

# MSCI USA BUSINESS CYCLE CLOCK FACTOR SELECT INDEX

September 2019

**CONTENTS**

- 1 Introduction.....3
- 2 Constructing the Index .....4
  - 2.1 Constructing the Parent Sub-Indices .....4
    - 2.1.1 Expansion Parent Sub-Index .....4
    - 2.1.2 Slowdown Parent Sub-Index.....4
    - 2.1.3 Recovery Parent Sub-Index.....4
    - 2.1.4 Contraction Parent Sub-Index.....4
  - 2.2 Constructing Risk Controlled Regime Sub-Indices .....5
    - 2.2.1 Volatility Estimation .....5
    - 2.2.2 Index Leverage .....5
    - 2.2.3 Exchange Holidays .....6
    - 2.2.4 Interest Rate Deduction .....6
  - 2.3 Momentum Leverage.....6
  - 2.4 CFNAI Signal.....7
  - 2.5 Weight Calculation.....7
- 3 Maintaining the Index .....9
  - 3.1 Monthly Index Reviews.....9
    - 3.1.1 Staggered Rebalance.....9
  - 3.2 Ongoing Event Related Changes .....9
- Appendix 1 Methodology For Component Indexes..... 11

## **1 INTRODUCTION**

The MSCI USA Business Cycle Clock Factor Select Index aims to represent the performance of a rotational strategy that invests across 4 different MSCI sub-indices representing different business cycles. Each sub-index is allocated a weight based on the Chicago Fed National Activity Index as indicator.

## 2 CONSTRUCTING THE INDEX

The objective of this methodology is to create a 6% volatility targeted index that dynamically allocates monthly to different factor components based on a well-known macro signal: Chicago Fed National Activity Index (CFNAI). <sup>1</sup>The CFNAI is a monthly index which is designed to gauge overall economic activity and related inflationary pressure.

The methodology defines different economic regimes such as expansion, contraction, recovery and slowdown based on the CFNAI signal outputs and allocates weights to one of the component factor mixes, monthly, on the basis of these values.

Each of the component factor mixes is risk controlled at a target volatility of 6% for the blended index to achieve the desired volatility level. In the risk control mechanism, the ‘safe asset’ is an investment in a 5-year rolling bond futures index and the ‘risky asset’ is the respective factor component index. The process in detail is as follows:

### 2.1 CONSTRUCTING THE PARENT SUB-INDICES

#### 2.1.1 EXPANSION PARENT SUB-INDEX

The Expansion parent sub-index is created by allocating 100% weight to MSCI USA Momentum Price Return Index.

#### 2.1.2 SLOWDOWN PARENT SUB-INDEX

The slowdown parent sub-index is created by allocating 50% weight to MSCI USA Quality Price Return Index and 50% weight to MSCI USA Minimum Volatility Price Return Index. The Slowdown Parent Sub-Index rebalances monthly on second last trading day of the month.

#### 2.1.3 RECOVERY PARENT SUB-INDEX

The recovery parent sub-index is created by allocating 50% weight to MSCI USA Enhanced Value Price Return Index and 50% weight to MSCI USA Equal Weight Price Return Index. The Recovery Parent Sub-Index rebalances monthly on second last trading day of the month.

#### 2.1.4 CONTRACTION PARENT SUB-INDEX

The contraction parent sub-index is created by allocating 100% weight to MSCI USA Minimum Volatility Price Return Index.

---

<sup>1</sup> <https://www.chicagofed.org/publications/cfnai/index>

## 2.2 CONSTRUCTING RISK CONTROLLED REGIME SUB-INDICES

On each of the above parent sub-indices, a 6% Risk Control overlay is applied based on the following methodology to create risk-controlled regime sub-indices:

### 2.2.1 VOLATILITY ESTIMATION

The returns of each parent sub-index are used for volatility estimation. The volatility estimation approach considers both the short-term and the long-term volatility trends of the respective parent sub-index. Volatility is calculated as the maximum of two volatility estimates: the short-term realized volatility estimate, calculated over a short horizon of 20 days, and the long-term realized volatility estimate, calculated over a long horizon of 60 days. The volatility estimation approach uses equally weighted daily price returns of the parent sub-index for both horizons. The volatility calculation formulas are described below:

$$Realized\ Volatility_t = \sqrt{\frac{252}{n} * Variance(t)}$$

$$Variance(t) = \frac{1}{N} * \sum_{t-N+1}^t \left[ \ln\left(\frac{Parent\ SubIndex(i)}{Parent\ SubIndex(i-n)}\right) \right]^2$$

n = Number of interval days used for return calculation; n=1 for daily returns

N = Total number of historical trading days used for variance calculation and varies for short-term volatility estimate (N = 20) and long-term volatility estimate (N = 60)

$$Parent\ SubIndex\ Volatility(t) = Max(Short\ term\ Realized\ Volatility(t), Long\ term\ Realized\ Volatility(t))$$

### 2.2.2 INDEX LEVERAGE

The objective of the Risk Controlled Sub-Indices is to replicate the performance of a strategy that targets a specific level of risk by varying the weights of the parent sub-index and a cash component. The Index Leverage is calculated daily as the ratio of the specific risk level and the Parent Sub-Index Volatility subject to a maximum leverage of 100%. If the MSCI Parent Sub-Index Volatility is higher than 6% then the weight of the MSCI parent sub-index will be less than 100% while the weight of the cash component will be 100% minus the weight of the parent sub-index. The daily return on the cash component is determined using the returns of SGX 5-Year US Treasury Futures Index. The Index Leverage applicable on an

effective date is determined using the parent sub-index volatility estimated one trading day before the effective date.

**2.2.3 EXCHANGE HOLIDAYS AND TRADING DAY**

The Risk Controlled sub-indices are not rebalanced on a NYSE or CME exchange holiday. Any business day that is not a NYSE or CME exchange holiday is defined as Trading Day (“TD”).

**2.2.4 INTEREST RATE DEDUCTION**

For each of the Risk Controlled sub-indices calculated above, a blended rate as calculated below is deducted daily<sup>2</sup>:

$$IR_{t-1} = (Days_{t-1,t} * SOFR3M_{t-1} - \left( SOFR3M_{t-1} - SOFR3M_{t-2} - Days_{t-1,t} * (SOFR3M_{t-1} - SOFR2M_{t-1}) * \left( \frac{1}{30} \right) \right) * 90) / 360$$

Where:

*Days<sub>t-1,t</sub>* = Number of calendar days between t-1 and t

*SOFR3M<sub>t-1</sub>* = SOFR rate on date t-1 + 15 basis points

*SOFR2M<sub>t-1</sub>* = SOFR rate on date t-1 + 11 basis points

**2.3 MOMENTUM LEVERAGE**

To each of the above calculated risk controlled regime sub-indices, a momentum leverage overlay is applied to get the following final regime sub-indices:

- IndexExpansion
- IndexRecovery
- IndexSlowdown
- IndexContraction

Calculation

For each risk-controlled regime sub-index, a momentum signal is calculated as:

$$ETO(t) = \frac{Average(RC\ IL(t):RCIL(t-19d))}{Average(RC\ IL(t-12m):RCIL(t-12m-19d))}$$

Where:

---

<sup>2</sup> The Methodology was updated to reflect usage of SOFR from 5<sup>th</sup> October 2021

*Average(RC IL(t): RCIL(t – 19d))* : Average if respective Risk Controlled regime sub-index levels over 20 trading days

*Average(RC IL(t – 12m): RCIL(t – 12m – 19d))* : Average if respective Risk Controlled regime sub-index levels from 12 months back over 20 trading days

A corresponding momentum overlay weight is assigned to the respective risk-controlled regime sub-indices to get final regime sub-indices. The weight is assigned as  $ETO(t-1TD) > 1$ ,  $LeverageWeight(t) = 130\%$  else  $LeverageWeight(t) = 30\%$ . This weight is applied by smoothing over 5 trading days.

