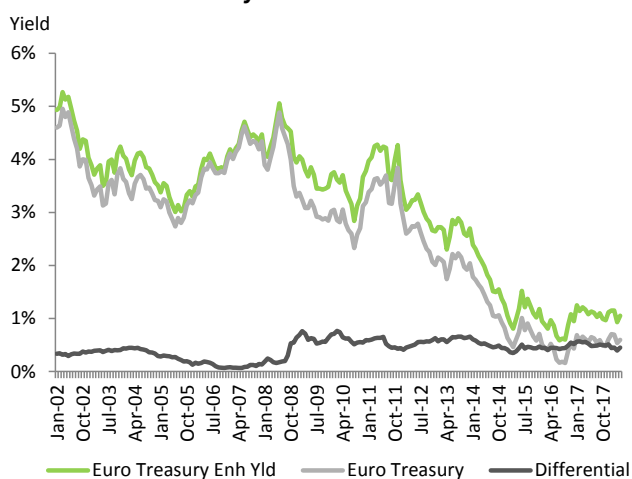# Euro Treasury Enhanced Yield Index

The Bloomberg Barclays Euro Treasury Enhanced Yield Index aims to achieve a higher yield than the Bloomberg Barclays Euro Treasury Bond Index. Yield can typically be increased by shifting exposure along a number of different risk dimensions, including sovereign and interest rate risk (i.e., duration). The index uses a rules-based approach to reweight the sub-components of the Euro Treasury Bond Index such that yield is maximized – subject to certain constraints – while the risk characteristics are broadly preserved. Hence, the Euro Treasury Enhanced Yield Index risk is quantified as tracking error to the market-value weighted Euro Treasury Bond Index. The Euro Treasury Enhanced Yield Index was launched in April 2018, with history backfilled to January 2002.

Historical Average Yields – Euro Treasury Enhanced Yield vs Euro Treasury Bond Index

Euro Treasury Enhanced Yield vs Euro Treasury Bond Index*

	Euro Treasury Enhanced Yield	Euro Tsy Bond
Annualized Total Return Since Inception	5.42%	4.72%
Annualized Volatility Since Inception	4.82%	3.93%
Total Return / Volatility	1.13	1.20
Max Drawdown / Volatility	1.46	1.46
Realized TEV vs. Euro Treasury Bond Index	34bp	
Duration	8.62	7.61
Yield to Worst	1.05	0.60
Additional Yield to Worst vs. Euro Treasury	45bp	
Avg Additional Yield to Worst Since Inception	42bp	

*Note: Data are as of April 2018. Annualized values shown through April 2018.

Methodology & Weight Calculations

Overview	The index uses a rules–based approach to reweight the Euro Treasury Bond Index such that yield is increased, while risk characteristics of the index are preserved. Four steps are used in the calculation of weights/ allocations and returns/statistics: 1. Specification of Buckets 2. Determination of Constraints 3. Determination of Bucket Weights 4. Calculation of Returns and Statistics
Step 1: **Specification of Buckets**	The Euro Treasury Enhanced Yield Index reweights majors sub–components of the Euro Treasury Bond Index (rather than individual securities) using 21 "buckets" (Figure 1). The buckets are chosen to allow for meaningful yield differentials between components based on their primary risk characteristics (country and duration), while retaining adequate size for liquidity and trading purposes. Individual securities within each bucket retain identical market value weights between the Euro Treasury Enhanced Yield and the Euro Treasury Bond Indices.

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Methodology & Weight Calculations

Figure 1
Buckets Comprising the Euro Treasury Enhanced Yield Index

Country	Treasury[1]			
Bucket	Germany Treasury 1–5 Years	France Treasury 1–5 Years	Netherlands Treasury 1–5 Years	Italy Treasury 1–5 Years
	Germany Treasury 5–10 Years	France Treasury 5–10 Years	Netherlands Treasury 5–10 Years	Italy Treasury 5–10 Years
	Germany Treasury 10+ Years	France Treasury 10+ Years	Netherlands Treasury 10+ Years	Italy Treasury 10+ Years
	Belgium Treasury 1–5 Years	Spain Treasury 1–5 Years	Other Countries Treasury 1–5 Years	
	Belgium Treasury 5–10 Years	Spain Treasury 5–10 Years	Other Countries Treasury 5–10 Years	
	Belgium Treasury 10+ Years	Spain Treasury 10+ Years	Other Countries Treasury 10+ Years	

Step 2: **Determination of Constraints**	An optimizer is used to set the weight of each of the 21 buckets in the Euro Treasury Enhanced Yield Index with the objective of maximizing the yield of the index, subject to certain constraints that are designed to control risk, and limit turnover. The optimizer is subject to the following constraints:

- The forecasted monthly tracking error volatility (TEV) of the Euro Treasury Enhanced Yield Index relative to the Euro Treasury Bond Index is less than or equal to 35bp/mo.
- The duration extension of the Euro Treasury Enhanced Yield Index cannot be more than 1 year longer than the duration of the Euro Treasury Bond Index.
- The notional weight of each Euro Treasury Enhanced Yield Index bucket in Figure 1 cannot deviate from its weight in the Euro Treasury Bond Index by more than 10%.
- The country weight of each Euro Treasury Enhanced Yield Index bucket in Figure 1 cannot deviate from their weights in the Euro Treasury Bond Index by more than 20%.
- In order to be eligible for selection on any given monthly weight determination date, a bucket's market value has to be at least EUR10bn, or its weight has to be at least 0.15% of the Euro Treasury Bond Index.
- The portfolio turnover due to monthly reweighting of the buckets must be less than 5% per month.
- In the event that the optimizer cannot find a solution given the above constraints, the monthly turnover limit shall be increased by 1% in a step–wise fashion until a solution is found.

Step 3: **Determination of Bucket Weights**	With all of the constraints simultaneously in place, the optimizer is run to determine the buckets' weights.
Step 4: **Calculation of Returns and Statistics**	Once the weights are derived for each of the 21 buckets, total return is calculated by multiplying the weight of the bucket by its month–to–date return and then summing these values. Several average statistics for the index are also calculated by multiplying the bucket weight by the corresponding statistic of that bucket. Average statistics published include: option–adjusted duration (OAD), yield, price, and option–adjusted spread (OAS).

Yield and Tracking Error Volatility Calculations

Yield Calculation	Yields used in the optimization for determining the bucket weights are based on yield–to–worst.
Determination of TEV	The forecasted tracking error volatility (TEV_i) of each bucket in the Euro Treasury Enhanced Yield Index is a function of the deviation of the bucket's weight (w_i) from the Euro Treasury Bond Index and the forecasted covariance of its returns ($\sum$) with that of all the other buckets' returns. This can be expressed as the following: $TEV_i = (w^t \sum)_i w_i$. The TEV of the Euro Treasury Enhanced Yield Index is the sum of the TEV of each of the 21 buckets. The forecasted covariance matrix of the buckets' returns is constructed from exponentially–weighted moving averages of the volatilities and correlations of the buckets' historical returns. Volatilities and correlations are forecasted separately to allow for slightly different models to be used to appropriately forecast the volatilities of different buckets as well as to reduce measurement error that can be present in joint estimation. For the three Germany Treasury buckets in Figure 1, volatility is forecasted from historical total return volatility. For all of the other buckets in Figure 1, we incorporate a forward–looking risk measure, DTS, to better forecast

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[1] As of May 31, 2018, the following countries were in the EMU: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, and Spain. The "Other Countries Treasury" buckets could include index eligible debt from any of these countries, besides the six countries that already have their own individual buckets.

Yield and Tracking Error Volatility Calculations

volatility. We first decompose the returns of these buckets into a rates component and a spread component. The volatility of the spread component, however, is forecasted using Duration Times Spread (DTS[2]). This measure incorporates current market information (spreads) and, thus, is more responsive to changes in market environments and risk than historical estimates.

Rebalancing Rules

Frequency

The weights of the components in the Euro Treasury Enhanced Yield Index are rebalanced on a monthly basis using data three business days prior to the month–end date (T–3). This allows for three business days advanced notice for any weighting changes among buckets. The new weights will be applied to the Projected (Forward) Universe on a T–3 basis.

Within the components themselves, Bloomberg maintains two universes of securities: the Returns (Backward) and the Projected Universes. The composition of the Returns Universe is rebalanced at each month–end and represents the fixed set of bonds on which index returns are calculated. The Projected Universe is a forward–looking projection that changes daily to reflect issues dropping out of and entering the index but is not used for return calculations. On the last business day of the month (the rebalancing date), the composition of the latest Projected Universe becomes the Returns Universe for the following month.

Index Changes

During the month, indicative changes to securities (credit rating change, sector reclassification, amount outstanding changes, corporate actions, and ticker changes) are reflected daily in the Projected and Returns Universes of the index. These changes may cause bonds to enter or fall out of the Projected Universe of the index on a daily basis, but will affect the composition of the Returns Universe at month–end only, when the index is next rebalanced.

Reinvestment of Cash Flows

Intra–month cash flows from interest and principal payments contribute to monthly index returns but are not reinvested at a short–term reinvestment rate between rebalance dates. At each rebalancing, cash is effectively reinvested into the Returns Universe for the following month so that index results over two or more months reflect monthly compounding.

New Issues

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

Pricing and Related Issues

Sources & Frequency

Bonds are priced on a daily basis by Bloomberg's evaluated pricing service, BVAL.

Pricing Quotes

Bonds are quoted on a dollar basis.

Timing

4:15pm (London time) for all securities. On early market closes, prices are taken as of 12pm (London time), unless otherwise noted.

Bid or Offer Side

Bonds in the index are priced using mid.

