



SPIKES[®] Volatility Products

Interactive resource on the index, products and more.

Table of Contents

Jump to:

O V E R V I E W

S P I K E S[®] O P T I O N S

S P I K E S[®] F U T U R E S

A P P E N D I X



OVERVIEW

O V E R V I E W

Key Features



Volatility, reimagined.

SPIKES® Futures

Offered by MGEX and now trading on the CME GLOBEX® platform. Trade 23 hours a day, 5 days per week with highly accurate data and peak transparency.

SPIKES® Options

Now trading on MIAX®. Get fully-electronic execution, unparalleled determinism, low latency, high throughput, and unmatched uptime.

SPIKES® Combos

Orders to buy or sell one or more SPIKES Options series and the offsetting number of SPIKES Combinations to be delta neutral – with ratios of up to eight to one.

Powered by **miox**®

One of the fastest, most efficient trading platforms in the world, offering complex trading and price improvement auctions with industry-leading risk control features.

Contact us

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MIAX is proud to partner with T3 index to offer SPIKES Volatility Products.

Track accurately



30-day volatility

The SPIKES Volatility Index (index symbol: SPIKE) is a measure of the expected 30-day volatility in the SPDR® S&P 500® ETF (SPY).



SPY

The SPIKES Index uses live SPY options prices—traded on all U.S. options exchanges—to calculate volatility.



Dissemination speed

Radically faster index calculation dissemination, publishing every 100 milliseconds, ensures pinpoint accuracy of market conditions.



Price Dragging

This proprietary technique uses a blend of trades, bids, and offer prices in the index calculation to insulate the index from erratic movements.

Trade confidently

New choice and transparency

SPY options are traded on all U.S. options exchanges, and the SPIKES settlement auction is visible to all MIAX market participants. This enables market participants to arbitrage SPY option mispricings, enhancing the accuracy of the SPIKES index settlement value.

Ultra-low exchange fees

Trade volatility more affordably than ever, thanks to highly competitive exchange fees that put the customer first.

Imbalance messages

During the settlement auction, MIAX provides imbalance messages to all market participants for all components eligible to be included in the index settlement value calculation.

Rich data and analytics

Visit spikesanalytics.com for settlement process analytics immediately following the auction.

O V E R V I E W

Index
Methodology



SPIKES® Volatility Index Methodology Guide



T3
Index

Introduction

The SPIKES Volatility Index (SPIKES) is a measure of expected 30-day volatility in the SPDR® S&P 500® ETF (SPY), the largest exchange-traded fund in the world that tracks the most widely-followed stock index in the United States. With over \$38 billion in daily notional value traded per day, SPY is the world's most actively traded ETF.¹

A by-product of SPY's popularity is a highly liquid market for its associated options, accounting for a daily notional trading value of \$140 billion.² SPIKES is calculated using live prices on options linked to SPY and represents the market's expectation of price movements in SPY over the next 30 days.

To best align to the way the trading community models risk and hedges exposure, SPIKES is constructed using the well-known variance swap methodology using live options prices to calculate volatility. SPIKES can be physically replicated with a strip of options, and can easily be incorporated into the existing ecosystem of volatility-based products, which include options, futures, and ETPs.

In addition, SPIKES incorporates material enhancements in its calculation to help improve index stability - namely its proprietary "price dragging" technique, which is designed to reduce erratic movements in the index during periods of high volatility and/or low liquidity in the broader market. Options are often quoted in bulk by market makers, which in some cases cause a divergence from orthodox supply-demand dynamics as quotes are constantly updated across a series of strikes throughout the day. As a result, there can be more notable movements within the bid/ask spread that impact the calculation of an index based on mid-point prices. SPIKES proprietary price dragging technique has been designed to mitigate this effect, producing a more stable index value.

Moreover, to calculate the index, SPIKES uses highly-active, electronically-traded multi-listed SPY options over singly-listed S&P 500 index options. This better reflects the nature of today's high-velocity, and principally electronic, options market.

¹ Source: Yahoo Finance - based on 2020 H1 figures

² Source: iVolatility

The SPIKES Formula

Like most indices, SPIKES has a defined rules-based approach to selecting components—a series of options on SPY—and weighting them to derive a single price for the index.

The formula for expected T-term variance is as follows:

$$\sigma^2 = \frac{1}{T} \left[2e^{RT} \sum_i \frac{\Delta K_i p_i}{K_i^2} - \left(\frac{e^{RT}(p_{ATM}^c - p_{ATM}^p)}{K_{ATM}} \right)^2 \right]$$

p_{ATM}^c Price of the at-the-money (ATM) SPY call option
 p_{ATM}^p Price of the ATM SPY put option
 K_{ATM} Strike closest to the point where linearly interpolated SPY call and put prices intersect

T Time to options expiration (in years, with 1-second precision)
 K_i, p_i A list of unique SPY options strikes, ordered from lowest to highest, and corresponding SPY options prices; of a call if $K_i > K_{ATM}$; and of a put if $K_i < K_{ATM}$; if $K_i = K_{ATM}$ then an average between the ATM SPY put and call prices
 ΔK_i Half the difference between the strikes on either side of K_i

$$\Delta K_i = \frac{(K_{i+1} - K_{i-1})}{2}$$

For the last (highest and lowest) selected strikes, ΔK_i is simply the absolute difference between K_i and the nearest selected option's strike
R Risk-free interest rate to option's expiration

Calculation Methodology

SPIKES is calculated using only standard options on SPY that expire on the third Friday of each calendar month. Although weekly options on SPY are available, these are **not** used in the calculation of the SPIKES Index.

The calculation linearly interpolates between the variances of two monthly expirations—near-term (the closest expiration more than two full days into the future) and next-term (the monthly expiration following the near-term). This expiration selection method is used to avoid using highly irregular option prices close to the options settlement date.

The 30-day point is typically in between these two expirations and the index value is interpolated between the volatilities of these two terms. When the closest expiration is too close to expiry (less than two full days), rolling to the third-closest expiration occurs. This rolling rule serves to reduce spurious variability in the index by means of minimizing the period of “extrapolation” between the two expirations. The switch from closest to third-closest expiry rarely has any noticeable impact on the index value, as the weight of the switched term is close to zero.

