BlackRock

BlackRock Dynamic Factor Index Series Methodology

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PRODUCED AND MAINTAINED BY:
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Introduction

The BlackRock Dynamic Factor Index and the BlackRock Dynamic Factor VC3 Index ER (the "Series") measures the extent to which the performance of a diversified multi-asset weighted basket of up to eight exchange-traded funds (five Equity ETFs and three Fixed Income ETFs) and a Cash Constituent outperforms the sum of the Return on the notional Interest Rate plus an Index Fee of 0.65% per annum, in each case accruing daily on an Act/360 basis, subject to a given Target Volatility level. A Volatility Control overlay is used to adjust into or out of risky assets with the objective of stabilizing the Index's Return.

Index Constituents are comprised of iShares® ETFs which may provide liquid, transparent and cost-effective building blocks that can be used in working toward the target objectives.

The Index includes the following features:

- The equity basket seeks to provide exposure to three broad factors ("Economic Regime," "Value" and "Momentum") by monthly rebalancing its allocation to the five Equity ETFs based on certain relationships between the Equity ETFs and the three common factors, as described in greater detail herein. The five Equity ETFs are: the iShares Edge MSCI USA Momentum Factor ETF; the iShares Edge MSCI USA Size Factor ETF; the iShares Edge MSCI USA Quality Factor ETF; the iShares Edge MSCI USA Value Factor ETF; and the iShares Edge MSCI Min Vol USA ETF.
- The fixed income basket rebalances among the three Fixed Income ETFs, which are comprised of Treasury bonds with short-term (1-3 years), medium-term (7-10 years) and long-term (20+ years) tenors, on each Business Day based on a Rates Momentum Signal, with increased allocations to the long-term Fixed Income ETFs when medium-term rates exceed the one-year average, and the short-term Fixed Income ETF's, when medium-term rates fall short of their one year average. The three Fixed Income ETFs are: the iShares 1-3 Year Treasury Bond ETF; the iShares 7-10 Year Treasury Bond ETF; and the iShares 20+ Year Treasury Bond ETF.
- The allocations to the Equity ETF basket, the three Fixed Income ETFs and the Cash Constituent are determined on each Business Day according to the following Volatility Control procedures:
    - First, to the extent that the volatility of the Equity ETF basket (based on two equally weighted realized volatilities with "Half-Lives" of 10 days and 30 days) exceeds the Target Volatility, the Fixed Income ETF basket is assigned a positive weight, and the weight of the Equity ETF basket is reduced by the amount needed to achieve the Target Volatility, in each case based on the procedures described in greater detail below (including that the total weight of the equity ETF basket and fixed income ETF basket sum to one).
    - Second, to the extent that the historically realized volatility of a four-asset portfolio consisting of the Equity ETF basket and the three Fixed Income ETFs (based on two equally weighted realized volatilities with "Half-Lives" of 10 days and 30 days, but taking into account the risk/volatility of the Fixed Income ETFs and the correlations among the four assets) with the relative weights described in the prior step exceeds the Target Volatility, the Index will make an allocation to the Cash Constituent, and the weights of the Equity ETF basket and Fixed Income ETFs will be notably reduced. The Cash Constituent reflects the notional Returns accruing to a hypothetical investor from an investment in a notional money market account that accrues interest as described in greater detail herein.

For additional Governance and Methodology details including usage and licensing opportunities for the BlackRock Indices, please contact BLKIndexServices@blackrock.com. Additionally, the Index Services Governance Committee ("**ISGCo**") has been established by BlackRock, Inc. to provide independent oversight of the Index Administrator in accordance with the International Organization of Securities Commissions Principles on Financial Indexes ("**IOSCO Principles**").

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Definitions

Act/360 – means the actual number of days in the relevant accrual period divided by 360.

Alpha – Represents the Index methodology's estimation of Return for a given factor-based investment strategy in excess of market return.

Backfill Convention – With respect to any timeseries whereby a minimum of N periods required is specified, the first N-1 values of such timeseries shall be equal to the N-th value of such timeseries.

Business Day – Refers to a day when the [New York Stock Exchange] is open for regular trading.

Cash Constituent – Is intended to express the notional Returns accruing to a hypothetical investor from an investment in a notional money market account denominated in U.S. dollars that accrues interest at a rate determined by reference to the Interest Rate, according to the Act/360-day count convention.

Cash Constituent Daily Weight – The weight in the Final Index Daily Weights that corresponds to the Cash Constituent.

Cash Flow to Price Ratio ("CFO2P") – The cashflow to price ratio for each Equity ETF is computed according to the below:

(a) For each equity holding of such Equity ETF, excluding companies from the Financials sector, retrieve the historical "cash flow from operations", field 04860 "NET CASH FLOW - OPERATING ACTIVITIES"

(b) Derive the last 12-months of "cash flow from operations" for each equity holding and divide by its latest Company Market Capitalization

(c) Compute the weight of each equity holding in the ETF based on the ratio of the market value of each relative to the sum of the market values of all the ETF's equity holdings

(d) Calculate the market-value weighted sum of the result of (b), using the weights from (c)

This calculation results in a monthly time series of the cash flow from operations to price ratio over the historical data set, starting from the Initial Data Start Date.

Cash Flow to Price Signal – Used for each Equity ETF and derived based on its Cash Flow to Price Ratio.

Chicago Fed National Activity Index ("CFNAI") – The Federal Reserve Bank of Chicago's data published on the website: https://www.chicagofed.org/research/data/cfnai/historical-data. The CFNAI is a monthly index published by the Federal Reserve Bank of Chicago to provide a "real-time" statistical measure of coincident economic activity in the United States. The CFNAI is a weighted average of 85 monthly indicators of national economic activity drawn from four broad categories of data: (1) production and income (23 series), (2) employment, unemployment, and hours (24 series), (3) personal consumption and housing (15 series), and (4) sales, orders and inventories (23 series), in each case adjusted for inflation. Based on the assumption that economic activity tends toward a trend growth rate over time, the CFNAI was designed to have an average value of zero, which represents an economy growing at trend, while a positive value is intended to represent above-trend growth and a negative value is intended to represent below-trend growth. Scale is in standard deviations from trend growth. The CFNAI is released according to the Federal Reserve Bank of Chicago's schedule, usually reporting data for the previous month toward the end of each calendar month.

Characteristic Signal Weights – Zero sum weights assigned to the Equity ETFs for a given Signal. They are obtained using the Mean-Variance Optimization described herein.

Closing Price with respect to an Index Constituent means the closing price for such Index Constituent as reported on its Exchange, or its successor.

Cross-Sectional Score ("CSS") – The Cross-Sectional Score $CSS(X)$ of a vector X is a vector of the same dimension and where each element is calculated as:

$$CSS(X)_i = \frac{X_i - \mu}{\sigma}$$

$$\mu = \frac{1}{N}\sum_{i=1}^{i=N} X_i$$

$$\sigma = \sqrt{\frac{\sum_{i=1}^{i=N}(X_i - \mu)^2}{N-1}}$$

Where:

X_i: is the i-th element of vector X

N: is the number of elements in vector X

The Cross-Sectional Score is calculated on a cross-section of Equity ETFs on a given date.

Economic Regime Signal – Used for each Equity ETF and derived based on the current stage of the economic cycle.

Equity Basket Rebalancing Day – Any Business Day in the Equity Basket Rebalancing Period.

Equity Basket Rebalancing Period – The period from, and including, the 3rd Business Day following each Equity Basket Target Weight Determination Day (such a day the "**Initial Equity Basket Rebalancing Period Day**"), to, and including, the 12th Business Day following the Equity Basket Target Weight Determination Day, and where for each of these 10 Business Days no Market Disruption Event occurs or is continuing.