Settlement Assumptions

T+1 calendar day settlement basis for all bonds. At month–end, settlement is assumed to be the first calendar day of the following month, even if the last business day is not the last day of the month, to allow for one full month of accrued interest to be calculated.

Verification

Daily price moves for each security are analyzed by the index pricing team to identify outliers. Index users may also challenge price levels, which are then reviewed and updated as needed.

Calendar

The Euro Treasury Enhanced Yield Index follows the UK bond market holiday schedule. For month–end dates, the

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[2] Excess returns due to spread changes can be decomposed into duration times spread change, and further decomposed into DTS times the percentage spread change: $ER \cong -D * \delta S = -D * S * \frac{\delta S}{S} = -DTS * \frac{\delta S}{S}$. The volatility of percentage spread changes tends to be relatively stable; thus, excess return volatility is roughly proportional to DTS. Since DTS includes current spreads (i.e. the latest market information), the DTS-based forecast allows the model to be more responsive to changes in perceived risk.

Pricing and Related Issues

European calendar may also be employed in the event a UK holiday falls on a month–end date but European markets remain open.

Monthly Returns in EUR, 2002-2018 (%)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Eur Tsy Enh Yld YTD	Eur Tsy Bond YTD
2002	0.80	0.15	−1.21	1.25	0.20	1.87	1.76	1.63	2.43	−0.74	0.65	2.43	11.74	9.73
2003	1.38	1.46	−0.38	0.11	2.85	−0.13	−2.05	0.22	1.89	−1.77	−0.47	1.49	4.57	4.06
2004	0.80	1.64	1.17	−1.37	−0.38	0.30	1.08	1.65	0.54	1.15	1.33	0.87	9.09	7.57
2005	1.38	−0.79	0.70	1.79	1.34	1.27	−0.54	1.20	−0.09	−1.35	−0.11	1.11	6.02	5.36
2006	−0.96	0.14	−1.72	−1.05	0.37	−0.40	1.33	1.42	0.66	0.27	0.64	−1.40	−0.77	−0.24
2007	−0.59	1.19	−0.54	−0.16	−1.31	−0.88	1.57	1.02	−0.01	0.86	0.63	−0.44	1.28	1.67
2008	2.61	0.26	−0.61	−0.51	−1.47	−1.44	2.22	1.25	0.01	−0.17	4.07	0.58	6.86	9.28
2009	−1.21	0.63	1.75	1.33	−1.18	1.46	2.39	0.64	0.72	0.17	0.45	−1.22	6.00	4.30
2010	−0.07	1.44	0.88	−2.12	1.35	−1.12	1.54	2.63	−1.22	−0.49	−3.96	−0.32	−1.64	1.14
2011	−0.32	−0.01	−0.61	0.50	0.96	−0.32	−0.45	3.73	0.88	−2.39	−2.81	4.68	3.66	3.36
2012	2.39	1.86	0.02	−0.24	1.43	−0.74	2.04	0.91	1.51	0.94	1.65	0.88	13.35	11.00
2013	−0.25	0.16	0.74	3.28	−1.59	−1.72	0.94	−0.51	0.99	1.80	0.37	−0.52	3.64	2.24
2014	2.68	0.95	1.31	1.32	1.13	1.44	1.24	2.36	0.13	0.21	1.88	1.40	17.24	13.13
2015	2.72	1.12	1.54	−1.73	−2.18	−3.29	3.05	−1.35	1.60	1.51	0.71	−1.31	2.17	1.65
2016	2.16	0.85	0.89	−1.33	1.27	2.79	1.22	−0.25	0.40	−2.49	−2.40	1.01	4.05	3.23
2017	−2.46	0.93	−0.36	0.80	0.99	−0.21	0.40	0.77	−0.45	1.51	0.47	−1.15	1.19	0.17
2018	0.19	0.18	2.21	−0.39	−3.19	–	–	–	–	–	–	–	−1.08	−0.19

Accessing Index Data

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- Index methodology and factsheets
- Current performance numbers for select indices

Accessing Index Data

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- Automatic delivery of files via email or SFTP following the completion of the index production process after market close
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- Index data is also available via authorized redistributors

Bloomberg Total Return Index Value Tickers: Euro Treasury Enhanced Yield and Related Indices

Ticker	Index	Ticker	Index
I33855EU	Euro Treasury Enhanced Yield Index	BUASTRUU	US Short Aggregate Enhanced Yield Index
LEATTREU	Euro Treasury Bond Index	BDGLTRDU	Canadian Aggregate Enhanced Yield Index
BAYDTRUU	US Aggregate Enhanced Yield Index	BDGSTRDU	Canadian Short Aggregate Enhanced Yield Index

Total Return Index Values are available in other currencies and on a hedged basis. Attributes such as yield and duration are also available. Please refer to Accessing Bloomberg Barclays Index Data Using Bloomberg Tickers for a full list of tickers and attributes that are available.

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