



# JANUS HENDERSON INDICES

The VelocityShares 4X Currency  
Indices Methodology  
July 2018

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## Table of Contents

Introduction.....	3
Index Sponsor and Index Calculation Agent.....	3
Index Overview.....	4
Index Calculations for the Indices.....	6
Index Maintenance .....	10
Index Committee.....	12
Contact Information.....	14
Disclosures.....	15
Appendix I: Reference Adjustments.....	16
Appendix II: Holiday Schedule .....	17
Appendix III: Indices .....	18
Appendix IV: Currency Inversion.....	19

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## Introduction

This document describes the VelocityShares 4X Currency Indices Methodology. Each Index in the family of VelocityShares 4X Currency Indices is designed to track a long leveraged exposure to the performance of one currency in a Currency Pair relative to the other on a daily-compounded basis. Each Currency Pair includes the US Dollar as one of the underlying currencies. Because the underlying currencies are traded with ample liquidity, the Indices are fully replicable using standard foreign exchange products.

The index methodology is flexible: it is designed to handle an array of reference currencies, including currencies that are quoted directly and currencies that are quoted indirectly.

The Indices' Inception Date was October 31, 2017. All data prior to this date is a backtest.

## Index Sponsor and Index Calculation Agent

The Index Sponsor is Janus Index & Calculation Services LLC. As at the date of this Index Methodology, the Index Sponsor has appointed Solactive as Index Calculation Agent to calculate and publish the Indices in accordance with the Index Methodology contained in this document. The Index Sponsor may, in its sole discretion and without notice, appoint an alternative Index Calculation Agent at any time which may be the Index Sponsor or one of its Affiliates.

The Index Sponsor's determinations in respect of the Indices shall be final.

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## Index Overview

The VelocityShares 4X Currency Index family of indices is a proprietary suite of indices sponsored by Janus Index & Calculation Services LLC (the “Index Sponsor”). Each Index is designed to reflect 4X leveraged exposure on a daily-resetting basis to one currency in an underlying Currency Pair relative to the other.

Each Index references a particular Currency Pair, where one of the currencies in the pair is the US Dollar and the other is a foreign currency. The exchange rate between the currencies in a Currency Pair may be quoted in one of two ways: (i) as a number of US Dollars per 1 unit of the foreign currency or (ii) as a number of units of the foreign currency per 1 US Dollar. In the foreign exchange market, for a given Currency Pair, if the standard method of quoting the exchange rate is as a number of US Dollars per 1 unit of the foreign currency, that Currency Pair is said to have an “indirect” quotation standard, and if the standard method of quoting the exchange rate is as a number of units of the foreign currency per 1 US Dollar, that Currency Pair is said to have a “direct” quotation standard.

The following is a list of the foreign currencies paired with the US Dollar that are referenced by the Indices along with their currency quotation standard v. the US Dollar:

Currency Code	Currency	Currency Quotation Standard
JPY	Japanese Yen	Direct: An amount of Japanese Yen per 1 U.S. Dollar
EUR	Euro	Indirect: An amount of U.S. Dollars per 1 Euro
GBP	British Pound	Indirect: An amount of U.S. Dollars per 1 British Pound
CHF	Swiss Franc	Direct: An amount of Swiss Francs per 1 U.S. Dollar
AUD	Australian Dollar	Indirect: An amount of U.S. Dollars per 1 Australian Dollar

For each pair of currencies (of which the US Dollar is one currency), there are two Indices, which take the form of the VelocityShares Daily 4X Long FOR vs. USD Index (where “FOR” is a placeholder for a foreign currency) and the VelocityShares Daily 4X Long USD vs. FOR Index. In other words, for each Currency Pair, there is one Index that reflects a long position in the US Dollar relative to the foreign currency, and one Index that reflects a long position in the foreign currency relative to the US Dollar. The currency in which a given Index reflects a long position is referred to as the “Long Currency” for that Index, and the other currency is referred to as the “Reference Currency” for that Index. In sum, there are 5 Currency Pairs and thus there are 10 Indices. The 10 indices and their tickers are provided in Appendix III.