Equity Basket Target Weights – Target weights assigned to each of the Equity ETFs prior to the application of the Volatility Control and computed on the Equity Basket Target Weight Determination Day. These weights change once a month, are rebalanced over the Equity Basket Rebalancing Period and sum to 1.

Equity Basket Target Weight Determination Day – The last Business Day of each calendar month or if a Market Disruption Event occurs is continuing on such day the immediately following Business Day on which no Market Disruption Event occurs or is continuing.

Equity Basket Weights – Weights assigned to each of the Equity ETFs prior to the application of the Volatility Control. They sum to 1. Equity Basket Weights only change during the Equity Basket Rebalancing Period.

Equity Combined Characteristic Signal Weights – Weights assigned to each of the Equity ETFs obtained by summing the Scaled Characteristic Signal Weights from each Signal and adding a static weight of 20% to each Equity ETF. They sum to 1.

Equity ETF Monthly Covariance Matrix – 5-by-5 matrix where the element on the i-th row and j-th column is the 36-month Half-Life Exponentially Weighted Moving Covariance of the i-th and j-th Equity ETF Monthly Return timeseries, with at least 12 periods required according to the Backfill Convention.

Equity ETF Daily Return – The daily Return R_t of an Equity ETF is defined as:

$$R_t = \frac{L_t - L_{t-1} + D_t}{L_{t-1}}$$

Where:

L_t is the ETF Closing Price with respect to Business Day t

D_t is the ETF Gross cash dividend with respect to Business Day t

Equity ETF Monthly Return – The monthly Return R_t of an Equity ETF is defined as:

$$R_t = \prod_{i=0}^{k-1}\left(1 + R_{t-i}^{Daily}\right) - 1$$

Where:

R_t^{Daily} is the Equity ETF Daily Return with respect to Business Day t

k is the total number of Business Days in the relevant month

R_t is timestamped on the last Business Day of each month, starting on the Initial Data Start Date and ending on the Equity Basket Target Weight Determination Day if this day falls on the last Business Day of the month, or on the last Business Day of the month preceding the Equity Basket Target Weight Determination Day otherwise. The Equity ETF Monthly Return is used in the determination of the Equity ETF Volatility.

Equity ETF Volatility – The Equity ETF Volatility is used in the calculations of the Alphas associated with the Equity Signals. It is defined as the latest available value from the 36-month Half-Life Exponentially Weighted Moving Volatility timeseries of the timeseries of Equity ETF monthly Returns, with at least 12 periods required, according to the Backfill Convention.

Equity Signals – Refers to the Economic Regime Signal, the Momentum Signal, and the Value Signals.

Exchange – Means the primary exchange on which shares of an ETF are listed.

Exchange Disruption – Means any event that disrupts or impairs (as determined by the Index Administrator in consultation with ISGCo or Index Subscriber) the ability of market participants in general to effect transactions in, or obtain market values for, the shares of the ETF (or ETF constituent holdings) on the relevant Exchange.

Excess Return – Total Return minus the sum of (i) the notional Interest Rate and (ii) the Index Fee, in each case compounded on a daily basis.

Exponentially Weighted Moving Average ("EWMA") – Backward-looking average value for each point of a time series, where a Half-Life is applied to weight the more recent values more heavily and the older values less so. The Exponentially Weighted Moving Average of timeseries X with a Half-Life HL is a timeseries of same dimension, denoted EWMA (X) and is calculated as:

$$EWMA^{HL}(X)_t = \frac{\sum_{i=1}^{t} \beta_{t,i}\, X_i}{\sum_{i=1}^{t} \beta_{t,i}}$$

$$\beta_{t,i} = \left(\frac{1}{2}\right)^{\frac{t-i}{HL}}$$

Where:

t: is the t-th position within timeseries EWMA(X)

X_i : is the i-th element of timeseries X

HL : is the specified Half-Life used in number of Business Days. The Index uses 22 days per month and 252 days per year when the Half-Life is specified in months or years.

In instances where it is specified that "at least N periods required according to the Backfill Convention", the first N-1 elements of $EWMA^{HL}(X)$ are then set to $EWMA^{HL}(X)_N$.

Exponentially Weighted Moving Covariance Matrix – i-by-j matrix where the element on the i-th row and j-th column is the Exponentially Weighted Moving Covariance of the i-th and j-th arguments with the specified Half-Life.

Exponentially Weighted Moving Covariance ("EWMC") – Backward-looking covariance value for each point of a time series, where a Half-Life is applied to weight the more recent values more heavily and the older values

less so. The Exponentially Weighted Moving Covariance of timeseries X and Y with a Half-Life HL is a timeseries of same dimension, denoted $EWMC^{HL}(X,Y)$ and is calculated as:

$$For\ t > 1 \qquad EWMC^{HL}(X,Y)_t = \frac{EWMA^{HL}(XY)_t - EWMA^{HL}(X)_t \times EWMA^{HL}(Y)_t}{D} \times N$$

$$EWMC^{HL}(X,Y)_1 = EWMC^{HL}(X,Y)_2$$

With:

$$D = 1 - \frac{v_2}{v_1^2}$$

$$and \quad \beta_{t,i} = \left(\frac{1}{2}\right)^{\frac{t-i}{HL}} \qquad v_2 = \sum_{i=1}^{t} \beta_{t,i}^2 \qquad v_1 = \sum_{i=1}^{t} \beta_{t,i}$$

Where:

t: is the t-th position within timeseries $EWMC^{HL}(X,Y)$

N: is the number of observations per year associated with X and Y (i.e. 12 for monthly Return observations and 252 for daily Return observations), or 1 when a Timeseries Score or Volatility Scaled Timeseries is being calculated

HL: is the Half-Life

Exponentially Weighted Moving Volatility ("EWMV") – Backward-looking standard deviation value for each point of a time series, where a Half-Life is applied to weight the more recent values more heavily and the older values less so. The Exponentially Weighted Moving Volatility of timeseries X, $EWMV^{HL}(X)$ with a Half-Life HL is a timeseries of same dimension, denoted $EWMV^{HL}(X)$, calculated as:

$$EWMV^{HL}(X) = \sqrt{EWMC^{HL}(X,X)}$$

Final Index Daily Weights – Include the Index Equity ETFs Daily Weights, the Index Fixed Income ETFs Daily Weights and the Cash Constituent Daily Weight. Together, they sum to 1.

Fixed Income Basket Target Weights – Target weights assigned to each of the Fixed Income ETFs prior to the application of the Volatility Control. These weights are calculated daily from the Rates Momentum Signal. They are either 0 or 0.5, and they sum to 1.

Fixed Income Basket Weights – Weights assigned to each of the Fixed Income ETFs prior to the application of the Volatility Control.

Force Majeure Event – Occurs when there has been a systems failure resulting from a natural or man-made disaster, act of God, armed conflict, act of terrorism, riot or labor disruption or any similar intervening circumstance that is beyond the reasonable control of the Index Administrator and is likely to have a material effect on the Index Administrator's ability to perform its role in respect to calculation of the Index, all as determined by the Index Administrator.

Forward Earnings Yield ("FEY") - The Forward Earning Yield for each Equity ETF is computed according to the below:

(a) For each equity holding of such Equity ETF, retrieve the mean annual IBES earnings per share estimate for forward fiscal years 1 and 2

(b) Calculate the 1-year forward estimate $EPS1Y$

$$EPS1Y = \frac{M \times EPS_1 + (12 - M) \times EPS_2}{12}$$

EPS_1 is the Earnings per Share estimate for the company's current fiscal year

EPS_2 is the Earnings per Share estimate for the following fiscal year

M is the number of months remaining in the company's current fiscal year

The current fiscal year is the most recent fiscal year for which the company has not yet published its results

(c) Next, compute the sum of each Equity holding EPS1Y calculated in (b) multiplied by the number of shares of that company held by the ETF

(d) FEY of the ETF is calculated as the ratio of the result of (c) relative to the sum of the market value of all the ETF's equity holdings

Forward Earnings Yield Signal – Used for each Equity ETF and derived based on its Forward Earnings Yield.