After the SPY options expirations used in the calculation have been selected, the calculation proceeds as follows:

1. Determine Option Prices

SPIKES uses a proprietary “price dragging” technique to capture live options prices as inputs for the index calculation. The option price inputs that result from price dragging are called Cash Reference Prices (CRPs), and determined as follows:

- Set all CRPs to 0 at SPY options market opening;
- For trades, only consider standard simple trades (conditions “space”, I, or J.)
- For quotes, only consider NBBO eligible bids and offers from all eligible exchanges (quote conditions A, B, C, O, or “space”)
- Block trades, out of sequence prints, as well as trades resulting from complex transactions and stopped orders are ignored.
- On the opening quote, the opening **bid** is used as the CRP;
- When there is a trade, the CRP is set to trade price;
- For newly-placed ask (bid) quotes, if the ask (bid) is lower (higher) than current CRP, the CRP is set to ask (bid).

This method should materially reduce erratic movements of the index value as quotations on out-of-the-money (OTM) options are rapidly altered during times of low liquidity and or high volatility.

SPIKES Overview: Index Methodology

2. Select the Options Used in the Calculation

For each of the expirations, the options to be used in the calculation are then selected by removing in-the-money (ITM) and far OTM options:

- To determine the at-the-money (ATM) strike, only use strikes for which both the call and put prices are available. For each strike, find the absolute value of the call CRP minus the put CRP, and select the strike where that value is closest to zero. In the case of a tie, select the lower strike.
- Stepping away from the ATM, (for puts going to the next lower strike, and for calls the next higher strike) when two consecutive options with CRPs of 5 cents or less are reached exclude all options further away from the money.

3. Weight the Options and Estimate Volatility

For each term, the volatility is estimated using the variance swap formula, with the selected options' CRPs weighted according to the SPIKES formula:

$$\sigma^2 = \frac{1}{T} \left[2e^{RT} \sum_i \frac{\Delta K_i p_i}{K_i^2} - \left(\frac{e^{RT}(p_{ATM}^c - p_{ATM}^p)}{K_{ATM}} \right)^2 \right]$$

The risk-free interest rate is the yield (mid-point of bid-ask) for the United States Treasury Bill which matures on the date closest to the monthly SPY expiration--generally the day prior to the monthly expiration date. In the event of two T-Bills maturing equidistant from the monthly options expiration, use the shortest dated maturity.

4. Calculate the Index

Compute the 30-day weighted average of the near- and next-term variances, take the square root, and multiply by 100, as follows:

$$\text{SPIKES} = 100 \times \sqrt{\left(\frac{t_1}{t_M} \frac{t_2 - t_M}{t_2 - t_1} \sigma_1^2 + \frac{t_2}{t_M} \frac{t_M - t_1}{t_2 - t_1} \sigma_2^2 \right)}$$

- t_1 Time (in seconds) to near-term expiration
- σ_1 Estimated volatility computed by variance swap formula, near-term
- t_2 Time (in seconds) to next-term expiration
- σ_2 Estimated volatility computed by variance swap formula, next-term
- t_M Number of seconds in 30 days ($30 \times 86,400 = 2,592,000$)

Sample Calculation

Some examples of "price dragging" and options selection using real prices are included on the following page to help illustrate how SPIKES is calculated. Since the full calculation is very repetitive, only a select sample of the full calculation method is included.

A fully worked up example of the full calculation with formulas in Excel is available upon request.

Email sales@tradespikes.com.

Price Dragging

Here “price dragging” is used for one option to determine the Cash Reference Price.

Time	Update	Cash Reference Price Update	Comment
9:30:00	Market Open	0	Initially set at zero
9:31:12	2.35 bid	Set to 2.35	Opening CRP is the bid
9:33:01	2.31 bid	Unchanged	Bid updates but is not above current CRP
9:33:48	2.37 ask	Unchanged	Ask is not below the last eligible CRP of 2.35
9:36:41	Trade at 2.37	Set to 2.37	Trade triggers CRP update to 2.37
9:38:34	2.38 ask	Unchanged	Ask is updated but is not below the last CRP
9:39:00	2.36 ask	Set to 2.36	Ask moves below the latest CRP, becomes the new CRP

Options Selection

The following calculations use historical SPY option prices (determined by using the price dragging technique) sampled on February 13th, 2015. Based on the SPIKES rules, the two closest eligible expirations are February 20th, 2015 and March 20th, 2015. Both are more than two days away from the current date of February 13th so are selected as near- and next-term.

The intersections of put and call prices are observed in between the yellow highlighted strikes. For the near-term, the absolute difference between the 209.50 strike call and put price is 28 cents, whereas for 210 it is 20 cents. Since the intersection of the price curves is closer to 210, the ATM strike is 210. Using the same logic, the next-term ATM strike would be 209.

Once the ATM strike is determined, the series is truncated after two consecutive CRPs are 5 cents or less. For the near-term, all strikes at 199 and below and 217 and above are removed as the puts encounter two consecutive CRPs below or equal to 5 cents at 200 and 199.50 and the calls at 215 and 216. Similarly, for the next-term expiration, strikes at 148 and below and 240 and above are truncated.

Near-Term (February 20th)

Strike	Call Price	Put Price
197	12.82	0.04
197.5	12.32	0.03
198	11.83	0.04
198.5	10.62	0.03
199	10.86	0.05
199.5	10.35	0.04
200	9.87	0.05
200.5	9.36	0.06
201	8.85	0.06
201.5	8.36	0.07
202	7.86	0.08
202.5	7.42	0.09
203	6.91	0.10
203.5	6.44	0.11
204	5.96	0.13
204.5	5.48	0.15
205	5.01	0.19
205.5	4.54	0.23
206	4.11	0.28
206.5	3.64	0.33

SPIKES Overview: Index Methodology

Strike	Call Price	Put Price
207	3.22	0.41
207.5	2.80	0.50
208	2.41	0.60
208.5	2.04	0.71
209	1.68	0.88
209.5	1.35	1.07
210	1.09	1.29
210.5	0.82	1.53
211	0.60	1.80
212	0.30	2.51
212.5	0.21	2.92
213	0.15	3.32
214	0.07	4.24
215	0.04	5.82
216	0.03	6.21
217	0.02	6.74
217.5	0.02	6.90
218	0.01	8.22
219	0.01	8.76
220	0.01	10.19
221	0.01	11.20