### Prices

The Spot prices for each Currency Pair’s standard quotation on an “Index Business Day” are the WM/Reuters Bid, Ask and Mid Spot prices of the Currency Pair as reported by Thomson Reuters as of 9:00AM New York Time on such Index Business Day. The Forward Points for each Currency Pair’s standard quotation on an “Index Business Day” are the WM/Reuters Bid, Ask and Mid Forward Points of the Currency Pair as reported by Thomson Reuters as of 9:00AM New York Time on such Index Business Day. In the event that forward points are not available, forward points from 9:00AM New York Time on the most recent Index Business Day for which these forward points were available are used.

On days where the NYSE is open (and the Index is being calculated) but the Currency Pair has a settlement holiday, the Forward Points for that Currency Pair are zeroed out. However, the underlying Index is still calculated.

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For purposes of calculating the levels of the Indices, the Spot Price is always expressed as a number of units of the Reference Currency per 1 unit of the Long Currency. If the standard quotation convention for a given Currency Pair is not consistent with this, then the Indices will determine the applicable Spot Price as the reciprocal of the quotation in the standard convention as set forth in Appendix IV. The Forward Points will be expressed on a similar basis and, to the extent the standard quotation convention is not consistent with this, the quoted Forward Points will be inverted as set forth in Appendix IV.

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## Index Calculations

Each Index Level on the Index Start Date, January 2, 2004, is a number such that on December 30<sup>th</sup> 2016 the Index Level is 10,000. The official Index Level on each Index Business Day is referred to as the “Fixing Index Level.”

Each Fixing Index Level on each Index Business Day  $t$  (following the Index Start Date) shall be an amount determined by the Index Calculation Agent in accordance with the formula set out below.

Let

$$I_t$$

be the Index Level at time  $t$ .  $I_0$  is the Index Level on the Index Start Date.

Let

$$LR = 4$$

### Long FOR vs. USD Indices

For Indices where the foreign currency is the Long Currency and the US Dollar is the Reference Currency, all prices are expressed as (or, in the case of Forward Points, in a manner consistent with) a number of US Dollars per 1 unit of the foreign currency.

For Indices where the foreign currency is the Long Currency and the US Dollar is the Reference Currency, the US Dollar exposure on Day 0 is

$$Exp_0^{USD} = I_0 \times LR$$

US Dollar exposure is simply the leverage ratio times the starting Index Level. To compute foreign currency exposure (rounded to 8 decimal points), we use the Spot price on Day 0 (Mid).

$$Exp_0^{FOR} = Exp_0^{USD} / S_0^{Mid}$$

Where

$$S_t^{Mid}$$

is, more broadly, the Spot Price (Mid) on Day  $t$ . In other words, the USD exposure is what an investor would pay in dollars and the foreign currency exposure is what an investor would receive in foreign currency at settlement. On Day 1, the foreign currency receipt is then valued with a price that settles one day prior to spot settlement, based on the Tom-Next Bid. P&L is calculated versus the price paid for the foreign currency, i.e. the USD exposure from Day 0:

$$\pi_1 = Exp_0^{FOR} \times TN_1^{Bid} - Exp_0^{USD}$$

( $Exp_0^{USD}$ ,  $TN_1^{Bid}$ , and  $Exp_0^{FOR} * TN_1^{Bid}$  are all rounded to 8 decimal points)

Where

$$TN_t^{Bid} = S_t^{Mid} - TNFP_t^{Ask}$$

And TNFP represents the Tom-Next Forward Points. The Index accrues this P&L:

$$I_1 = I_0 + \pi_1$$

The foreign currency exposure is then rolled at the Spot Mid price. Any additional foreign currency exposure (positive or negative) is an adjustment to the foreign currency receipt, which is based off the Index Level at time t:

$$Exp_t^{USD} = LR \times I_t$$

The adjustment is done on the Spot Bid or Ask price, depending on the directionality of the trade:

$$\begin{aligned} ADJ_t^{USD} &= Exp_t^{USD} - Exp_{t-1}^{FOR} \times S_t^{Mid} \\ ADJ_t^{FOR} &= ADJ_t^{USD} / S_t^{B/A} \\ Exp_t^{FOR} &= Exp_{t-1}^{FOR} + ADJ_t^{FOR} \end{aligned}$$