Half-Life – The number of periods required for the weight used in the exponentially weighted moving calculations to decrease by half.

Index Administrator – Means BlackRock Index Services, LLC being the entity responsible for the production and maintenance of this Methodology and the administration and calculation of the Index.

Index Constituents – Means each of the ETFs and the Cash Constituent.

Index Dislocation – Will be identified by the Index Subscriber and typically occurs when a market participant, as a result of a market-wide condition relating to the Index or any Index Constituent (i) is unable, after using commercially reasonable efforts, to acquire, establish, re-establish, substitute, maintain, unwind, or dispose of all or a material portion of any hedge position relating to the Index or any Index Constituent (or one or more constituent securities/instruments underlying an Index Constituent), or (ii) would incur a materially increased cost in doing so, including due to any capital requirements or other law or regulation.

Index Equity ETFs Daily Weights – The subset of weights in the Final Index Daily Weights that correspond to Equity ETFs.

Index Fee – Is equal to 0.65%. This fee is per annum and deducted from the Index value using the Act/360-day count convention

Index Fixed Income ETFs Daily Weights – The subset of weights in the Final Index Daily Weights that correspond to Fixed Income ETFs.

Interest Rate Disruption Event – Occurs when the Interest Rate, or any successor rate as determined by the Index Administrator is not published on a date on which it is scheduled for publication.

Index Subscriber – Is a person or entity that purchases Index determination services from the Index Administrator and hence is the licensee of the Index.

Index Website – Accessed via https://www.blackrock.com/investing/products/blackrock-index-services (and may be updated by the Index Administrator from time to time)

Information Coefficient ("IC") – An assumed measure of confidence in an investment strategy and applied as a multiplier for a given Signal in computing the Alpha for that Signal. It is set to 0.1 for each factor signal for which it is used.

Initial Data Start Date ("IDSD") – 31 July 2013

Interest Rate – 3-Month USD LIBOR was the interest rate used in the index from index inception until December 27, 2021. SOFR plus 0.26161% is the interest rate used in the index thereafter. The Interest Rate is per annum and deducted from the Index value using the Act/360-day count convention.

Market Disruption Events – Occurs when data is not sufficiently available or able to accurately and reliably represent the market or economic reality.

These events come under the following categories:

1. The official Closing Price, level, rate or other value of any Index Constituent is unavailable on any relevant day when the index is scheduled to be published;
2. a relevant Exchange is not open for trading during its regular trading session, or there is an Exchange Disruption as determined by the Index Administrator or in consultation with the Index Subscriber or ISGCo;

3. the net asset value per share of an ETF is not calculated or is not announced by the ETF or the sponsor of such ETF and such event has a material impact on the Index as determined by the Index Administrator in consultation with Index Subscriber, or ISGCo;
4. upon the occurrence or existence of a Trading Disruption Event, for more than two hours of trading, or at any time during the one-hour period that ends at the scheduled closing time of the relevant Exchange;
5. the ETF, or the relevant sponsor of such ETF suspends creations or redemptions of shares and such event has a material impact on the Index;
6. upon the occurrence or existence of an Index Dislocation;
7. upon the occurrence or existence of an Interest Rate Disruption Event;
8. upon the occurrence or existence of a Force Majeure Event;

Mean-Variance Optimization – An optimization that allocates weights to assets using the trade-off between risk and Return. The Index uses in-house software that may yield different results from other software, commercial or open-source.

Momentum Signal – Designed to allocate to the Equity ETFs that are demonstrating strong recent price trends. It is constructed from the daily total Returns of each Equity ETF to account for any distribution payments.

Moving Rolling Average ("MRA") – The N-period Moving Rolling Average of a timeseries X, $MRA^N(X)$ is a timeseries with the same dimension and where each element $MRA^N(X)_t$ is defined as:

$$MRA^N(X)_t = \frac{\sum_{i=\max(1,t+1-N)}^{i=t} X_t}{\min(t, N)}$$

Rates Momentum Signal – Designed to allocate to the Fixed Income ETFs that are demonstrating stronger recent price trends relative to one another.

Return – Calculated as the relative change in levels between two time periods, expressed in units of 1 (i.e. 0.01 corresponds to a 1% change).

Scaled Characteristic Signal Weights – These weights are obtained by scaling the Characteristic Signal Weights by the same factor for all ETFs to achieve a 1% volatility forecast, as further described below under the caption "Volatility Control".

Score – Normalized signal.

Signal – A raw insight into the performance of an asset that feeds into the calculation of its Excess Return.

SOFR – Secured Overnight Financing Rate. It is a broad measure of the cost of borrowing cash overnight collateralized by Treasury securities.

Target Volatility – is 5% for the BlackRock Dynamic Factor Index and 3% for the BlackRock Dynamic Factor VC3 Index ER.

Timeseries Score ("TSS") – The Timeseries Score of a timeseries X for Half-Life HL, $TSS^{HL}(X)$, is a timeseries with the same dimension and where each element $TSS^{HL}(X)_t$ is defined as:

$$TSS^{HL}(X)_1 = 0$$

$$For\ t > 1 \qquad TSS^{HL}(X)_t = \frac{X_t - EWMA^{HL}(X)}{EWMV^{HL}(X)}$$

Where:

t: is the t-th position within the given timeseries

X_t: is the t-th element of timeseries X

Trading Disruption Event – Means any suspension of or limitation imposed on trading by the relevant Exchange, and whether by reason of movements in price exceeding limits permitted by the relevant Exchange

or otherwise, relating to the ETF shares as determined by the Index Administrator or in consultation with the Index Subscriber, or ISGCo.

Value Signals – Used to identify which of the Equity ETFs has a relatively more attractive valuation based on the fundamentals of its underlying stock holdings. Refers to the Cash Flow to Price Signal and the Forward Earnings Yield Signal.

Volatility Control – The daily two-step volatility control overlay applied to mitigate risk. In the first step, the overlay procedure determines the percentage of the Index that will be invested in Fixed Income each day (through allocation to the Fixed Income ETFs). If the required Target Volatility is not met after this step, the second step determines the percentage of the Index that will be invested in cash each day (through allocation to the Cash Constituent). The remainder of the Index holdings will be weighted pro-rata based on the relative allocation of the Index Constituents.

Volatility Scaled Timeseries ("VSTS") – The volatility scaled timeseries of X for Half-Life HL, $VSTS^{HL}(X)$, is a timeseries with the same dimension and where each element $VSTS^{HL}(X)_t$ is defined as:

$$VSTS^{HL}(X)_t = \frac{X_t}{EWMV^{HL}(X)}$$

Where:

t: is the t-th position within the given timeseries

X_t: is the t-th element of timeseries X

Index Objective

BlackRock Dynamic Factor Index

The BlackRock Dynamic Factor Index (the "**Index**") objective is to offer diversified multi-asset exposure for a given Target Volatility. The Index invests in up to eight exchange-traded funds (five Equity ETFs and three Fixed Income ETFs) and a Cash Constituent, subject to a Target Volatility of 5% (the "**Target Volatility**"). The Index seeks to provide dynamic exposure to broad factors using economic regime observations, stock level fundamentals and momentum insights by monthly rebalancing its allocation to the five Equity ETFs based on certain relationships between the Equity ETFs and the common factors, as described in greater detail below. The Index also seeks to achieve a 5% Target Volatility by investing in the Fixed Income ETFs and the Cash Constituent, as described in greater detail herein.

