ Duration_{Total\ Return} = US\ Aggregate_{Total\ Return} - US\ Aggregate_{Zero\ Duration\ Hedge} + Funding_{1-mo\ T-Bills}$$

Where:

$$US\ Aggregate_{Total\ Return} = published\ return\ of\ the\ benchmark\ bond\ index, including\ a\ price, coupon\ and\ paydown\ return\ component$$

$$US\ Aggregate_{Zero\ Duration\ Hedge} = the\ return\ of\ a\ portfolio\ of\ 2y, 5y, 10y\ and\ 30y\ OTR\ securities\ weighted\ to\ match\ the\ duration\ of\ the\ US\ Aggregate, including\ a\ position\ in\ US\ T-Bills, if\ necessary, to\ bring\ the\ sum\ of\ hedge\ weights\ to\ 100\%$$

$$Funding_{1-mo\ T-Bills} = the\ return\ of\ a\ basket\ of\ 1\ month\ T-Bills\ to\ make\ the\ total\ return\ a\ funded\ return$$

Construction of Short Duration Hedged Position

Calculating US Aggregate Zero Duration Index returns requires the creation of a monthly rebalanced hedge portfolio of US Treasury cash bonds weighted to match the interest rate duration of the flagship US Aggregate Index. The hedge portfolio is constructed in four steps:

1. Bucketing of the Option Adjusted Duration (OAD) of the US Aggregate Index
2. Selection of OTR Treasury bellwethers for the hedge portfolio
3. Calculation of hedge portfolio weights
4. Calculation of hedge portfolio returns

Step 1: OAD Bucketing of the US Aggregate Index

- The Zero Duration hedge portfolio consists of OTR US Treasury securities in four different tenors: 2y, 5y, 10y, and 30y.
- The first step to constructing the hedge portfolio is to sort the underlying US Aggregate Index (Statistics Universe) into four non–overlapping duration buckets, and to identify the duration contribution to be hedged by each of these instruments in the hedge portfolio.
- The duration measure used is OAD, as computed and reported within the Bloomberg Barclays Indices.
- Contribution to OAD is calculated by multiplying the market value percent of each duration bucket as of the month–end index rebalancing date by the OAD of each bucket.

Step 2: Selecting OTR Instruments for Hedge Portfolio

- The selected securities for each monthly rebalance match the instruments that are used for Bloomberg Barclays US Treasury Bellwether Indices.
- OTR instruments for the portfolio are selected once a month on the last business day to include the most recently issued instrument for each tenor used in the hedge.

Example: US Aggregate Duration Weight by OAD Bucket for May 2017

OTR Bellwether	OAD Bucket	% of US Agg	Duration of Bucket	Contribution to OAD
2y	<3	22.19%	2.00	0.44
5y	3–7.5	58.13%	4.88	2.84
10y	7.5–15	10.90%	10.40	1.13
30y	15+	8.79%	17.61	1.55
Totals			5.96	5.96

Construction of Short Duration Hedged Position

Step 3: Calculating Zero Duration Hedge portfolio weights

- To replicate the duration exposure from Step 1 with the four OTR US Treasuries selected in Step 2, each security is assigned a weight equal to the contribution–to–duration exposure of each duration bucket of the index.
- For example, the table shows that the <3 year bucket is 22.19% of the US Aggregate Index and the bonds in it have a duration of 2.00 years, for a total contribution to duration of 0.44 (22.19% * 2.00). The US Treasury security used to hedge this duration exposure of the US Aggregate Index is the 2y on–the–run, which has a duration of 1.89 years. To match the contribution to duration of 0.44 years, the weight given to the 2y is 23.53%.
- The remaining buckets are handled in a similar fashion.
- The percentage weights of the US Treasury securities in this example add up to more than 100%. Therefore, a short position (3.33%) in a zero duration instrument (a 1–mo Treasury Bill) is added to the hedging position to bring the weights to 100%.

Example: Security Weights of Hedge Portfolio for May 2017

Index Duration				Security Weight			
OAD Bucket	MV% of US Agg	OAD	OAD Contr	UST Hedge	OAD	Hedge Wght	Cont to OAD (UST)
<3	22.19%	2.00	0.44	2y	1.89	23.53%	0.44
3–7.5	58.13%	4.88	2.84	5y	4.79	59.31%	2.84
7.5–15	10.90%	10.40	1.13	10y	8.82	12.84%	1.13
15+	8.79%	17.61	1.55	30y	20.23	7.65%	1.55
Totals		5.96	5.96			103.33%	5.96

Step 4: Calculating Total Return of the Zero Duration Hedge portfolio

- To calculate the return of the duration hedged position for May 2017, the weights assigned for each US Treasury security are multiplied by the total return of that security for the month.
- Continuing to work through the example for May 2017, the total return for the duration hedged position is as follows:

Example: Hedge Portfolio Returns for May 2017

Tsy Bellwether	Hedge Weight	MTD Total Return	Contribution to Return
US Treasury 2y	23.53%	0.09	0.02
US Treasury 5y	59.31%	0.43	0.26
US Treasury 10y	12.84%	0.87	0.11
US Treasury 30y	7.65%	2.05	0.16
T–Bills	–3.33%	0.06	0.00
		Total	0.55

Calculating US Aggregate Zero Duration Index Returns

- Continuing with the example above, the return of the US Aggregate Zero Duration Index for May 2017 is as follows:

$$US\ Aggregate\ Zero\ Duration_{Total\ Return} = US\ Aggregate_{Total\ Return} - Duration\ Hedge\ Portfolio_{Total\ Return} + Funding_{1-mo\ T-Bills}$$
$$= 0.77\% - 0.55\% + 0.06\% = 0.28\%$$

- The US Aggregate Index return and the duration hedged position return are both funded returns. Therefore, subtracting one from the other would result in an unfunded return. This is why a funding component is added back so that the final return reported for the US Aggregate Zero Duration Index is a funded return.

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Index Tickers	• BAZDTRUU: US Aggregate Zero Duration Hedged Index Total Return USD Unhedged • LBUSTRUU: US Aggregate Index Total Return USD Unhedged

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