( $Exp_t^{USD}$ ,  $Exp_{t-1}^{FOR} * S_t^{Mid}$ ,  $S_t^{B/A}$ , and  $ADJ_t^{FOR}$  are all rounded to 8 decimal points)

where

$$S_t^{B/A} = \begin{cases} S_t^B & \text{if } ADJ_t^{USD} < 0 \\ S_t^A & \text{if } ADJ_t^{USD} > 0 \end{cases}$$

and

$$S_t^B$$

and

$$S_t^A$$

are the Spot Price (Bid) and Spot Price (Ask) respectively at Day t. Once again the P&L is calculated

$$\pi_t = Exp_{t-1}^{FOR} \times TN_t^{Bid} - Exp_{t-1}^{USD}$$

and added to the Index Level:

$$I_t = I_{t-1} + \pi_t$$

The return on the Index on any given day is

$$r_t = \frac{I_t}{I_{t-1}} - 1$$

### Long USD vs. FOR Indices

For Indices where the US Dollar is the Long Currency and the foreign currency is the Reference Currency, all prices are expressed as (or, in the case of Forward Points, in a manner consistent with) a number of units of the foreign currency per 1 US Dollar.

For Indices where the US Dollar is the Long Currency and the foreign currency is the Reference Currency, the US Dollar exposure on Day 0 is

$$Exp_0^{USD} = I_0 \times LR$$

US Dollar exposure is simply the leverage ratio times the starting Index Level. To compute foreign currency exposure (rounded to 8 decimal points), we use the Spot price on Day 0 (Mid).

$$Exp_0^{FOR} = Exp_0^{USD} \times S_0^{Mid}$$

Here, the USD exposure is what an investor would receive in dollars and the foreign currency exposure is what an investor would pay in foreign currency at settlement. On Day 1, the foreign currency receipt is then valued with a price that settles one day prior to spot settlement, based on the Tom-Next Bid Price. P&L is calculated versus the price received for the foreign currency, i.e. the USD exposure from Day 0:

$$\pi_1 = Exp_0^{USD} - Exp_0^{FOR} / TN_1^{Bid}$$

( $Exp_0^{USD}$ ,  $TN_1^{Bid}$ , and  $\frac{Exp_0^{FOR}}{TN_1^{Bid}}$  are all rounded to 8 decimal points)

The Index accrues this P&L:

$$I_1 = I_0 + \pi_1$$

The foreign currency exposure is then rolled at the Spot Mid price. Any additional foreign currency exposure (positive or negative) is an adjustment to the foreign currency payment, which is based off the Index Level at time t:

$$Exp_t^{USD} = LR \times I_t$$

The adjustment is done on the Spot Bid or Ask price, depending on the directionality of the trade:

$$\begin{aligned} ADJ_t^{USD} &= Exp_t^{USD} - Exp_{t-1}^{FOR} / S_t^{Mid} \\ ADJ_t^{FOR} &= ADJ_t^{USD} \times S_t^{B/A} \\ Exp_t^{FOR} &= Exp_{t-1}^{FOR} + ADJ_t^{FOR} \end{aligned}$$

( $Exp_t^{USD}$ ,  $Exp_{t-1}^{FOR} / S_t^{Mid}$ ,  $S_t^{B/A}$ , and  $ADJ_t^{FOR}$  are all rounded to 8 decimal points)

where now

$$S_t^{B/A} = \begin{cases} S_t^B & \text{if } ADJ_t^{USD} < 0 \\ S_t^A & \text{if } ADJ_t^{USD} > 0 \end{cases}$$