The Equity ETFs emphasize broad, persistent drivers of Return, consisting of the following factor strategies (which are separate from the factor strategies used by the Index):

- Value - stocks with lower valuations based on fundamentals
- Momentum - stocks exhibiting strong recent price trends
- Quality - stocks with strong and stable balance sheets
- Size – smaller, more nimble companies
- Minimum Volatility - stocks with lower levels of historical volatility

The Index tracks the Return of the weighted ETFs and any Cash Constituent above the sum of the Return on the Interest Rate and the Index Fee.

BlackRock Dynamic Factor VC3 Index ER

The BlackRock Dynamic Factor VC3 Index ER (the "**Index**") objective is to offer diversified multi-asset exposure for a given Target Volatility. The Index invests in up to eight exchange-traded funds (five Equity ETFs and three Fixed Income ETFs) and a Cash Constituent, subject to a Target Volatility of 3% (the "**Target Volatility**"). The Index seeks to provide dynamic exposure to broad factors using economic regime observations, stock level fundamentals and momentum insights by monthly rebalancing its allocation to the five Equity ETFs based on certain relationships between the Equity ETFs and the common factors, as described in greater detail below. The Index also seeks to achieve a 3% Target Volatility by investing in the Fixed Income ETFs and the Cash Constituent, as described in greater detail herein.

The Equity ETFs emphasize broad, persistent drivers of Return, consisting of the following factor strategies (which are separate from the factor strategies used by the Index):

- Value - stocks with lower valuations based on fundamentals
- Momentum - stocks exhibiting strong recent price trends
- Quality - stocks with strong and stable balance sheets
- Size – smaller, more nimble companies
- Minimum Volatility - stocks with lower levels of historical volatility

The Index tracks the Return of the weighted ETFs and any Cash Constituent above the sum of the Return on the Interest Rate and the Index Fee.

Index ETF Constituents

Each Index in the Series is composed of U.S. listed iShares Exchange-Traded Funds (each an "**ETF**" and together, the "**ETFs**") that are managed, distributed and sponsored by subsidiaries of BlackRock, Inc.

The iShares® ETFs comprising the Index are:

Equity Basket ETFs (each an "**Equity ETF**" and together the "**Equity ETFs**")

- MTUM – iShares Edge MSCI USA Momentum Factor ETF
- SIZE – iShares Edge MSCI USA Size Factor ETF
- QUAL – iShares Edge MSCI USA Quality Factor ETF
- VLUE – iShares Edge MSCI USA Value Factor ETF
- USMV – iShares Edge MSCI Min Vol USA ETF

Fixed Income Basket ETFs (each a "**Fixed Income ETF**" and together the "**Fixed Income ETFs**")

- SHY – iShares 1-3 Year Treasury Bond ETF
- IEF – iShares 7-10 Year Treasury Bond ETF
- TLT – iShares 20+ Year Treasury Bond ETF

Index Construction

At the end of each month, on each Equity Basket Target Weight Determination Day, the Equity Basket Target Weights are recomputed to provide exposure to the common factors based on certain historical or assumed relationships between the Equity ETFs and the common factors, as described in greater detail below. On a daily basis, the allocation to Fixed Income ETFs are ratably adjusted based on the realized volatility of the Equity ETF's actual weights compared to the Target Volatility (but without considering the risk contribution of the Fixed Income ETFs or any diversification relationships between the Fixed Income ETFs and the Equity ETF basket). Among the Fixed Income ETFs, adjustments are based on an Interest Rate momentum strategy, as described herein. Finally, the allocation between (i) the Cash Constituent and (ii) the combined basket of Equity ETFs and Fixed Income ETFs is determined daily based on a risk model for both the Equity and Fixed Income compositions (taking into account the risk contribution of the Fixed Income ETFs and diversification relationships between the Fixed Income ETFs and the Equity ETF basket).

Equity Basket Weights

Economic Regime Signal

The stage of the economic cycle is determined by looking at the CFNAI in conjunction with its recent evolution. A Signal for each Equity ETF is derived based on the current stage of the economic cycle.

The Economic Regime Signal assigns a Score to each Equity ETF based on the stage of the economic cycle ("Contraction," "Expansion," "Recovery" and "Slowdown") based on assumptions about how the various Equity ETFs will perform in different stages of the economic cycle. The stage of the economic cycle is determined by reference to the Chicago Fed National Activity Index (the CFNAI), as determined by the Federal Reserve Bank of Chicago using 85 monthly indicators of national economic activity. The CFNAI raw data is taken 'as-released' by the Federal Reserve Bank of Chicago to avoid any look-ahead bias. The methodology subsequently applied by the Index to smooth data to assess economic regimes differs from the methodology used by the Federal Reserve Bank of Chicago to interpret the data.

The Economic Regime Signal is determined on each Equity Basket Target Weight Determination Day using the following steps:

1. Starting with the raw monthly as-released CFNAI timeseries data $CFNAI_t$ which begins on March01, 1967.
    a. Calculate $CFNAI3M_t$, the 3-month Moving Rolling Average timeseries of $CFNAI_t$
    $$CFNAI3M_t = MRA^{3M}(CFNAI_t)$$
    b. Calculate the probability of recession timeseries $PREC_t$ defined as follows
    $$PREC_t = +1 \; if \; CFNAI3M_t \leq -0.7$$
    $$PREC_t = -1 \; if \; CFNAI3M_t > -0.7$$
2. The growth acceleration/deceleration is obtained as follows:
    a. Calculate the timeseries of month-over-month differences between each month's $CFNAI3M_t$ value over the full historical data set, starting on July 31, 1967.
    $$DCFNAI3M_t = CFNAI3M_t - CFNAI3M_{t-1}$$
    b. Smooth the results of '2a' using an Exponentially Weighted Moving Average with a 3-month Half-Life.
    $$S_{1,t} = EWMA^{3M}(DCFNAI3M_t)$$
    c. Smooth the timeseries results of '2b' a second time using an Exponentially Weighted Moving Average for each element in the time series with a 3-month Half-Life.
    $$S_{2,t} = EWMA^{3M}(S_{1,t})$$
    d. Compute the Timeseries Score of the results from '2c' using a 12-month Half-Life. This yields the following result of GS:
    $$GS_t = TSS^{12M}(S_{2,t})$$
    e. Calculate the Growth Momentum ("GM"):
    $$GM_0 = 0$$
    $$If \; t > 0 \; and \; GS_t < -0.1 \quad GM_t = -1$$
    $$If \; t > 0 \; and \; -0.1 \leq GS_t \leq 0.1 \quad GM_t = GM_{t-1}$$
    $$If \; t > 0 \; and \; GS_t > 0.1 \quad GM_t = +1$$
    f. If T is the first day where GM_t is not zero, reset GM_t to GM_T for $t < T$
3. The results from steps 1 and 2 are converted into an economic regime timeseries ECON indicator specified as follows:

    PREC = -1 and GM = -1, ECON = "slowdown"

    PREC = +1 and GM = -1, ECON = "contraction"

    PREC = +1 and GM = +1, ECON = "recovery"

    PREC = -1 and GM = +1, ECON = "expansion"

4. For each state, the Score of each of the Equity ETFs is assigned based on the assumed prospective performance of each Equity ETF under such state (represented by the ECON Indicator resulting from step 3) as follows:

	MTUM	QUAL	SIZE	USMV	VLUE
contraction	-2	1	0	1	0
expansion	1	0	0	-1	0
recovery	-1	-1	1.5	-1	1.5
slowdown	0	1	-1	1	-1

