

## J.P. Morgan ESG EMU Government Bond IG 1-3 Year Index

### Index Methodology and Profile

#### Highlights

The J.P. Morgan ESG EMU Government Bond IG 1-3 Year Index aims to track the performance of eligible fixed-rate, euro-denominated domestic government debt issued by Eurozone countries with minimum €80 billion debt outstanding. Securities or issuers must be rated investment grade and mature in the next 1 to 3 years to be eligible. The index currently includes government bonds issued by Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal and Spain. The index applies an Environmental, Social and Governance (ESG) scoring and screening methodology to tilt toward issuers ranked higher on ESG criteria, and to underweight or remove issuers that rank lower. The returns and statistics are available since January 2015.

#### Index Criteria

<b>Minimum Issue Size</b>	€1 billion
<b>Minimum Country Size</b>	€80 billion
<b>Instrument Type</b>	<b>Includes:</b> Fixed-rate and zero-coupon bonds <b>Excludes:</b> Floating-rate bonds, capitalization/amortizing bonds, bonds with callable, puttable, or convertible features
<b>Remaining Maturity</b>	> 1 year and < 3 years
<b>Currency Denomination</b>	Euro denominated
<b>Credit Quality Classification</b>	Securities or issuers must be rated investment grade using the middle rating of three (Moody's, S&P, Fitch) to be eligible

#### Index Characteristics and Methodology

<b>Pricing</b>	Mid prices are taken from a third party pricing source, PricingDirect
<b>Aggregate Return</b>	Weighted average of bond returns using mid prices
<b>Rebalancing</b>	Rebalances on the last weekday of the month. If FX rates from WM Reuters are unavailable on the last weekday of the month (e.g. Good Friday), indices are rebalanced on the previous business day.
<b>Coupon Reinvestment</b>	Immediately reinvested into the respective local market
<b>FX Rates</b>	All FX rates used for hedged/unhedged returns are as of 4pm London time provided by WM/Reuters
<b>Hedging Strategy</b>	Assume a 1-month currency forward position that begins on rebalance day and ends on next rebalance day
<b>Weighting</b>	Market capitalization based weighting, subject to adjustments based on JESG scores.
<b>Price Timing</b>	As of the respective local market close
<b>Settlement Convention</b>	Respective local market country convention
<b>Holiday Calendar</b>	Index levels are published on all weekdays. Individual instrument analytics follow respective local market calendar

## JESG Overlay Criteria

<b>ESG providers &amp; Green Bond certification authorities</b>	Sustainalytics RepRisk Climate Bonds Initiative
<b>JESG Scoring methodology</b>	JESG issuer scores are a 0-100 percentile rank calculated based on normalized raw ESG scores from third-party research providers Sustainalytics and RepRisk. An issuer's finalized JESG score incorporates a 3-month rolling average. See <i>ESG Methodology</i> for more details.
<b>JESG Integration methodology</b>	The JESG scores are divided into 10 bands that are used to scale each issue's baseline index market value, with the band rebalance occurring with a one-month lag. Issuers in Band 9 or below will be excluded from the index. See <i>ESG Methodology</i> for more details.
<b>Green bond treatment</b>	If an instrument is categorized as a "green bond" by the Climate Bonds Initiative, the security will receive a one-band upgrade. Green bonds by issuers already in Band 1 will not receive any further upgrades. See <i>ESG Methodology</i> for more details.

## Defining the universe of eligible countries

The J.P. Morgan ESG EMU Government Bond IG 1-3 Year Index includes liquid, bullet, fixed-rate local debt issued by Eurozone countries with minimum €80 billion debt outstanding. The index currently includes government bonds issued by Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Spain. This index includes investment grade rated securities only.

## Instrument type

Only fixed-rate and zero coupon instruments are included. Floating-rate and capitalization, amortizing bonds or bonds with callable, puttable or convertible features are not part of the indices.

## Liquidity

A key feature that distinguishes our indices from other index products is the strict enforcement of liquidity criteria in the selection of instruments. Yet, while the notion of liquidity differs from market to market, J.P. Morgan indices include only securities, subject to several considerations including but not limited to:

- **Pricing:** Bonds must trade with enough frequency to prevent stale price quotations
- **Availability:** Bonds must be regularly traded in size at acceptable bid-offer spreads and readily redeemable for cash. A reasonable two-way market must exist for the instrument to be included in the index portfolio.
- **Replication costs:** Investors should be able to replicate the index without incurring excessive transaction costs.

## ESG Methodology

The J.P. Morgan ESG EMU Government Bond IG 1-3 Year Index applies J.P. Morgan ESG (JESG) issuer scores to adjust the weights of index constituents from the respective baseline indices. JESG issuer scores are a 0-100 percentile rank calculated based on normalized raw ESG scores from third-party research providers Sustainalytics and RepRisk. An issuer's finalized JESG score incorporates a 3-month rolling average. The JESG scores are divided into ten bands that are used to scale each issue's baseline index market value, with the band rebalance occurring with a one-month lag.