Once again the P&L is calculated

$$\pi_t = Exp_{t-1}^{USD} - Exp_{t-1}^{FOR} / TN_t^{Bid}$$

and added to the Index Level:

$$I_t = I_{t-1} + \pi_t$$

The return on the Index on any given day is



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$$r_t = \frac{I_t}{I_{t-1}} - 1$$

### **Intra-day Index Calculation**

The value of each index will be calculated intra-day by applying the then current currency prices of the reference currencies as if they were the fixing prices and following the calculations described above. Intra-day index levels are indicative only and may use real-time currency rates from alternative sources other than Thomson Reuters, the primary source.

## **Intra-Day Index Calculation**

The value of each index will be calculated intra-day by applying the then current currency prices of the reference currencies as if they were the fixing prices and following the calculations described above. Intra-day index levels are indicative only and may use real-time currency rates from alternative sources other than Thomson Reuters, the primary source.

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## **Index Maintenance**

### **Base Date**

Each Index has a level of 10,000 on December 30th, 2016.

### **Adjustments**

The index committee will be solely responsible for the determination and calculation of any adjustments to the price of any underlying currency of an index and of any related determinations and calculations with respect to any adjustment and its determinations and calculations will be conclusive absent manifest error.

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## Index Policy

### Announcements

Announcements regarding changes to any of the indices will be made publicly available prior to the effective date of the change. All announcements will be published on the index website: [indices.janushenderson.com](http://indices.janushenderson.com).

### Holiday Schedule

Each index will be calculated on days when the NYSE is open for trading (each, an “Index Business Day”).

### Force Majeure

Calculation of the indices may not be possible or feasible under certain events or circumstances, including, without limitation, market disruptions, a systems failure, 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 provider and that the index provider determines affects the Indices or underlying currency markets. Upon the occurrence of any occurrence deemed to be a force majeure event as determined by the index provider, the index provider may, in its discretion, elect one (or more) of the following options:

- I. Make such determinations and/or adjustments to the terms of an Index as it considers appropriate to determine any fixing level on any such appropriate Index Business Day; and/or
- II. Defer publication of the information relating to an Index until the next Index Business Day on which it determines that no force majeure event exists; and/or
- III. Permanently cancel the publication of the information relating to an Index.

The index provider employs the methodology described above and its application of the methodology shall be conclusive and binding.

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## Index Committee

The index committee is responsible for reviewing the design, composition, and calculation of the VelocityShares Indices, the development of new indices, and to determine changes, if any, to the index methodology, and the treatment of corporate actions.

Decisions made by the index committee include all matters relating to index policy and maintenance. The index committee meets periodically to review market conditions and index performance. The committee meets on as-needed basis to address major market developments.

**The index committee reserves the right to exercise its discretion in making decisions with respect to any index policy or action. Index committee internal procedures and discussions are confidential.**

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## Index Dissemination

### Index Tickers

The indices are calculated in real-time and disseminated over the Consolidated Tape Association every 15 seconds during the US trading Day. Official Fixing Index Levels are published each Index Business Day at approximately 6PM Eastern Time to [indices.janushenderson.com](http://indices.janushenderson.com).

### FTP

Daily Index Level information is available via FTP. Please contact the Index Sponsor for subscription information.

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## Contact Information

Email: [qs@janushenderson.com](mailto:qs@janushenderson.com)

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## Appendix I: Reference Adjustments

The “Reference Currency Sponsor,” with respect to an Underlying Currency Pair, refers to that company or entity that (a) is responsible for setting and reviewing the rules and procedures and the methods of calculation and adjustments, if any, related to the Reference Currency Prices and (b) announces (directly or through an agent) the level of such Reference Currency Prices.