Next-Term (March 20th)

Strike	Call CRP	Put CRP
144	65.85	0.03
145	64.87	0.04
146	63.85	0.03
147	62.87	0.04
148	61.87	0.04
149	60.57	0.04
150	59.84	0.04
151	58.88	0.06
152	57.88	0.06
153	56.58	0.06
154	55.86	0.06
155	54.70	0.07
156	53.59	0.06
157	52.90	0.07
158	51.87	0.06
159	50.86	0.06
160	49.60	0.07
161	48.93	0.07
162	47.92	0.08
163	46.92	0.08
164	45.62	0.08
165	44.95	0.09
166	43.94	0.09
167	42.63	0.10
168	41.64	0.11
169	40.95	0.11
170	39.65	0.12
171	38.98	0.12

SPIKES Overview: Index Methodology

Strike	Call Price	Put Price
172	37.83	0.13
173	36.66	0.13
174	35.97	0.14
175	34.68	0.16
176	33.69	0.17
177	32.70	0.18
178	31.72	0.19
179	31.18	0.20
180	30.07	0.22
181	29.47	0.23
182	28.04	0.26
183	27.08	0.27
184	26.04	0.30
185	24.97	0.32
186	24.12	0.33
187	23.02	0.36
188	22.61	0.39
189	21.20	0.43
190	20.22	0.46
191	19.26	0.51
192	18.29	0.55
193	16.59	0.60
194	15.76	0.67
195	15.44	0.73
196	14.51	0.82
197	13.56	0.90
198	12.67	1.00
199	11.76	1.11
200	10.83	1.25
201	9.99	1.38
202	9.11	1.54
203	8.27	1.71
204	7.42	1.92
205	6.67	2.14
206	5.82	2.39
207	5.09	2.68
208	4.38	3.00
209	3.70	3.37
210	3.09	3.80
211	2.53	4.26
212	1.98	4.79
213	1.53	5.38
214	1.18	6.03
215	0.88	6.77
216	0.60	7.56
217	0.42	8.41
218	0.30	9.32
219	0.22	10.27
220	0.17	11.21
221	0.13	12.34
222	0.10	13.16

SPIKES Overview: Index Methodology

Strike	Call Price	Put Price
223	0.09	13.85
224	0.08	15.15
225	0.06	16.14
230	0.04	21.12
235	0.03	25.81
240	0.02	31.11
245	0.01	36.09
250	0.01	41.08
255	0.01	46.08
260	0.01	51.08

Index Dissemination

SPIKES is calculated by MIAX[®] and disseminated every 100 milliseconds via OPRA and the MIAX[®] Product Feed (MPF).

A sample of data vendors and the symbol for SPIKES from each data vendor are below:

Data Vendor	Symbol
Bloomberg	SPIKE
Thomson Reuters	.SPIKE
LiveVol	^SPIKE
Yahoo Finance	^SPIKE

SPIKES Overview: Index Methodology

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T3
Index

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O V E R V I E W

Settlement Process



SPIKES® Volatility Products Settlement Process

This document outlines the procedure used for the final settlement calculation for SPIKES derivatives at expiration. The final settlement value is calculated from actual opening prices of SPY options on MIAX® Options through the SPIKES Special Settlement Auction and makes use of a new Special Settlement Imbalance Process (SSIP).

MIAX's fully electronic and transparent Opening Process functionality, accessible to all Members of the Exchange for participation, results in a robust Opening Process that presents arbitrage opportunities across multiple exchange venues to drive prices into line and reach equilibrium.

Settlement Value Calculation for SPIKES Derivatives Overview

SPIKES options and futures are based on the SPIKES Volatility Index, a measure of 30-day expected volatility of the SPY ETF. The final settlement value for SPIKES options and futures is obtained via a SPIKES Special Settlement Auction using opening prices on MIAX Options of constituent SPY options that expire 30 days after the relevant SPIKES expiration date. These options are the Settlement Options. For instance, the final settlement value for SPIKES derivatives on November 21, 2018 will be derived using SPY options that expire 30 days later on December 21, 2018. If there is an Exchange holiday, the final settlement value shall be calculated on the preceding business day.

The opening prices for the SPY options used to calculate the SPIKES settlement value are determined through an automated auction mechanism on MIAX Options that matches locked or crossed buy and sell orders and quotes on the electronic order book at the opening of trading. This auction mechanism utilizes the SSIP, and the trade matching algorithm prioritizes price, then is pro-rata in the case of multiple participants' orders or quotes at the opening price.

Opening Mechanism for SPY Options

MIAX's existing Opening Process runs to completion and precedes the engagement of the new SSIP. The existing Opening Process starts when SPY opens, after 9:30am Eastern Time. The SSIP accounts for situations where there remains an order imbalance that must be filled at the opening price after the existing Opening Process. When there is an imbalance, the Exchange will broadcast a System Imbalance Message to subscribers of the Exchange's data feeds and initiate an imbalance timer. Two data feeds are relevant for SPIKES Settlement Auction traders:

1. MIAX Administrative Information Subscriber Feed (AIS) – Includes imbalance messages beginning at 9:15 am ET. It is available to all, and updates every 5 seconds until 9:30 am. Once SPY opens, the imbalance messages are updated in real time.
2. MIAX Order Feed (MOR) – Includes all orders on the book beginning at 7:30 am ET.

SPIKES Overview: Settlement Process

While the Exchange is conducting its Opening Process, all the other option exchanges will also be conducting their opening process for SPY options. As the Exchange works through its process to resolve imbalances under the existing Opening Process and the SSIP, other Exchanges will be open and will serve as real-time cross-reference prices for the relevant SPY options, enabling market participants to send orders to the Exchange if there are pricing anomalies for these SPY options across venues.

The longer it takes the Exchange to work through the imbalance, the greater the likelihood that other exchanges will have opened their SPY options market and the natural pressures of a competitive market will help to eliminate pricing anomalies and aid in satisfying the imbalance on the Exchange. Further, the Exchange's imbalance process is transparent, as every subscriber to the Exchange's data feeds receives the imbalance messages, and every Member of the Exchange can participate in the imbalance process.