Issuers in Band 9 or below will be excluded from the index.

If an instrument is categorized as a "green bond" by the Climate Bonds Initiative, the security will receive a one-band upgrade. Green bonds by issuers already in Band 1 will not receive any further upgrades

JESG Score Bands	Scalar
Band 1: 90 < Score <= 100	1.00
Band 2: 80 < Score <= 90	0.90
Band 3: 70 < Score <= 80	0.80
Band 4: 60 < Score <= 70	0.70
Band 5: 50 < Score <= 60	0.60
Band 6: 40 < Score <= 50	0.50
Band 7: 30 < Score <= 40	0.40
Band 8: 20 < Score <= 30	0.30
Band 9: 10 < Score <= 20	0.00
Band 10: Score <= 10	0.00

## Bond calculations

**Calculations are according to market convention:** all calculations including accrued interest, duration, yield, etc., are done according to local market convention using parameters (ex-dividend rules, settlement conventions, etc.) relevant to each specific bond. All calculations are gross of tax and ignore transactions costs.

**Bond pricing:** Pricing for our underlying instruments is provided on a daily basis from Pricing Direct, a third party valuation vendor. In the event the primary source for pricing is unable to provide a quote, the Index Group reserves the right to consider the use of an appropriate alternative source for index inputs. Please see <http://www.pricing-direct.com> for further details.

**Ex-dividend rules:** ex-dividend rules, when applicable, are incorporated into accrued interest calculations, as appropriate, by country. Ex-dividend rules define the last day a bondholder must own a bond in order to receive that bond's next coupon payment, otherwise known as the ex-dividend date.

- During the period between the ex-dividend date and the coupon date, the bond trades "ex-dividend"
- An investor who purchases a bond for settlement between the ex-dividend date and coupon date will not receive that bond's next coupon payment
- During this period, according to market convention, accrued interest becomes negative resulting in a total price at a discount to the clean price and in effect, compensating the investor for the time the bond will be held without interest
- On coupon date, interest will start to accrue for the subsequent coupon payment

**Returns and return indices:** return indices on individual bonds are calculated on a daily basis and measure bond performance over time:

- Principal return index is based on changes in clean price
- Interest return index is based on changes in accrued interest
- Total return index is based on changes in both clean price and accrued interest

At the individual bond level focus is on total return. The segregation of interest and principal return becomes relevant at the portfolio level.

Total return indices for individual bonds are calculated as shown below:

$$Index_t = Index_{t-1} \times Total Return_t$$

$Index_t$                       Index value on day t

**Reinvestment of coupons:** the J.P. Morgan indices are always fully invested. All coupons received are immediately reinvested back into the local market.

**Interest accruals:** interest is accrued starting from the bond's dated date up to the first coupon value date. Accrued interest is calculated according to market convention, on a settlement day basis. Interest is accrued by value or settlement date. Weekly, seven days of interest are accrued, including the weekend.

In markets with ex-dividend rules, if a bond is purchased after the ex-dividend date the purchaser will not receive the bond's next coupon. In order to compensate the buyer of the bond, the price paid for the bond must be less than the clean market price, thus, accrued interest will be negative.

**Coupon value date:** The coupon value date is the trade date associated with settlement on coupon date (the day the coupon is paid). Thus, the coupon value date is the last trade date which an investor may purchase a bond and have that bond settle prior to payment of the subsequent coupon. On coupon value date, accrued interest resets to zero, and accruals begin towards the next coupon.

**Yield:** effective annual rate of return, expressed as a percentage. For the J.P. Morgan ESG EMU Government Bond IG 1-3 Year Index body of data, yields are all calculated as yield- to-maturity, which is the discount rate that the present value of future payments equals the price of the security.

## Index calculations

The base for the index level is: January 1, 2015 = 100.

The index rebalances on the last weekday of each month. Bonds comprising the indices are required to have more than 6 months remaining to maturity on rebalance day for inclusion in the index.

If FX rates from WM Reuters are unavailable on the last weekday of the month (e.g. Good Friday), indices are rebalanced on the previous business day.

The index is weighted by the component countries' aggregate normalized market capitalization (dirty price times par outstanding). These weights are then scaled based on the issuer's JESG score, as described above. The weights change monthly on each rebalance day, and those weights remain active for the remainder of that month.

Accrued interest is assigned to the bonds in the index according to the specific convention of each country's market, and this interest is settlement adjusted.

Daily indicative pricing for each security and FX rate is closely scrutinized and are reconciled using market movements and other pricing sources as guidance. As necessary, an established alternate source will be used to maintain the integrity of daily index calculations. On any given calculation day, if the primary source is unable to provide a quote, the Index Group reserves the right to consider the use of an appropriate alternate source for index inputs, such as pricing and FX. If a permanent switch for the primary third party pricing source is necessary, clients will be notified in advance prior to any official switch.

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