### Successor Reference Currency Sponsor

If Spot Prices and/or Forward Points (“Reference Currency Prices”) are (i) not calculated and announced by the relevant Reference Currency Sponsor but are calculated and announced by a successor sponsor acceptable to the Index Calculation Agent, or (ii) replaced by successor Spot Prices and/or Forward Points using, in the determination of the Index Calculation Agent, the same or a substantially similar formula for and/or method of calculation, then in each case those Spot Prices and/or Forward Points (the “Successor Currency Prices”) will be deemed to be the relevant Reference Currency Prices with effect from the date determined by the Index Calculation Agent who may make such adjustment(s) to the Index Conditions as it determines appropriate to account for such change.

### Reference Currency Price Modification and Reference Currency Price Cancellation

If a Reference Currency Sponsor announces that it will make a material change in the formula for or method of calculating a Reference Currency Price or in any other way materially modifies that Reference Currency Price (other than a modification prescribed in that formula or method to maintain that Reference Currency Price) (a “Reference Currency Price Modification”) or permanently cancels that Reference Currency Price and no Successor Reference Currency Price exists (a “Reference Currency Price Cancellation” and, together with a Reference Currency Price Modification, each a “Reference Currency Price Adjustment Event”), then:

- I. the Index Calculation Agent may suspend the calculation, publication and dissemination of the Index and the Index Level until the first succeeding Index Business Day on which such event does not occur or continue to occur; and/or
- II. the Index Calculation Agent may select a replacement Reference Currency Price that has substantially similar characteristics to the Reference Currency Price that is being replaced, having regard to the manner in which such Reference Currency Price is used in the calculation of the Index, in which case the Index Calculation Agent will (a) determine the effective date of such replacement, and (b) make such adjustment(s) to the Index Conditions as it determines appropriate to account for the effect on the Index of such replacement; and/or
- III. the Index Sponsor may discontinue and cancel the Index.

### Cancellation of Reference Currency Price License

If, in respect of a Reference Currency Price, a license granted (if required) to the Index Sponsor and/or the Index Calculation Agent and/or any of their respective Affiliates, to use such Reference Currency Price in connection with the Index is terminated, or any such entity’s right to use such Reference Currency Price in connection with calculating the Index is otherwise disputed, impaired or ceases for any reason, then:

- I. the Index Calculation Agent may suspend the calculation, publication and dissemination of the Index and the Index Level until the first succeeding Index Business Day on which such event does not occur or continue to occur; and/or



- II. the Index Calculation Agent may select a replacement Reference Currency Price that has substantially similar characteristics to the Reference Currency Price that is being replaced, having regard to the manner in which such Reference Currency Price is used in the calculation of the Index, in which case the Index Calculation Agent will (a) determine the effective date of such replacement, and (b) make such adjustment(s) to the Index Conditions as it determines appropriate to account for the effect on the Index of such replacement; and/or
- III. the Index Sponsor may discontinue and cancel the Index.

**Corrections of published levels, prices, rates or values in respect of a Reference Currency Price**

If, in respect of a Reference Index, any level, price, rate or value (as applicable) in respect of such Reference Index or any related derivative or other related instrument, for any time on any day, which is announced by or on behalf of the person or entity responsible for such publication or announcement and which is used for any calculation or determination in respect of the Index, is subsequently corrected, and such correction (the “Corrected Level”) is published by or on behalf of such person or entity within two Index Business Days after the original publication, then such Corrected Level shall be deemed to be the level, price, rate or value (as applicable) for such Reference Index, related derivative or other related instrument (as the case may be) for the relevant time on the relevant day and the Index Sponsor may, but shall not be obliged to, make appropriate adjustments to the Index and the Index Level for the relevant Index Business Day(s).