5. Take the Score on the last month-end Business Day in the timeseries obtained in step '4'. For purposes of this step 5, "Business Day" is the Equity Basket Target Weight Determination Day if this day falls on the last Business Day of the month, and the last Business Day of the month preceding the Equity Basket Target Weight Determination Day otherwise. On this day, for each Equity ETF, the Alpha for the Economic Regime Signal is computed from the Score as:

$$Alpha_{ECON}^{EQ} = Score_{ECON}^{EQ} \times \sigma^{EQ} \times IC$$

IC=0.10 is the Information Coefficient

σ^{EQ} is the Equity ETF Volatility

Value

The Value Signal is a 50-50 blend of two Signals that seeks to identify the extent to which the Equity ETFs offer attractive value (based on market prices of underlying stocks) relative to underlying fundamentals (based on financial reporting metrics of constituent companies), and is calculated as follows:

1. Cash Flow to Price Signal
    a. Using the latest available Cash Flow to Price Ratio (CFO2P) for the iShares Core S&P 500 ETF (ticker IVV) (representing a proxy for the broader U.S. equity market) and for each Equity ETF EQ, on each of the last Business Day of the months between the Initial Data Start Date and the Equity Basket Target Weight Determination Day, subtract the market CFO2P from each ETF CFO2P:

$$ACFO2P_t^{EQ} = CFO2P_t^{EQ} - CFO2P_t^{IVV}$$

    b. Smooth the results from step 'a' using an Exponentially Weighted Moving Average with a 3-month Half-Life and at least 12 periods required:

$$SCFO2P_t^{EQ} = EWMA^{3M}(ACFO2P^{EQ})_t$$

    c. Next, compute the Timeseries Score of the values obtained in step 'b' using a 36-month Half-Life, and cap and floor the results at +2 and -2, respectively:

$$TCFO2P_t^{EQ} = TSS^{36M}(SCFO2P^{EQ})_t \;\; if\; TSS^{36M}(SCFO2P^{EQ})_t \in [-2,2]$$

$$TCFO2P_t^{EQ} = -2 \;\; if\; TSS^{36M}(SCFO2P^{EQ})_t < -2$$

$$TCFO2P_t^{EQ} = +2 \;\; if\; TSS^{36M}(SCFO2P^{EQ})_t > +2$$

    d. Backfill the values obtained in step 'c' according to the Backfill Convention:

$$TCFO2P_t^{EQ} = TCFO2P_t^{EQ} \;\; if\; t \geq 13$$

$$TCFO2P_t^{EQ} = TCFO2P_{13}^{EQ} \;\; if\; t < 13$$

    e. Compute the Cross-Sectional Scores of the most recent Timeseries Scores for each of the 5 Equity ETFs obtained in step 'd':

$$Score_{CFO2P}^{EQ} = CSS(TCFO2P_T)_{EQ}$$

Where:

$TCFO2P_T$ is the 5x1 vector comprising each $TCFO2P_T^{EQ}$ value for $EQ = \{MTUM, QUAL, SIZE, USMV, VLUE\}$

T is the last date in the $TCFO2P^{EQ}$ timeseries

f. Lastly compute $Alpha_{CFO2P}^{EQ}$ using the Score $Score_{CFO2P}^{EQ}$ from step 'f':

$$Alpha_{CFO2P}^{EQ} = Score_{CFO2P}^{EQ} \times \sigma^{EQ} \times IC$$

IC=0.10 is the Information Coefficient

σ^{EQ} is the Equity ETF Volatility

2. Forward Earnings Yield Signal

a. Using the latest available Forward Earnings Yield (FEY) for the iShares Core S&P 500 ETF (ticker IVV) (representing a proxy for the broader U.S. equity market) and for each Equity ETF EQ, on each of the last Business Day of the months between the Initial Data Start Date and the Equity Basket Target Weight Determination Day, subtract the market FEY from each ETF FEY:

$$AFEY_t^{EQ} = FEY_t^{EQ} - FEY_t^{IVV}$$

b. Smooth the results from step 'a' using an Exponentially Weighted Moving Average with a 3-month Half-Life and at least 12 periods required:

$$SFEY_t^{EQ} = EWMA^{3M}(AFEY^{EQ})_t$$

c. Next, compute the Timeseries Score of the values obtained in step 'b' using a 36-month Half-Life, and cap and floor the results at +2 and -2, respectively:

$$TFEY_t^{EQ} = TSS^{36M}(SFEY^{EQ})_t \quad if\ TSS^{36M}(SFEY^{EQ})_t \in [-2,2]$$

$$TFEY_t^{EQ} = -2 \quad if\ TSS^{36M}(SFEY^{EQ})_t < -2$$

$$TFEY_t^{EQ} = +2 \quad if\ TSS^{36M}(SFEY^{EQ})_t > +2$$

d. Backfill the values obtained in step 'c' according to the Backfill Convention:

$$TFEY_t^{EQ} = TFEY_t^{EQ} \quad if\ t \geq 13$$

$$TFEY_t^{EQ} = TFEY_{13}^{EQ} \quad if\ t < 13$$

e. Compute the Cross-Sectional Score of the most recent 5 Timeseries Scores obtained for each of the 5 Equity ETFs in step 'd':

$$Score_{FEY}^{EQ} = CSS(TFEY_T)_{EQ}$$

Where:

$TFEY_T$ is the 5x1 vector comprising each $TFEY_T^{EQ}$ value for $EQ = \{MTUM, QUAL, SIZE, USMV, VLUE\}$

T is the last date in the $TFEY^{EQ}$ timeseries

f. Lastly, for each of the Equity ETFs, compute $Alpha_{FEY}^{EQ}$ using the Score $Score_{FEY}^{EQ}$ from step 'f':

$$Alpha_{FEY}^{EQ} = Score_{FEY}^{EQ} \times \sigma^{EQ} \times IC$$

IC=0.10 is the Information Coefficient

σ^{EQ} is the Equity ETF Volatility

Momentum Signal

The Momentum Signal seeks to identify the extent to which the daily adjusted Returns of an Equity ETF demonstrate above-market price momentum, and is constructed as follows:

1. Start with the Equity ETFs' Daily Return timeseries R^{EQ}.
2. Construct a similar timeseries R^{IVV} for the iShares Core S&P 500 ETF (ticker IVV) total market Return
3. Calculate the Equity ETFs' daily Returns relative to the market AR^{EQ} timeseries:

$$AR^{EQ} = R^{EQ} - R^{IVV}$$

4. Smooth the Returns from step '3' using an Exponentially Weighted Moving Average with a 130-day Half-Life and at least 130 periods required:

$$SAR_t^{EQ} = EWMA^{130D}(AR^{EQ})_t$$

5. Compute the Volatility Scaled Timeseries of the results obtained in step '4' using a 260-day Half-Life:

$$VSTAR_t^{EQ} = VSTS^{260D}(SAR^{EQ})_t$$

6. Backfill the values obtained in Step '5' according to the Backfill Convention:

$$VSTAR_t^{EQ} = VSTAR_t^{EQ} \ \ if\ t \geq 131$$
$$VSTAR_t^{EQ} = VSTAR_{131}^{EQ} \ \ if\ t < 131$$

7. Take the Volatility Scaled Timeseries on the last month-end Business Day date in the timeseries obtained in step '6'. For purposes of this step 7, "Business Day" is the Equity Basket Target Weight Determination Day if this day falls on the last Business Day of the month, and the last Business Day of the month preceding the Equity Basket Target Weight Determination Day otherwise. On this day T, compute the Cross-Sectional Scores from the results from step '6':

$$Score_{MOM}^{EQ} = CSS(VSTAR_T)_{EQ}$$

Where:

$VSTAR_T$ is the 5x1 vector comprising each $VSTAR_T^{EQ}$ value for $EQ = \{MTUM, QUAL, SIZE, USMV, VLUE\}$

T is the last date in the $VSTAR^{EQ}$ timeseries

6. For each of the Equity ETFs, Alphas are computed from the scores from step '6':

$$Alpha_{MOM}^{EQ} = Score_{MOM}^{EQ} \times \sigma^{EQ} \times IC$$

IC=0.10 is the Information Coefficient

σ^{EQ} is the Equity ETF Volatility

Characteristic Signal Weights

For each of the Economic Regime Signal, Forward Earnings Yield Signal, Cash Flow to Price Signal and Momentum Signal, the Alphas calculated above are converted into month-end Characteristic Signal Weights for each Equity ETF with respect to the given Signal. The Index does this by solving the following Mean-Variance Optimization for each of the four signals separately:

$$Maximize\ \left(h_{Signal}^{CSW}{}'\alpha_{Signal} - h_{Signal}^{CSW}{}'Vh_{Signal}^{CSW}\right)$$
$$Subject\ to\ the\ sum\ of\ weights\ equals\ zero\ \ \left(\sum h_{Signal}^{CSW} = 0\right)$$

h_{Signal}^{CSW} is the M-by-1 matrix of Characteristics Signal Weights with respect to a given Signal

$h_{Signal}^{CSW}{}'$ is the transpose of h , a 1-by-M matrix

α_{Signal} is M-by-1 matrix of Alphas for the given Signal for each Equity ETF with respect to the Equity Basket Target Weight Determination Day

V is the M-by-M matrix Equity ETF Monthly Covariance Matrix

M = 5 is the number of Equity ETFs

Equity Basket Target Weights

With respect to an Equity Basket Target Weight Determination Day, the Equity Basket Target Weights are determined as follows:

1. The Characteristic Signal Weights for each Signal are scaled to achieve 1% risk. This yields the Scaled Characteristic Signal Weights for the given Signal which are determined in accordance to the following:

$$h_{Signal}^{SCSW} = \frac{h_{Signal}^{CSW}}{\sqrt{h_{Signal}^{CSW\prime} V h_{Signal}^{CSW}}} \times 0.01$$

h_{Signal}^{SCSW} is the M-by-1 matrix of Scaled Characteristics Signal Weights with respect to a given Signal

h_{Signal}^{CSW} is the M-by-1 matrix of Characteristics Signal Weights with respect to a given Signal

$M = 5$ is the number of Equity ETFs

2. The Equity Combined Characteristic Signal Weights are then constructed for each Equity ETF by aggregating the four Scaled Characteristic Signal Weights and a static weight of 20%.

$$h_c = \frac{h_{CFO2P}^{SCSW} + h_{FEY}^{SCSW}}{2} + h_{MOM}^{SCSW} + h_{ECON}^{SCSW} + h_{REF}$$

h_c is the M-by-1 matrix of Equity Combined Characteristics Signal Weight

h_{CFO2P}^{SCSW} is the M-by-1 matrix of Scaled Characteristics Signal Weights for the Cash Flow to Price Signal

h_{FEY}^{SCSW} is the M-by-1 matrix of Scaled Characteristics Signal Weights for the Forward Earnings Yield Signal

h_{MOM}^{SCSW} is the M-by-1 matrix of Scaled Characteristics Signal Weights with respect for the Momentum Signal

h_{ECON}^{SCSW} is the M-by-1 matrix of Scaled Characteristics Signal Weights for the Economic Regime Signal

h_{REF} is a M-by-1 matrix where each element is static and equal to 0.2

$M = 5$ is the number of Equity ETFs

3. The Equity Basket Target Weights are obtained on each Equity Basket Target Weight Determination Day by solving the following optimization equation:

$$Minimize\ (h - h_c)'V(h - h_c)$$

$$Subject\ to \sum h_i = 1\ and\ 0 \leq h_i \leq 0.6\ \forall\ i$$

h is the M-by-1 matrix of unknown Equity Basket Target Weights

h_c is the M-by-1 matrix of Equity Combined Characteristic Signal Weights

V is the Equity ETF Monthly Covariance Matrix

$M = 5$ is the number of Equity ETFs

Equity Basket Weights

With respect to a Business Day t, the Equity Basket Weight for each Equity ETF is equal to:

- On the Initial Data Start Date:

$$w_{IDSD}^{EQ} = w_{IDSD}^{EQ,T}$$

- If Business Day t is after the Initial Data Start Date and such Business Day t is not an Equity Basket Rebalancing Day then:

$$w_t^{EQ} = w_{t-1}^{EQ}$$

Where:

w_{t-1}^{EQ}: is the Equity Basket Weight for the relevant Equity ETF on the Business Day immediately preceding Business Day t

- If such Business Day t is an Equity Basket Rebalancing Day, then:

$$w_t^{EQ} = w_{t-1}^{EQ} + \frac{w_{Dt}^{EQ,T} - w_{t-1}^{EQ}}{p}$$

Where:

w_t^{EQ}: is the Equity Basket Weight for the relevant Equity ETF on Business Day t

$w_{Dt}^{EQ,T}$: is the Equity Basket Target Weight for the relevant Equity ETF on the Equity Basket Weight Determination Day immediately preceding Business Day t

w_{t-1}^{EQ}: is the Equity Basket Weight for the relevant Equity ETF on the Business Day immediately preceding Business Day t

p: is the number of remaining Equity Basket Rebalancing Days (and including such Equity Basket Rebalancing Day) in the Equity Basket Rebalancing Period

Fixed Income Basket Weights

Rates Momentum Signal

The Rates Momentum Signal is used to determine the Fixed Income Basket Weights. The iShares 7-10 Year Treasury Bond ETF (IEF) is the reference asset for the Rates Signal (the "**Rates Signal Reference Asset**")

1. An implied Rates Signal Reference Asset level (the "**Implied Rates Signal Reference Asset Level**") timeseries is computed from the Rates Signal Reference Asset daily Return timeseries, starting on the Initial Data Start Date:

$$L_{IDSD}^{RSRA} = 0$$

$$for\ t > IDSD \qquad L_t^{RSRA} = \prod_{i=2}^{i=t}(1 + R_i^{RSRA}) - 1$$

Where:

L_{IDSD}^{RSRA} is the Implied Rates Signal Reference Asset Level on the Initial Data Start Date

L_t^{RSRA} is the Implied Rates Signal Reference Asset Level on Business Day t

R_i^{RSRA} is the Rates Signal Reference Asset Return for Business Day i with

$$R_i^{RSRA} = \frac{P_i^{RSRA} - P_{i-1}^{RSRA} + D_i^{RSRA}}{P_{i-1}^{RSRA}}$$

P_i^{RSRA} is the Rates Signal Reference Asset Closing Price for Business Day i

D_i^{RSRA} is the Rates Signal Reference Asset Gross cash dividend with respect to Business Day i

2. From and including the Initial Data Start Date and for each following Business Day t, a rates momentum signal (the "**Rates Momentum Signal**") on the Implied Rates Signal Reference Asset Level is calculated as follows:

$$RMS_t^{RSRA} = \begin{cases} 1 & if\ IDSD \le t \le IDSD + 9 \\ v\left(10 - \sum_{i=t-9}^{t} u(LA_{i-1}^{RSRA} - L_i^{RSRA})\right) & if\ t > IDSD + 9 \end{cases}$$

$$LA_t^{RSRA} = \frac{\sum_{i=\max(1,t+1-252)}^{i=t} L_i^{RSRA}}{\min(t, 252)}$$

$$u(x) = 0\ if\ x \le 0\ and + 1\ otherwise$$

$$v(x) = +1\ if\ x \ne 0\ and - 1\ otherwise$$

Where:

$IDSD$ refers to the Initial Data Start Date

RMS_t^{RSRA} is the Rates Momentum Signal on Business Day t

L_t^{RSRA} is the Implied Rates Signal Reference Asset Level on Business Day i

Fixed Income Basket Target Weights

On the Initial Data Start Date, the Fixed Income Basket Target Weights are set to 50% for the iShares 7-10 Year Treasury Bond ETF (IEF), 50% for the iShares 20+ Year Treasury Bond ETF (TLT) and 0% for the iShares 1-3 Year Treasury Bond ETF (SHY).