Standard Opening Process

If there are quotes or orders that lock or cross each other, the MIAX Options System (System) will calculate an Expanded Quote Range (EQR, see Appendix), which represents the limits of the range in which transactions may occur during the Opening Process. The EQR is recalculated any time a route timer or Imbalance Timer expires. The System uses the EQR to determine the highest and lowest price of the opening price range.

To calculate the opening price, the System takes into consideration all valid Exchange quotes and orders, together with other exchanges' markets for the option, and identifies the price at which the maximum number of contracts can trade. If that price is at or within the EQR and leaves no imbalance, the Exchange will open at that price, executing marketable trading interest as long as the opening price includes only Exchange interest. If the calculated opening price included interest other than solely Exchange interest, the System will broadcast a system imbalance message and initiate a route timer for routable Customer orders. If, during the route timer, interest is received by the System which would allow all interest to trade on the System (i.e. there is no longer an imbalance) at the opening price without trading at a price inferior to other markets, the System will trade and the route timer will end.

If all marketable interest cannot be completely executed at or within the EQR without trading at a price inferior to the ABBO, or cannot trade at or within the quality opening market range in the absence of a valid width NBBO, the System will automatically institute an imbalance process. The System will broadcast a system imbalance message and begin an Imbalance Timer. Market Makers may enter Opening Only (OPG) eQuotes, Auction or Cancel (AOC) eQuotes, Standard quotes, Opening Orders (OPG Orders), AOC Orders and limit orders during the Imbalance Timer. Other Exchange Members may enter OPG Orders, AOC Orders and other order types. At the conclusion of the timer, a route timer may be initiated if required. The imbalance process may be repeated up to three times. Eligible liquidity that would not fully trade that is priced more aggressively than the Opening price is considered to be "must fill" liquidity. If at any time during the imbalance process if all must fill liquidity can trade, open. After the third imbalance process in the standard opening process, open and cancel all other interest except for that in the Settlement Options. This interest is subject to the SSIP, as discussed on the following page.

The Special Settlement Imbalance Process (SSIP)

On SPIKES expiration, a revised process is used. In the SPIKES Special Settlement Auction, in addition to any order types that may be regularly accepted by the Exchange, the Exchange will also accept Settlement Auction Only orders (SAO Orders) and Settlement Auction Only eQuotes ('SAO eQuotes').

Strategy Orders

All orders for participation in the SPIKES Special Settlement Auction that are related to positions in, or a trading strategy involving SPIKES Index options ('SPIKES strategy orders'):

- are only on SPIKES settlement days and only in the SPY expiration used for SPIKES settlement.
- must be received prior to the applicable SPIKES strategy order cut-off time (9:20 a.m. Eastern) for the constituent option series, as determined by the Exchange; and
- may not be cancelled or modified after the applicable SPIKES strategy order cut-off time, unless the SPIKES strategy order is not executed in the SPIKES Special Settlement Auction and is automatically cancelled.

The SPIKES strategy order cut-off time exists because trades to liquidate hedges can contribute to an order imbalance during the SPIKES Special Settlement Auction in SPY option series on expiration dates. As a result of having a SPIKES strategy order cut-off time in place, the Exchange has created a defined window to encourage participation in the SPIKES Special Settlement Auction among market participants who may wish to place off-setting orders against imbalances to which SPIKES strategy orders may have contributed. Additionally, by precluding the modification or cancellation of SPIKES strategy orders from occurring after the cut-off time, the Exchange is ensuring that the order book reflects bona-fide interest for execution. This is a feature designed to prevent manipulation of the final settlement price.

If, after the standard opening process and the three iterations of its imbalance process have been run, a must fill imbalance still exists, the SSIP is initiated. The SSIP is an iterative process that is designed to determine a price at which all must fill imbalance interest can be satisfied.

To begin the SSIP, the System will broadcast a system imbalance message to all subscribers of the Exchange's AIS data feed and begin an SSIP Imbalance Timer, the duration of which is to be determined by the Exchange, not to exceed ten seconds, and communicated via Regulatory Circular. During the SSIP Imbalance Timer, the System accepts all quote and order types supported during the standard Opening Process.

Next, the System will evaluate the must fill imbalance and adjust the EQR by a defined amount (as previously determined by the Exchange and communicated via Regulatory Circular). At each iteration of the SSIP, the allowable EQR will be increased 0.5 times the EQR value. The SSIP will be repeated until a price is reached at which there is no remaining must fill imbalance.

Once there is no remaining must fill imbalance, open. Unfilled SAOs, AOC Orders, AOC eQuotes, OPG Orders, and OPG eQuotes submitted into the SPIKES Special Settlement Auction are cancelled. Any unfilled day limit orders and GTC orders that are priced at or inferior to the Opening Price are placed on the Book and managed by the System.

An example of a SPIKES Special Settlement Auction (which utilizes the Exchange's standard, existing Opening Process, as modified by the SSIP), for a constituent option is provided to illustrate the process.

SPIKES Overview: Settlement Process

Example

SPY Mar 280 Call – constituent option

The Exchange interest for the constituent option is as follows:

MIAX Participant	Bid Size	Bid Price	Ask Price	Ask Size
PLMM	100	1.01	1.10	100
MM1	50	1.02	1.10	50

The Exchange receives an SAO Order to purchase 500 SPY March 280 contracts at the market price. Accordingly, there are 150 contracts offered at \$1.10 and a market order to buy 500 contracts. This results in the following:

Imbalance Quantity	350
Must Fill Imbalance Quantity	350
Matched Quantity	150
Expected Opening Price	1.10

The Exchange's standard Opening Process is used, and because an imbalance exists, the Exchange's Standard Opening Imbalance Process commences. The EQR is expanded by the EQR value of \$0.10, becoming $\$0.92 \times \1.20 .

After three iterations of the Exchange's Standard Opening Imbalance Process, if the must-fill imbalance quantity has not been satisfied, the new SSIP will be employed. (For purposes of this example, assume that all such three iterations have completed and the must fill imbalance quantity still has not been satisfied.)