**Appendix II: Holiday Schedule**

**NYSE Holiday Schedule**

2017	2018	2019
January 2	January 1	January 1
January 16	January 15	January 21
February 20	February 19	February 18
April 14	March 30	April 19
May 29	May 28	May 27
July 4	July 4	July 4
September 4	September 3	September 2
November 23	November 22	November 28
December 25	December 25	December 25

## Appendix III: Indices

### Fixing Index Tickers

Fixing Index Ticker	Index Name	Underlying Foreign Currency
UJPYFV	VelocityShares Daily 4X Long JPY vs. USD Index	Japanese Yen
UEURFV	VelocityShares Daily 4X Long EUR vs. USD Index	Euro
UGBPFV	VelocityShares Daily 4X Long GBP vs. USD Index	British Pound
UCHFFV	VelocityShares Daily 4X Long CHF vs. USD Index	Swiss Franc
UAUDFV	VelocityShares Daily 4X Long AUD vs. USD Index	Australian Dollar
DJPYFV	VelocityShares Daily 4X Long USD vs. JPY Index	Japanese Yen
DEURFV	VelocityShares Daily 4X Long USD vs. EUR Index	Euro
DGBPFV	VelocityShares Daily 4X Long USD vs. GBP Index	British Pound
DCHFFV	VelocityShares Daily 4X Long USD vs. CHF Index	Swiss Franc
DAUDFV	VelocityShares Daily 4X Long USD vs. AUD Index	Australian Dollar

### Intraday Index Tickers

Intraday Index Ticker	Index Name	Underlying Foreign Currency
UJPYID	VelocityShares Daily 4X Long JPY vs. USD Index	Japanese Yen
UEURID	VelocityShares Daily 4X Long EUR vs. USD Index	Euro
UGBPID	VelocityShares Daily 4X Long GBP vs. USD Index	British Pound
UCHFID	VelocityShares Daily 4X Long CHF vs. USD Index	Swiss Franc
UAUDID	VelocityShares Daily 4X Long AUD vs. USD Index	Australian Dollar
DJPYID	VelocityShares Daily 4X Long USD vs. JPY Index	Japanese Yen
DEURID	VelocityShares Daily 4X Long USD vs. EUR Index	Euro
DGBPID	VelocityShares Daily 4X Long USD vs. GBP Index	British Pound
DCHFID	VelocityShares Daily 4X Long USD vs. CHF Index	Swiss Franc
DAUDID	VelocityShares Daily 4X Long USD vs. AUD Index	Australian Dollar

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## Appendix IV: Currency Inversion

For currency inversions, we take reciprocals of the Bid, Mid and Ask Spot prices to yield the Ask, Mid and Bid prices. So, for example, a USDFOR Ask Spot price is the reciprocal of the FORUSD Bid Spot Price. A “USDFOR” price is expressed in terms of a number of units of foreign currency per 1 US Dollar, and a “FORUSD” price is expressed in terms of a number of US Dollars per 1 unit of foreign currency.

Forward Points are calculated as follows, depending on which is provided as the standard quotation:

$$TNFP_t^{FORUSD,Bid} = - \left( \frac{1}{\left( S_t^{USDFOR,Bid} - \frac{TNFP_t^{USDFOR,Ask}}{Scale} \right)} - \frac{1}{S_t^{USDFOR,Bid}} \right) \times Scale$$

$$TNFP_t^{FORUSD,Ask} = - \left( \frac{1}{\left( S_t^{USDFOR,Ask} - \frac{TNFP_t^{USDFOR,Bid}}{Scale} \right)} - \frac{1}{S_t^{USDFOR,Ask}} \right) \times Scale$$

$$TNFP_t^{USDFOR,Bid} = - \left( \frac{1}{\left( S_t^{FORUSD,Bid} - \frac{TNFP_t^{FORUSD,Ask}}{Scale} \right)} - \frac{1}{S_t^{FORUSD,Bid}} \right) \times Scale$$

$$TNFP_t^{USDFOR,Ask} = - \left( \frac{1}{\left( S_t^{FORUSD,Ask} - \frac{TNFP_t^{FORUSD,Bid}}{Scale} \right)} - \frac{1}{S_t^{FORUSD,Ask}} \right) \times Scale$$

Unless otherwise specified, Scale is set to one (we allow for other scaling factors if the forward points are not quoted as true decimals either because of a change in format or change in sourcing).