The momentum Leverage weight applicable on an effective date is determined based on the average LeverageWeight over 5 previous trading days starting one trading day before effective date.

## 2.4 CFNAI SIGNAL

A Chicago Fed National Activity Index derived signal is used for allocating weights between different final regime sub-indices. We calculate 2 derivations of the CFNAI Index:

$$CFNAI_{change} = CFNAI(t) - CFNAI(t - 3)$$

Where:

$CFNAI(t)$  = The latest available CFNAI Index value as of t

$CFNAI(t - 3)$  = The latest available 3-month prior CFNAI Index value as of t

$$CFNAI_{Average} = 0.6 * CFNAI(t) + 0.3 * CFNAI(t - 1) + 0.1 * CFNAI(t - 2)$$

Where:

$CFNAI(t)$  = The latest available CFNAI Index value as of t

$CFNAI(t - 1)$  = The latest available 1-month prior CFNAI Index value as of t

$CFNAI(t - 2)$  = The latest available 2-month prior CFNAI Index value as of t

$CFNAI(t - 3)$  = The latest available 3-month prior CFNAI Index value as of t

## 2.5 WEIGHT CALCULATION

At each monthly index rebalance date, 100% weight is allocated to any of the Regime Momentum Leveraged Sub Index based on the following rule:

- If  $CFNAI_{Change}(t) \geq 0$  and  $CFNAI_{Average}(t) \geq 0$  Then IndexExpansion = 100%
- If  $CFNAI_{Change}(t) \geq 0$  and  $CFNAI_{Average}(t) < 0$  Then IndexRecovery = 100%
- If  $CFNAI_{Change}(t) < 0$  and  $CFNAI_{Average}(t) \geq 0$  Then IndexSlowdown = 100%
- If  $CFNAI_{Change}(t) < 0$  and  $CFNAI_{Average}(t) < 0$  Then  
 If  $CFNAI_{Change}(t - 1) \geq 0$  and  $CFNAI_{Average}(t - 1) < 0$  Then IndexRecovery = 100%  
 Otherwise, IndexContraction = 100%



### 3 MAINTAINING THE INDEX

#### 3.1 MONTHLY INDEX REVIEWS

The MSCI USA Business Cycle Select Factor Index is reviewed on a monthly basis.

##### 3.1.1 STAGGERED REBALANCE

The monthly Index rebalance is staggered over a period of 3 days starting on the last trading day of each month. Three versions of the Index are calculated, based on the steps described above, each having their rebalancing dates as last but one trading day of the month, last trading day of the month and 1<sup>st</sup> trading day of subsequent month with their respective effective dates as the Last trading day of the month, 1<sup>st</sup> trading day of subsequent month and to 2<sup>nd</sup> trading day of subsequent month. These indexes are then equal weighted to arrive at the final index, which rebalances to equal weights.

#### 3.2 ONGOING EVENT RELATED CHANGES

The following section briefly describes the treatment of common corporate events within each of the component indices of the MSCI USA Business Cycle Select Factor Index:

- MSCI USA Quality Index
- MSCI USA Equal Weight Index
- MSCI USA Enhanced Value Index
- MSCI USA Minimum Volatility Index
- MSCI USA Momentum Index

No new securities will be added (except where noted below) to the Index between Index Reviews. For cases where additions are noted below, securities will be added to the index only if added to the parent index. Parent Index deletions will be reflected simultaneously.

#### EVENT TYPE

#### EVENT DETAILS

##### New additions to the Parent Index

A new security added to the parent index (such as IPO and other early inclusions) will not be added to the index.

##### Spin-Offs

All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for

continued inclusion in the Index will occur at the subsequent Index Review.

**Merger/Acquisition**

For Mergers and Acquisitions, the acquirer’s post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index.

If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index and the acquiring non-constituent will not be added to the Index.

**Changes in Security Characteristics**

A security will be kept in the Index if there are changes in its characteristics (country, sector, size segment, etc.) Reevaluation for inclusion in the Index will occur at the subsequent Index Review.