Thereafter, on any Business Day t following the Initial Data Start Date

a. If the Rates Momentum Signal on the Business Day immediately preceding Business Day t is equal to +1, then the Fixed Income Basket Target Weights are set to 50% for the iShares 7-10 Year Treasury Bond ETF (IEF), 50% for the iShares 20+ Year Treasury Bond ETF (TLT) and 0% for the iShares 1-3 Year Treasury Bond ETF (SHY).

b. Otherwise, the Fixed Income Basket Target Weights are set to 50% for the iShares 1-3 Year Treasury Bond ETF (SHY), 50% for the iShares 7-10 Year Treasury Bond ETF (IEF) and 0% for the iShares 20+ Year Treasury Bond ETF (TLT).

As a result, if on each of ten consecutive Business Days, the Implied Rates Signal Reference Asset Levels are below the Rates Signal Reference Asset's one-year average (measured, with respect to each of the ten Business Days, based on the arithmetic average of Implied Rates Signal Reference Asset Levels for the 252 Business Days preceding the relevant Business Day), the Fixed Income Basket Weights will be equally allocated between the Rates Signal Reference Asset and the short-term Fixed Income ETF (SHY – iShares 1-3 Year Treasury Bond ETF); otherwise, the Fixed Income Basket Weights will be equally allocated between the Rates Signal Reference Asset and the long-term Fixed Income ETF (TLT – iShares 20+ Year Treasury Bond ETF).

Fixed Income Basket Weights

With respect to a Business Day t (from and including the Initial Data Start Date), the Fixed Income Basket Weight for each Fixed Income ETF is computed as follows:

$$w_{IDSD}^{FI} = w_{IDSD}^{FI,T}$$

$$For\ t > IDSD$$

$$If\ w_{t-1}^{FI} < w_t^{FI,T} \qquad w_t^{FI} = w_{t-1}^{FI} + 0.1$$

$$If\ w_{t-1}^{FI} > w_t^{FI,T} \qquad w_t^{FI} = w_{t-1}^{FI} - 0.1$$

$$If\ w_{t-1}^{FI} = w_t^{FI,T} \qquad w_t^{FI} = w_{t-1}^{FI}$$

Where:

w_t^{FI}: is the Fixed Income Basket Weight for the relevant Fixed Income ETF on Business Day t

w_{t-1}^{FI}: is the Fixed Income Basket Weight for the relevant Fixed Income ETF on the Business Day immediately preceding Business Day t

$w_t^{FI,T}$: is the Fixed Income Basket Target Weight for the relevant Fixed Income ETF on Business Day t

Volatility Control

With respect to a Business Day t, the daily Volatility Control process occurs in three stages.

Stage 1

a. Calculate the equity basket daily Returns timeseries by multiplying the Equity Basket Weights by the Equity ETFs daily Returns. This is a timeseries with one asset that starts in the Initial Data Start Date and finishes on Business Day t. For date t, the equity basket daily Return R_t^{Basket} is equal to:

$$R_t^{Basket} = \sum_{j=1}^{j=5} w_{t-1}^{EQ_j} R_t^{EQ_j}$$

Where:

EQ_j is the j-th Equity ETF

$t-1$ is the Business Day immediately preceding Business Day t

w_{t-1}^{EQ}: is the Equity Basket Weight for the Equity ETF EQ as of Business Day t-1

R_t^{EQ}: is the Equity ETF Daily Return for the Equity ETF EQ as of Business Day t

b. Calculate the Exponentially Weighted Moving Volatilities of the equity basket $\sigma_{EQ,10}$ and $\sigma_{EQ,30}$ using a 10-day and 30-day Half-Life, respectively:

$$\sigma_{EQ,10}(t) = EWMV^{10D}(R^{Basket})_t$$
$$\sigma_{EQ,30}(t) = EWMV^{30D}(R^{Basket})_t$$

c. Derive the associated volatility forecasts $\bar{\sigma}_{EQ,10}$ and $\bar{\sigma}_{EQ,30}$ forecasts, which are the 1-day lagged historical $\sigma_{EQ,10}$ and $\sigma_{EQ,30}$ as follows:

$$\bar{\sigma}_{EQ,10}(t) = \sigma_{EQ,10}(t-1)$$
$$\bar{\sigma}_{EQ,30}(t) = \sigma_{EQ,30}(t-1)$$

d. Create an intermediate index composed of the final equity basket, SHY, IEF and TLT, with the following weights:

For the equity basket:

$$a_{EQ}^I(t) = \min\left(1, \frac{2 * VT}{\bar{\sigma}_{EQ,10}(t) + \bar{\sigma}_{EQ,30}(t)}\right)$$

And for each Fixed Income ETF FI:

$$w_{FI}^I(t) = \left(1 - a_{EQ}^I(t)\right) * w_t^{FI}$$

Where:

w_t^{FI}: is the Fixed Income Basket Weight for the relevant Fixed Income ETF FI on Business Day t

VT is the Volatility Target

Stage 2

a. Build the 4-by-4 10-day and 30-day Half-Life Exponentially Weighted Moving Covariance Matrices $C_{10}(t-1)$ and $C_{30}(t-1)$ of the equity basket, SHY, IEF and TLT daily Returns timeseries starting on the Initial Data Start Date and ending on Business Day t-1.

b. Compute the volatility forecasts $\bar{\sigma}_{10}(t)$ and $\bar{\sigma}_{30}(t)$ of the intermediate index obtained in stage '1d' as follows:

$$\bar{\sigma}_{10}(t) = \sqrt{h(t)' C_{10}(t-1) h(t)}$$

$$\bar{\sigma}_{30}(t) = \sqrt{h(t)' C_{30}(t-1) h(t)}$$

$h(t) = \begin{bmatrix} a^I_{EQ}(t) \\ w^I_{SHY}(t) \\ w^I_{IEF}(t) \\ w^I_{TLT}(t) \end{bmatrix}$ and $h(t)'$ is the transpose of $h(t)$

c. The final asset class allocations are computed as:

$$a^F_{CASH}(t) = (1 - A(t))$$

$$a^F_{EQ}(t) = A(t) * a^I_{EQ}(t)$$

$$a^F_{FI}(t) = A(t) * \left(1 - a^I_{EQ}(t)\right)$$

With:

$$A(t) = min\left(1, \frac{VT}{max\left(\bar{\sigma}_{10}(t), \bar{\sigma}_{30}(t)\right)}\right)$$

And where:

VT is the Volatility Target

Stage 3

To obtain the Final Index Daily Weights:

1. The Equity Basket Weights w^{EQ}_t for each Equity ETF EQ are multiplied by the final equity allocation a^F_{EQ} to obtain the Index Equity ETFs Daily Weights:

$$w^{EQ}_{FINAL}(t) = w^{EQ}_t * a^F_{EQ}(t)$$

2. The Fixed Income Basket Weights w^{FI}_t for each Fixed Income ETF FI are multiplied by the final Fixed Income allocation a^F_{FI} to obtain the Index Fixed Income ETFs Daily Weights:

$$w^{FI}_{FINAL}(t) = w^{FI}_t * a^F_{FI}(t)$$

3. The Cash Constituent Daily Weight is equal to the final Cash Constituent allocation:

$$w^{CASH}_{FINAL}(t) = a^F_{CASH}(t)$$

4. Lastly, the Index Equity ETFs Daily Weights, the Index Fixed Income ETFs Daily Weights, and the Cash Constituent Daily Weight are rounded to the nearest 6th decimal place. If their sum altogether doesn't

add up to 100%, then the difference is added to or subtracted from the constituent with the largest weight.