The SSIP will begin by using an EQR expanded by 1.0 times the EQR value (\$0.10). Therefore, the EQR for the first iteration of SSIP is $\$0.92 \times \1.20 . Since no responses have yet been received, a system imbalance message is broadcast to all subscribers of the Exchange's data feeds and the SSIP auction period is started: The following responses are received:

- @ 20 milliseconds BD1 response, AOC Order to sell 200 @ \$1.20 arrives

At the end of the SSIP auction period, the System evaluates the orders and responses to determine if the must-fill imbalance quantity can be satisfied at or within the EQR. The Exchange market for the constituent option is as follows:

MIAX Participant	Bid Size	Bid Price	Ask Price	Ask Size
PLMM	100	1.01	1.10	100
MM1	50	1.02	1.10	50
BD1			1.20	200
SAO Order	500	Market		

SPIKES Overview: Settlement Process

The offer of 150 contracts at \$1.10 remains and there are now an additional 200 contracts offered at \$1.20. This results in the following:

Imbalance Quantity	150
Must Fill Imbalance Quantity	150
Matched Quantity	350
Expected Opening Price	1.20

A must fill imbalance quantity of 150 contracts priced through the EQR remains, as there are a total of 350 contracts offered and a buy order for 500 at the market. Because an imbalance still exists, a second iteration of the SSIP will begin by expanding both sides of the EQR opposite the must fill imbalance quantity quote range, from the original EQR value to the quote range plus 1.5 times the original EQR value (\$0.10), becoming \$1.25 ($\$1.10 + \0.15).

A new system imbalance message is broadcast to all subscribers of the Exchange's data feeds and a second SSIP auction period is started. The following responses are received:

- @ 500 milliseconds MM2 response, AOC eQuote to sell 1000 @ \$1.23 arrives
- @ 700 milliseconds MM3 response, AOC eQuote to sell 500 @ \$1.23 arrives

At the end of the SSIP auction period, the System evaluates the orders and responses to see if the must-fill imbalance quantity can be satisfied at or within the EQR. The Exchange market for the constituent option is as follows:

MIAX Participant	Bid Size	Bid Price	Ask Price	Ask Size
PLMM	100	1.01	1.10	100
MM1	50	1.02	1.10	50
BD1			1.20	200
MM2			1.23	1000
SAO	500	Market		
MM3			1.23	500

The offer of 150 contracts at \$1.10 remains, as well as the 200 contracts offered at \$1.20. In addition, there are now offers to sell 1,500 contracts at \$1.23. In this case, the entire must fill imbalance quantity can be satisfied at \$1.23. Open at \$1.23. The SAO Order to purchase 500 contracts at the market price is filled in the following fashion:

- The SAO Order buys 100 from the PLMM @ \$1.23 (must fill)
- The SAO Order buys 50 from MM1 @ \$1.23 (must fill)
- The SAO Order buys 200 from BD1 @ \$1.23 (must fill)
- The SAO Order buys 100 from MM2 @ \$1.23 (pro rata)
- The SAO Order buys 50 from MM3 @ \$1.23 (pro rata)

Settlement Calculation for SPIKES Derivatives at Expiration

At the conclusion of the SPIKES Special Settlement Auction, including the existing Opening Process and the SSIP, MIAX Options arrives at a single-price open, called the Settlement Reference Price (SRP), for each constituent SPY series at the price that allows the most contracts for that series to match within certain price boundaries, and leaving no “must fill” imbalance.

For each constituent SPY series the SRP is determined as follows:

(a) If MIAX Options opens with a trade, the SRP is the trade price

(b) If MIAX Options opens without a trade (no locking or crossing interest):

(i) Use all liquidity (all valid quotes and orders, including OPG, AOC and SAO orders and eQuotes) in determining the initial Settlement Opening bid and ask

(ii) Each relevant SPY option with a Settlement Opening bid ask spread equal to or less than the Settlement Reference Price Opening Width (SRPOW, see Appendix II), use the exact midpoint (i.e. no rounding) as the SRP

(iii) If a SPY option's Settlement Opening bid ask spread is greater than the SRPOW, open the series with the wide market and start a Settlement Reference Price Timer (SRPT):

1) The timer ends and the SRP is set accordingly, if there is a trade on MIAX Options or the option's bid ask spread on MIAX Options narrows to the SRPOW

2) If the SRPT expires without establishing an SRP, compare the MIAX bid and ask to the Cash Reference Price (CRP) used for the SPIKES cash index calculation (which uses data from ALL exchanges that trade SPY options) and determine the SRP accordingly:

a) If the CRP is inside the MIAX bid ask, use it as the SRP

b) If the CRP is higher than the MIAX ask, use MIAX ask as the SRP

c) If the CRP is lower than the MIAX bid, use MIAX bid as the SRP

d) If the CRP is zero, and all adjacent options have a non-zero SRP, exclude the option from the calculation

e) If the CRP is zero, and any adjacent options have a SRP of zero:

i) Use the midpoint of the NBBO if the NBBO spread width is at or within 2 times the SRPOW

ii) If at any point during the process:

a) There is a trade on MIAX, use the trade price

b) The MIAX bid ask spread narrows to be at or within the SRPOW, use the midpoint

c) The NBBO bid ask spread narrows to be at or within 2 times the SRPOW, use the midpoint

d) A CRP is established, use the CRP

(c) If the SPY goes into a trading halt during the SPIKES settlement process:

(i) Keep the SRP for all SPY options which have already opened and have an SRP assigned

(ii) For those that have not yet opened or established a SRP, use the SRP at the opening process described above once the series re-opens on MIAX

(d) Use each SPY option's SRP for the SPIKES settlement value calculation via the SPIKES index formula.

¹ Deep in-the-money (ITM) Calls and Puts are not subject to the SRPOW parameters.

SPIKES Overview: Settlement Process

SPIKES Cash Index Dissemination on All Days Including Expiration

Symbol: SPIKE

Every trading day for SPIKES derivatives, MIAX Options will start disseminating the SPIKES spot value as normal, as price data from ALL exchanges trading SPY options come in through OPRA.

SPIKES Settlement Value Dissemination

Symbol: SPKCS

On expiration days for SPIKES derivatives, MIAX Options will disseminate the SPIKES settlement value once all Settlement Options are open and have an SRP.

