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J.P. Morgan China Custom Liquid ESG Capped Index

Index Methodology and Profile

Highlights

The J.P. Morgan China Custom Liquid ESG Capped Index aims to track the performance of eligible fixed-rate, bullet, CNY-denominated government and policy bank bonds. Securities must be listed on the China interbank market to be eligible. The index applies an ESG scoring and screening methodology to tilt toward issuers ranked higher on ESG criteria, and to underweight issuers that rank lower. The index exposure to each of the three policy bank issuers is capped at 19% with the excess market value redistributed across the index on a pro-rata basis. The index is based on the composition and established methodology of the J.P. Morgan China Liquid Bond Index.

The returns and statistics are available since January 2015.

Index Criteria

Minimum Issue Size	CNY 50billion
Instrument Type	**Includes:** Liquid, fixed-rate coupon bonds listed on the interbank market. Only senior bonds are eligible.
	Excludes: Floating-rate bonds, amortizing bonds, capital securities, convertibles, inflation-linked, retail saving bonds and subordinated bonds.
Remaining Maturity	**Entry:** • Minimum 2.5 years remaining to maturity at issuance to be eligible • Issued with a benchmark tenor i.e. 3y, 5y, 7y, or 10y[1].
	Exit: securities with less than 13 months remaining to maturity will be excluded from the index
Currency Denomination	CNY
Issuers	**Government bonds**: the Ministry of Finance
	Policy bank bonds: China Development Bank, Agricultural Development Bank of China, and Export-Import Bank of China
Exchange	Securities must be listed on the China interbank market to be eligible
Bloomberg Ticker	GBIECLEC Index

JESG Overlay Criteria

[1] 1-year and 2-year are also benchmark tenors for China Government Bonds, however these securities are not eligible due to the minimum 2.5 years remaining to maturity rule.

ESG providers	• Sustainalytics • RepRisk
JESG Scoring methodology	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 *Appendix: ESG Methodology* for more details.
JESG Integration methodology	The JESG scores of eligible issuers are ranked, and their ranks used to scale each issuer's baseline index market value. See *Appendix: ESG Methodology* for more details.

Source: JPMorgan Chase & Co.

Index Characteristics and Methodology

Pricing	Mid prices are taken from a third party pricing source, PricingDirect
Aggregate Return	Weighted average of bond returns using mid side prices
Rebalancing	Rebalances on the last business day of the month.
Coupon Reinvestment	Immediately reinvested back into the index
FX Rates	All FX rates used for hedged/unhedged returns are as of 4pm London time provided by WM/Reuters
Hedging Strategy	Assume a 1-month currency forward position that begins on rebalance day and ends on next rebalance day
Settlement Convention	T+1 settlement convention
Price Timing	3pm local China time for all securities
Holiday Calendar	The index follows the China bond market holiday calendar
Policy Bank Issuer 20% Cap Methodology	The exposure of policy bank issuers in the index is capped at 19% each. Issuers that exceed 19% of the uncapped market value based index are limited to 19% with the excess market value redistributed across the board on a pro rata basis. The exposure of China government bonds in the index is not subject to any cap.

Defining the Index Universe

The J.P. Morgan China Custom Liquid ESG Capped Index is a subset of the J.P. Morgan China Aggregate Index which is an index tracking the performance of the most liquid portion of fixed-rate, CNY-denominated government and policy bank bonds listed on the China interbank market.

Instrument Type

The China Aggregate index includes CNY-denominated, fixed-rate coupon China government bonds (CGBs) issued by the Ministry of Finance, and financial policy bonds (FPBs) issued by the three policy banks. Securities must be listed on the China interbank market to be eligible for index inclusion.

Floating-rate, inflation linked, and capitalizing/amortizing bonds are not eligible for index inclusion. Additionally, retail and savings bonds issued by the Ministry of Finance are not eligible for index inclusion.

Minimum Issue Size

Securities must have a minimum size of CNY 50 billion to be eligible.

Remaining Maturity

Entry:

- Minimum 2.5 years remaining to maturity at issuance to be eligible
- Issued with a benchmark tenor i.e. 3y, 5y, 7y, or 10y.

- 1-year and 2-year are also benchmark tenors for China Government Bonds, however these securities are not eligible due to the minimum 2.5 years remaining to maturity rule.

Exit: securities with less than 13 months remaining to maturity will be excluded from the index.

Seniority

Only senior securities are eligible for the index inclusion. Subordinated bonds are excluded from the index.

Index Rebalancing

Rebalancing takes place monthly on the last business of each month, according to the local China bond market calendar. On rebalance day, eligible new bonds must be settled on or before month-end to enter the index at the close-of-business, and bonds which fail to comply with the index criteria will be removed. Any additional taps or buybacks that occur during the month will also be reflected at this time.

Liquidity

The China Liquid Index only includes securities that satisfy liquidity considerations including but not limited to:

- *Pricing:* bonds must trade with enough frequency to prevent stale price quotations. Regular pricing must be available through the primary third-party pricing source.
- *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 index applies J.P. Morgan ESG (JESG) issuer scores to adjust the market value of index constituents from the baseline index. 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 of eligible issuers are ranked (with 1 being the issuer with the highest JESG score, and 4 being the issuer with the lowest JESG score), and their ranks used to scale each issuer’s baseline index market value, subject to the 19% cap of China policy bank issuers.