Data Sources

Data Provider	Data Point
Refinitiv	• ETF Prices, Returns and cash dividends • TRBC Equity Sectors • Worldscope Cash Flow from Operations • Equity Company Market Capitalization • I/B/E/S Earnings Per Share Estimate • Interest Rate
Federal Reserve Bank of Chicago	Chicago Fed National Activity Index ("CFNAI")

Index Maintenance & Publication

The inception date of the BlackRock Dynamic Factor Index is October 31, 2019, and the BlackRock Dynamic Factor VC3 Index ER is January 21, 2021, when the base Index level was set to 1000. Index values are calculated once every Business Day at the close of the applicable Business Day. The Index value is calculated in U.S. dollars and published to the second decimal place.

Dividend Reinvestment

- ETF Dividends –The Index assumes ETF dividends are reinvested back into the index after the close of trading on the ex-dividend date.
- ETF Share Split – Index shares are multiplied by the split factor. Price is divided by the split factor.

Index Rebalance Timeline

The Equity Basket Target Weights are computed monthly as of the Equity Basket Target Weight Determination Day. However, they take effect starting on the Initial Equity Basket Rebalancing Period Day and are introduced in equal increments over each day during the course of the Equity Basket Rebalancing Period. The Equity Basket Weights are held constant to the immediately preceding Equity Basket Target Weights between two consecutive Equity Basket Rebalancing Periods.

The Fixed Income Basket Target Weights are evaluated daily. When the Fixed Income Basket Target Weights differ from the ones on the immediately preceding Business Day, those new weights are introduced in equal increments over each day during the next 5 Business Days. If the Rates Momentum Signal changes sign before the 5-day window is complete, the then-new Fixed Income Basket Target Weights are introduced in the same increments as before but with the opposite sign, and until the new target weights are reached.

The Volatility Control is computed daily. The resulting scaling applied to the Equity Basket Weights and the Fixed Income Basket Weights, to yield the relevant ETF Daily Weight plus the computation of the Cash Constituent Daily Weight are implemented in the final Index holdings on a one Business Day lag.

Index Calculations

Each Index is calculated based on the Excess Return of the constituents versus the sum of the Cash Constituent and the Index Fee. The Excess Return Index calculation is:

$$R^e(t) = \left(\sum_{i=1}^{n}\left[\left(\frac{P_i(t) + D_i(t)}{P_i(t-1)} - 1\right) \times W_i(t-1)\right] + R_c(t) \times W_c(t-1)\right) - R_c(t) - I(t)$$

where:

$R^e(t)$ = Excess Return from close of day t − 1 to close of day t.

n = Number of ETFs in the index

$P_i(t)$ = Closing Price of the i^{th} ETF at close of day t, as provided by the Data Source

$D_i(t)$ = Gross cash dividends on the i^{th} ETF in day t, as provided by the Data Source

$P_i(t-1)$ = Closing Price of the i^{th} ETF at close of day t − 1, as provided by the Data Source

$W_i(t-1)$ = Final Index Daily Weight on the i^{th} ETF computed after the close on day t − 1

$R_c(t)$ = Return on the Cash Constituent from day t − 1 to day t

$I(t)$ = Index Fee accrued from day t − 1 to day t

$W_c(t-1)$ = Cash Constituent Daily Weight computed after the close on day t − 1

t = Business Day on which the Index is calculated

The Interest Rate uses the Act/360-day count convention. An Index Fee is deducted from the daily Return calculation provided in the above formula. The Index Fee is set to 65bps. This fee is accounted for daily using the Act/360-day count convention. The Index level will be calculated using the Closing Price for each Index Constituent on its Exchange, or its successor. The Index level for a given Business Day will be computed and published after market close using the following formula:

$$Index\ (t) = \left(1 + R^e(t)\right) * Index\ (t-1)$$

In the event of half trading days, the Index level will be calculated in the same way as a full trading day where the Closing Price is used.

Governance

For additional Governance and Methodology details including usage and licensing opportunities for the BlackRock Indices, please contact BLKIndexServices@blackrock.com.

Appendix

1. **New York Stock Exchange**

   The Indices will follow the schedule which can be obtained on

   https://www.nyse.com/markets/hours-calendars

2. **Index Methodology Changes**

   The indices follow a rules-based methodology and more details pertaining to Methodology Change Policy can be made available upon request.

3. **Error Correction Process**

   The Error and Event Handling Policy can be made available upon request.

4. **Index Complaints**

   Complaints can be submitted, which seek clarity or proposed action relating to
   - Index determination process

- Application of the methodology
- Market conditions or other changes impacting the index strategy

Complaints regarding the index must be submitted via email to BLKIndexServices@BlackRock.com

The complaint must include:

1. The name of the Index;
2. The date of the issue;
3. A detailed description of how the issue impacts the Index;
4. Suggested turnaround time to resolve the issue to denote the priority of the matter.

5. Index Cessation

Index Cessation Policy can be made available upon request.

6. Market Disruption Events

If on any Business Day it is determined by the Index Administrator that a Market Disruption Event occurs, or is continuing, then the Index Administrator will not calculate the Index on that day, and the Index Administrator will postpone calculation of the Index value until the next Business Day on which no Market Disruption Event occurs or is continuing. The Index Administrator shall resume calculating the Index value on the next Business Day on which no Market Disruption Event occurs or is continuing by using for the weight of each Index Constituent the weight computed after the close on the Business Day immediately preceding the first day of such Market Disruption Event. If such Market Disruption Event persists for at least six Business Days, the resolution will be determined at the discretion of ISGCo after consultation with Index Subscribers. Notwithstanding the foregoing, in the event of a Force Majeure Event in which all constituents of the Index are affected, the calculation and publication of the Index will be postponed until, in the determination of the Index Administrator, such Force Majeure Event has been resolved.

If a Market Disruption Event occurs or is continuing during any Index rebalancing period, such rebalancing shall be postponed to the next Business Day on which no Market Disruption Event occurs or is continuing, and the Index will still be calculated using the defined period of rebalance dates. For example, if a Market Disruption Event occurs on the third day of the Equity Basket Rebalancing Period, then when the Index resumes there will still be eight days of rebalancing to occur. Additionally, if a Market Disruption Event occurs, or is continuing to occur, on a scheduled Equity Basket Target Weight Determination Day for the Equity Basket for example, the Equity Basket Target Weight Determination Day will be on the first Business Day of the following month when no Market Disruption Event occurs or is continuing, and the rebalancing will take effect three Business Days following the Equity Basket Target Weight Determination Day.

In the event of an Index Dislocation being escalated to the Index Administrator by the Index Subscriber via BLKIndexServices@BlackRock.com or escalated via phone call the Index Administrator will consult ISGCo to determine what actions (if any) need to be carried out by the Index Administrator.

If an Index Constituent is affected by a Trading Disruption Event on the day before the effective date of a Corporate Action, the implementation of the Corporate Action is moved to the next day on which:

- the Index is calculated and
- the affected Index Constituent is traded

Disclaimer

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