APPENDIX I. Expanded Quote Range (EQR) Table*

Bid Price	EQR
\$0.00 - \$0.40	\$0.05
\$0.41 - \$1.00	\$0.07
\$1.01 - \$2.00	\$0.10
\$2.01 - \$3.00	\$0.15
\$3.01 - \$5.00	\$0.20
\$5.01 - \$10.00	\$0.30
\$10.01 - \$20.00	\$0.50
\$20.01 - \$40.00	\$0.70
>\$40.00	\$0.90

APPENDIX II. Settlement Reference Price Opening Width (SRPOW) Table*

Bid Price	Maximum Spread: Near ITM, ATM and OTM Options**
Less than \$0.25	\$0.06
\$0.25 to less than \$0.50	\$0.10
\$0.50 to less than \$1.00	\$0.15
\$1.00 to less than \$2.00	\$0.20
\$2.00 to less than \$4.00	\$0.25
\$4.00 to less than \$10.00	\$0.40
\$10.00 or greater	\$0.50

* These tables show current values as at Oct 2019 and are subject to change.

** At-the-Money (ATM), In-the-Money (ITM), Out-of-the-Money (OTM).

SPIKES Overview: Settlement Process

DISCLAIMER

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For more information about SPIKES contact Sales at:
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O V E R V I E W

Frequently Asked Questions

SPIKES[®] Volatility Products FAQs

What is the SPIKES Index?

The SPIKES Volatility Index measures expected 30-day volatility in the SPDR[®] S&P 500[®] ETF Trust (SPY) options.

What is volatility?

Volatility is the amount of variation in a time series of prices, measured by the standard deviation of log returns. Historical volatility is based on what was observed in the past, and implied volatility is the expected future volatility derived from the options market's prices. The implied volatility over the next 30 days is a common measurement used to compare volatilities of different time periods or different instruments.

How is SPIKES calculated?

SPIKES uses SPY option prices and interpolates between two expirations' computed variances to determine the 30-day volatility.

The full index methodology guide is available [here](#).

What are some key features of SPIKES?

- Using SPY options inputs provides a high degree of accuracy. The options are multiply listed across many venues, ensuring no single point of failure for the option price inputs to the index.
- SPIKES Price Dragging technique prioritizes trades over quotes, and updates option price inputs using an algorithm designed to insulate the index from erratic movements in the bid-ask spread of constituent options by only considering order submissions which change the market in a meaningful way.
- SPIKES truncates SPY options inputs at consecutive 5 cent bids which reduces the number of low-priced components in the index. This decreases the potential to distort the index value as fewer far out-of-the-money puts are used in the calculation of the index.
- SPIKES is calculated and disseminated every 100 milliseconds, ensuring timely and accurate representation of actual market conditions.

The full index methodology guide is available [here](#).

SPIKES Overview: Frequently Asked Questions

How frequently does the SPIKES Index update?

SPIKES is calculated and disseminated every 100 milliseconds, ensuring timely and accurate representation of actual market conditions.

Why is the SPIKES Index more robust in fast markets?

SPIKES price dragging technique prioritizes trades over quotes, and updates option price inputs using an algorithm designed to insulate the index from erratic movements in the bid-ask spread of constituent options by only considering order submissions which change the market in a meaningful way. This prevents erratic moves in the index from quotes merely widening out.

Who created SPIKES?

SPIKES has been developed by T3 Index - a research-driven financial indexing firm focused on developing innovative, investible proprietary indices that transform the way people invest and manage risk. For more information, visit www.t3index.com.

Can I hold the SPIKES Index itself?

No. Since the SPIKES index components change over time, it is impossible to hold the index itself.

Is an index calculation example spreadsheet available?

Yes, please see an example calculation spreadsheet [here](#).

Which vendors carry the real-time index values?

Index values are available via [OPRA](#) and the [MIAX® Product Feed \(MPF\)](#). Most major data vendors include the index; a sample of data vendors and their index symbols is below.

Data Vendor	Symbol
Bloomberg	SPIKE
Thomson Reuters	.SPIKE
LiveVol	^SPIKE
Yahoo Finance	^SPIKE

Are there any potential tax advantages of trading SPIKES Options and Futures?

Yes. Certain cash-settled index options and futures, such as options and futures on the SPIKES Index that are listed in the United States may be eligible for the preferential 60/40 tax treatment. The ratio is such that 60% of any gains could be taxed as long term capital gains and the remaining 40% as short term capital gains. Options and futures on the SPIKES Index may fall into this category. Please consult your tax professional for advice on this topic. See, <https://www.irs.gov/forms-pubs/about-form-6781>, for self-directed guidance from the government's IRS website. MIAX® and its affiliates do not offer tax advice.

SPIKES® OPTIONS FAQs

How can I trade SPIKES Options?

Cash settled index options are available on MIAX Options. The ticker is **SPIKE**.

What are the trading hours for SPIKES Options?

9:30 a.m. - 4:15 p.m. Eastern Time (New York time).

What are the trading increments for SPIKES Options?

\$0.05 for series trading below \$3.00 and \$0.10 for series trading at or above \$3.00. Complex Orders and PRIME Price Improvement Auctions are in \$0.01 increments.

Which expirations are available for SPIKES Options? Are weekly options available?

Monthly expirations are available. SPIKES options expire on the Wednesday that is thirty days prior to the third Friday of the calendar month immediately following the expiring month and are AM settled.

The expiration dates are available [here](#).

Please note, weekly options are not available.

When do SPIKES Options expire?

SPIKES options expire on the Wednesday that is thirty days prior to the third Friday of the calendar month immediately following the expiring month and are AM settled.

The expiration dates are available [here](#).

SPIKES Overview: Frequently Asked Questions

What are the full contract specifications for SPIKES Options?

Contract specifications are available [here](#).

What are the fees for trading SPIKES Options?

Please see the fee schedule [here](#).

What is the ticker for SPIKES?

SPIKES and its option chain use the ticker **SPIKE**.

Can I trade a SPIKES Combo?

Participants may enter a combo order in any individual SPIKES combo using the standard MIAX Options complex order mechanism. Complex strategies/orders can also be entered which include a combo as a delta hedge against other options. The maximum allowable ratio in SPIKES is eight contracts in the largest quantity component of the complex strategy to one combo. The maximum number of SPIKES option components in a given strategy is 8 (2 of which would be the combo).

Is the margin for SPIKES Options the same as for VIX?

Yes, customer strategy based margin is the same.

SPIKES[®] FUTURES FAQs

Where do SPIKES Futures trade?