JESG Score Rank	Scalar
1	1.00
2	0.80
3	0.60
4	0.40

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.

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 China Custom Liquid ESG Capped securities, 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 13 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 (i.e. Good Friday), indices are rebalanced on the previous business day.

The index is weighted by the component securities' market capitalization (dirty price times par outstanding). The weights change monthly on each rebalance day, and those weights remain active for the remainder of that month.

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.

Appendix A: Bond Total Return Methodology

A. Standard Case

The total return for an individual bond between days (t-1) and (t) is calculated as shown below:

$$Total\ Return_t = \left(\frac{P_t + A_{v(t)}}{P_{t-1} + A_{v(t-1)}}\right) - 1$$

$Total\ Return_t$	Total return value on day t, incorporating both principal and interest
P_t	Local market closing clean pricing of a bond on day t.
$A_{v(t)}$	Accrued interest for a bond on day t; it is calculated up to, but excluding the value date v(t)
t	Current market day
$t-1$	Previous market day determined by the market's holiday calendar

Accrued interest for a bond is based on the following formula:

$$A_{v(t)} = \left(\frac{C_{v(t)} \times d_{v(t)}}{d_y}\right)$$

$C_{v(t)}$	Next coupon to be paid on a bond after the value date v(t)
$d_{v(t)}$	Number of days of accrued interest used to calculate : it can be zero or negative
d_y	Number of days in a year according to a bond's day count convention

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

The base for the index level is December 31st, 2014 = 100.

B. On Coupon Value Date

On coupon value date, the accrued interest for specific bond is reset to zero. On that date, the coupon value will be added into calculation of the total return and the associated index.

$$Total\ Return_t = \left(\frac{P_t + C_{v(t)}}{P_{t-1} + A_{v(t-1)}}\right) - 1 \qquad Index_t = Index_{t-1} \times \left(\frac{P_t + C_{v(t)}}{P_{t-1} + A_{v(t-1)}}\right)$$

Appendix B: Bond Yield Methodology

Calculation of yield to maturity in the GBI indices is a two-step process. First, the following equation is solved iteratively for the discount rate (r):

$$P + A = \sum_{n}^{i=1} \left(\frac{C_i}{b}\right) \times [1 - \sum f_k] \times r^{t_i} + \sum f_i R_i \times r^{t_i} + \ f_F \times (R_F + A_F) \times r^{t_F}$$

P	Clean Price
A	Accrued interest through the value date
r	Discount rate
d_t	Number of days from settlement to coupon payment i (final payment if i = F)
d_y	Number of days in the year
t_i	Time to the ith cash flow expressed in coupon periods
N	Number of coupon payments left
F	Indicator for final redemption if F>N (else, ignore this term)
C_i	Annual coupon rate in the ith period (percentage of face value)
f_i	Fraction of current amount outstanding redeemed on the ith coupon payment date (or on the final redemption date if i = F)
R_i	Redemption price on the ith coupon payment date (or on the final payment date if i = F)
A_F	Additional accrued interest from the final coupon date N to the final redemption date F

Once the discount factor is obtained, the true yield is calculated as follows:

$$Yield = 100 + \left[\frac{1^{\left(\frac{1}{b}\right)}}{r} - 1\right] \times b$$

b	Basis of yield quote (b=1= annual, b=2= semi-annual, etc.)

Appendix C: Total Return Calculation Methodology

Total return for a portfolio of bonds between days (t-1) and (t) is calculated as shown below.

$$Total\ Return_t = \sum_{n=1}^{bonds} \left[\left(\left(\frac{P_{n_t} + A_{n_{v(t)}} \langle if\ A_{v(t)} < A_{v(t-1)} \rangle + C_{v(t)}}{P_{n(t-1)} + A_{n_{v(t-1)}}}\right) - 1\right) * \frac{ParOuts_{n_t}}{ParOuts_{n_{t-1}}}\right]$$

The total return index is calculated as shown below:

$$T.R.Index\ _t = T.R.Index_{t-1} * Total\ Return_t$$

n	Indicates a given bond within the market portfolio. “n” moves from 1 to “bonds,” with “bonds” being the last bond in the portfolio.
t	Current market day
t-1	Previous market day determined by the market’s holiday calendar
P_{n_t}	Local market closing clean price of a bond n on day t
$A_{n_{v(t)}}$	Accrued interest for a bond n on day t; it is calculated up to, but excluding the value date v(t)
$C_{v(t)}$	Next coupon to be paid on a bond after the value date v(t)
$ParOuts_t$	Par value outstanding in local currency. This value remains constant through a given month. This value is rebalanced for new issues, retiring issues and auctions as part of the

month end process.

$\langle if\ A_{v(t)} < A_{v(t-1)} \rangle$	Equals 1 if the boolean expression is true; otherwise, it equals zero. This boolean will be true when t is equal to coupon value date and accrued interest is reset to zero.
$Total\ Return_t$	Total return value on day t, incorporating both principal and interest
$Index_t$	Index value on day t

Global Index Research

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