Further detail and illustration regarding specific treatment of corporate events relevant to this Index can be found in the MSCI Corporate Events Methodology book under the sections detailing the treatment of events in Capped Weighted and Non-Market Capitalization Weighted indexes.

The MSCI Corporate Events methodology book is available at: <https://www.msci.com/index-methodology>

## APPENDIX 1 METHODOLOGY FOR COMPONENT INDEXES

### SGX 5-Year Risk Controlled US Treasury Futures Index

The SGX 5-Year Risk Controlled US Treasury Futures Index is calculated in USD and utilized for the calculation of Risk Controlled Sub-Indices.

The returns of SGX 5-Year US Treasury Futures Index (Parent Index) are used for volatility estimation. The volatility estimation approach considers both the short-term and the long-term volatility trends of the parent index. Volatility is calculated as the maximum of two volatility estimates: the short-term realized volatility estimate, calculated over a short horizon of 20 days, and the long-term realized volatility estimate, calculated over a long horizon of 60 days. The volatility estimation approach uses equally weighted daily price returns of the parent index for both horizons. The volatility calculation formulas are described below:

$$\text{Realized Volatility}_t = \sqrt{\frac{252}{n} * \text{Variance}(t)}$$

$$\text{Variance}(t) = \frac{1}{N} * \sum_{t-N+1}^t \left[ \ln \left( \frac{\text{Parent Index}(i)}{\text{Parent Index}(i-n)} \right) \right]^2$$

n = Number of interval days used for return calculation; n=1 for daily returns

N = Total number of historical trading days used for variance calculation and varies for short-term volatility estimate (N = 20) and long-term volatility estimate (N = 60)

$$\begin{aligned} &\text{Parent Index Volatility}(t) \\ &= \text{Max}(\text{Short term Realized Volatility}(t), \text{Long term Realized Volatility}(t)) \end{aligned}$$

### INDEX LEVERAGE

The objective of the Risk Control is to replicate the performance of a strategy that targets a specific level of risk by varying the weights of the parent index and a cash component. The Index Leverage is calculated daily as the ratio of the specific risk level and the Parent Index Volatility subject to a maximum leverage of 100%. If the SGX Parent Index Volatility is higher than 6% then the weight of the SGX Parent Index will be less than 100% while the weight of the cash component will be 100% minus the weight of the parent index. The daily return on the cash component is determined using 3-month Libor rate. The Index Leverage applicable

on an effective date is determined using the parent index volatility estimated two trading days before the effective date.

The index methodology of SGX 5-Year US Treasury Futures Index as of 29<sup>th</sup> August 2019 has been published at:

<https://api2.sgx.com/sites/default/files/2019-08/5-Year%20US%20Treasury%20Futures%20Index%20-%20Index%20Methodology.pdf>

## Methodology Book Tracked Changes

First Version reviewed and published in September 2019.

The following modifications are effective from 5<sup>th</sup> October 2021.

- **Section 2.2.4: Interest Rate Deduction**
  - The First Version reflected using 3 month and 2 month Libor for Interest Rate Deduction.
  - The Methodology was updated to reflect usage of SOFR rate for Interest Rate Deduction from 5<sup>th</sup> October 2021.

## CONTACT US

clientservice@msci.com

### AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
Sao Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

### EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

### ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Tokyo	+ 81 3 5290 1555

\* = toll free

## ABOUT MSCI

For more than 40 years, MSCI's research-based indexes and analytics have helped the world's leading investors build and manage better portfolios. Clients rely on our offerings for deeper insights into the drivers of performance and risk in their portfolios, broad asset class coverage and innovative research.

Our line of products and services includes indexes, analytical models, data, real estate benchmarks and ESG research.

MSCI serves 98 of the top 100 largest money managers, according to the most recent P&I ranking.

For more information, visit us at [www.msci.com](http://www.msci.com).

## NOTICE AND DISCLAIMER

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or disseminated in whole or in part without prior written permission from MSCI.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investable assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on [www.msci.com](http://www.msci.com).

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of [www.msci.com](http://www.msci.com).

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD, FEA, InvestorForce, and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.