SPIKES Futures are offered by MGEX, via the CME Globex[®] platform.

Where do SPIKES Futures clear?

All SPIKES futures clear and settle at MGEX.

What are the full contract specifications for SPIKES Futures?

Contract specifications are available [here](#).

SPIKES Overview: Frequently Asked Questions

Do I need to be a member of MGEX to trade SPIKES Futures?

As of December 4, 2020, MGEX is no longer a membership organization, therefore a membership at MGEX is not required to trade SPIKES Futures. Please see the next question.

What is required to trade at MGEX?

A market participant must have an account with an MGEX Clearing Member or an account with an FCM and be permissioned to access MGEX markets via the Clearing Member.

List of current MGEX Clearing Members is available [here](#).

How do I access MGEX?

The MGEX Clearing Member and the market participant will choose how the participant will connect to the CME Globex® platform and the Clearing Member will offer connectivity methods to the market participants in question.

To access CME Globex® you or your broker needs a trading account with an MGEX Clearing Member or an account with an FCM who has a relationship with an MGEX Clearing Member. Clearing Members provide connectivity once you have an account.

How do I access SPIKES Futures market data?

SPIKES market data is available on the MGEX Electronic (Globex®) feed (Channel 460). Check with your data provider.

What are the symbols used by market data vendors for SPIKES?

SPK is the code that is used to trade on Globex® however data vendors may use different codes for products.

What are the SPIKES Futures trading hours?

SPIKES Futures will trade as follows (all hours listed in Central Time):

Extended Trading Session I:	5:00 p.m. – 8:30 a.m. (Sunday – Friday)
Pre-Open:	4:00 p.m. – 5:00 p.m. (Sunday)
	4:45 p.m. – 5:00 p.m. (Monday – Thursday)
Regular Trading Session:	8:30 a.m. – 3:15 p.m. (Monday – Friday)
Extended Trading Session II:	3:30 p.m. – 4:00 p.m. (Monday – Friday)
Pre-Open:	3:15 p.m. – 3:30 p.m. (Monday – Friday)

When is the last Trade at Settlement (TAS) for each SPIKES future?

The last TAS is at 3:13 p.m. (Central Time) the business day prior to the SPIKES future's Final Settlement.

SETTLEMENT FAQs

When does the settlement auction take place?

The settlement auction takes place on the SPIKES expiration date at the open of the constituent SPY options.

The expiration dates are available [here](#).

A document explaining the settlement auction in detail is available [here](#).

Who can participate in the settlement auction?

Any MIAX Member can enter Settlement Auction Only (SAO) orders (prior to 9:20am ET) to replicate a full or partial strip of options at settlement. Any MIAX Member can see the auction imbalances and can respond to those auctions with orders.

A document explaining the settlement auction in detail is available [here](#).

How can traders see what is happening in the settlement auction before the open?

Traders may subscribe to the MIAX Administrative Information Subscriber Feed (AIS) which includes imbalance messages beginning at 9:15 am ET. It updates every 5 seconds until 9:30 am. Once SPY opens, the imbalance messages are updated in real time. Traders may also subscribe to the MIAX Order Feed (MOR) which includes all orders on the book beginning at 7:30 am ET.

A document explaining the settlement auction in detail is available [here](#).

How is settlement determined?

The final settlement value is calculated from actual opening prices of SPY options on MIAX Options through the SPIKES Special Settlement Auction and makes use of a new Special Settlement Imbalance Process (SSIP).

A document explaining the settlement auction in detail is available [here](#).



For more information about SPIKES Options & SPIKES Futures contact Sales at:

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O V E R V I E W

Combo Linked to Future (CLF)

Combo Linked to Future (CLF)

The Combo Linked to Future strategy type

The Combo Linked to Future (“CLF”) is a new strategy type that is available for trading. It will incorporate both, a Related Futures Cross (RFC) on MIAX for the options component and either an Exchange for Related Position (“EFRP”) on MGEX² or the Exchange of Contract for Related Position (“ECRP”) on other futures exchanges for the futures component. These simultaneous execution types allow for the exchange of SPIKES (SPK) futures for SPIKES option combinations. Please note, other highly correlated volatility products may also be eligible for trading versus SPIKES option combinations. The CLF strategy type will need to be executed by a broker, with the RFC component entered on MIAX and the futures side submitted to MGEX Clearing as an EFRP for SPIKES futures. This may be done as an ECRP on other exchanges in related futures. As long as the order is represented with the correct parameters, it will be crossed at 100%. Please see [MIAX](#), [MGEX](#) or [CFE](#)³ rulebooks for additional details.

Definitions

***Related Futures Cross (“RFC”):** A SPIKES Combination order traded in exchange for an opposing position in SPIKES futures or another related volatility future, such as VIX. See the MIAX [rulebook](#) for further details on RFC.

***SPIKES Combination:** The purchase (or sale) of a SPIKES call option and sale (or purchase) of a SPIKES put option with the same expiry and strike price.

***Exchange For Related Position (“EFRP”):** Involves a privately negotiated off exchange execution involving two separate, but related transactions, consisting of an exchange for futures and, on the opposite side of the market, the simultaneous execution of an equivalent quantity of physical (cash product, by-product, or related product) or in connection with a risk (a related non-MGEX exchange traded derivative, an over-the counter (OTC) derivative or a swap agreement) component that corresponds to the asset underlying the Exchange futures contract. Two types of EFRP transactions:

- 1) Exchange for Physical Transaction (“EFP”) - An exchange of futures for, or in connection with, a physical consisting of a cash commodity transaction and a futures transaction.
- 2) Exchange for Risk Transaction (“EFR”) - An exchange of futures for, or in connection with, a risk consisting of a related non-MGEX exchange traded derivative, an OTC derivative or a swap agreement and a futures transaction. i.e. SPIKES combination and/or non-MGEX related volatility future.

Please see the [MGEX](#) website for access to [rules](#) and frequently asked questions ([FAQ](#)).

***Exchange of Contract for Related Position (“ECRP”):** An exchange of a Contract listed on an Exchange for a Related Position that is entered into in accordance with its specific exchange rules. On CFE this is rule #414. For the purpose of this document, the “Related Position” is a SPIKES Combination which will trade on MIAX. For further information, please see: [MGEX](#) and [CFE](#).

¹ Market participants looking to execute an EFRP transaction at MGEX must have an account or an omnibus relationship with an existing MGEX Clearing Member.

² MGEX: Minneapolis Grain Exchange

³ CFE: Cboe Futures Exchange, LLC

SPIKES Overview: Combo Linked to Future (CLF)

Should a market participant seek to transfer a position and/or delta risk to (from) a volatility future from (to) a SPIKES option position, they can use the Combo Linked to Future strategy to trade the SPIKES option combinations against their volatility futures (“SPK” or “VIX”) position. The trade would consist of a buy (sell) of SPIKES option combination and the sell (buy) of an offsetting future, initiated as a CLF strategy at a net price.

Examples:

Buy 10 SPIKES combos⁴ and sell 1 SPIKES future, 50 times for a net credit of \$0.05.

Buy 10 SPIKES combos and sell 1 VIX future, 10 times for net \$0.00.

Buy 1 SPIKES combo and sell 1 VIX Mini future, 5 times for a net debit of \$0.02

The CLF may be entered as a paired order, where a contra order to take the other side already exists, or entered using an agency broker who can attempt to find an off Exchange counterparty to take the other side. Once there is a negotiated trade, the actual execution is done in two parts:

1. The option combination portion is executed on MIAX using the RFC order type.
2. The futures portion is submitted to the appropriate futures exchange.
 - a. An EFRP on MGEX if using SPIKES futures.
 - b. Most likely an ECRP on other exchanges when not involving SPIKES futures.

What are the benefits of the Combo Linked to Future strategy type?

With the evolution of derivatives trading expertise from market participants, the introduction to numerous tradeable instruments each year, and the constant need to reduce risk and costs associated with trading and investing, the CLF strategy may have several beneficial uses. The following are some potential uses as well as some trade examples:

1) Ability to reduce/collapse positions across products:

- a) Viable tool for shifting delta exposures between products.
- b) Will aide in the reduction of margin and/or haircut requirements as well as reduce balance sheet usage.

2) Centralize clearing under one clearing entity:

- a) SPIKES futures clear through the MGEX Clearing House.
- b) SPIKES options, VIX options and VIX futures clear at The Options Clearing Corp (OCC).

3) Mitigate exposures:

- a) Basis⁵ risk.
- b) Mark-to-market P&L volatility.

4) Low Fees:

SPIKES combo exchange fees are a mere \$.01 per leg, per side (\$.02 per combo) and SPIKES futures fees are also highly competitive making the decision to collapse positions across products and clearing entities a much easier decision.

5) Potential to add to overall market liquidity:

Hedging across products and later trade a CLF strategy to collapse the position.

⁴ Combo(s): Abbreviated term (slang) used by market participants to represent the purchase (or sale) of a call option and sale (or purchase) of a put option with the same expiry and strike price.

⁵ Basis risk: Potential for two highly correlated instruments to deviate in price from one another. This could be due to unusual market close, short term supply/demand imbalances, etc.

SPIKES Overview: Combo Linked to Future (CLF)

Hypothetical trade examples^{6,7}:

1) SPK future versus a SPIKES option combination. Why? Move all clearing to one clearing entity which may result in a reduction of margin requirements.

Suppose a client has 10 short SPK contracts and is long 200 of the SPIKES 50 delta calls. The options will clear through the OCC and the futures through MGEX Clearing. The client may need to post margins on both clearing entities. Client may trade a CLF strategy to collapse this margin treatment. Order: Buy 10 SPK futures and sell 100 SPIKES combos (sell call/buy put). This will result in no position in the futures and long 200 SPIKES calls delta hedged with 100 short combos (short call/long put). This will eliminate the need for margin posting at the MGEX Clearing House and some relief may now be given by The OCC as the new position in the SPIKES options has some offsetting delta risk.

2) VIX future versus a SPIKES option combination. Why? Move all positions into one underlying and one product which may result in a reduction of margin, haircut and/or capital usage.

Perhaps a client was hedging the purchase of 50 deep in the money SPIKES options by selling 5 VIX futures. The client can now use the CLF strategy, buying the 5 VIX futures and selling 50 SPIKES combos. The result will be no futures positions and 50 long deep-in-the-money SPIKES calls hedged with a short position of 50 SPIKES combos.

3) VIX future versus a SPIKES option combination. Why? Cost savings.

An advisor to a private fund or an exchange traded product, such as an exchange traded note (ETN) with a mandate is to have long exposure to a volatility index, i.e. SPIKES and/or VIX. The account currently holds VIX futures. For significant cost savings due to the fee differential, the advisor may use the CLF strategy and move the long VIX futures to SPIKES option combos. As the combos are a synthetic for the futures they should have a like performance. Going forward, the fund may now trade SPIKES futures and/or SPIKES combos, rolling the position accordingly to keep exposures consistent with the fund's mandate all while having the benefit of reduced costs.

4) SPIKES future versus a VIX future. Why? Move market exposure from one volatility index to another in a frictionless manner.

There are many reasons one may wish to do so but in this example a short volatility fund wishes to diversify some of their risk exposures to the clearing agencies, exchanges and products while also setting up future cost savings due to the low fees of SPIKES futures. Two separate submissions to the relevant exchanges, in accordance with each respective exchange's rules, such as an EFRP on MGEX, would be required. Please note that this transaction is not a CLF strategy.

In today's market environment, liquidity providers such as market makers, a bank's trading desks, a hedge fund and other professional traders may be trading multiple products and tickers. This activity will end up in a portfolio with many moving parts. Quite often traders will find themselves in a situation where they must make an immediate decision for the best possible trade to express a view and/or to trade a hedge. These trades may not always fit the profile the trader wants. The trader may have executed a VIX future rather than the preferred SPK future. With the CLF strategy type the delta exposure can now be closed in VIX futures and moved into SPIKES combos. Strategies such as the CLF, as discussed, are one piece of the puzzle to help the liquidity providers to reduce exposures which by default could also increase liquidity and tighten the bid/offer spread in similar products.

⁶ SPK and VIX futures both have a 1000 multiplier while SPIKES options have a 100 multiplier. For this reason the trades will be 1x 10 ratios.

⁷ Discuss any such scenarios with your account representative at your clearing house.

SPIKES Overview: Combo Linked to Future (CLF)

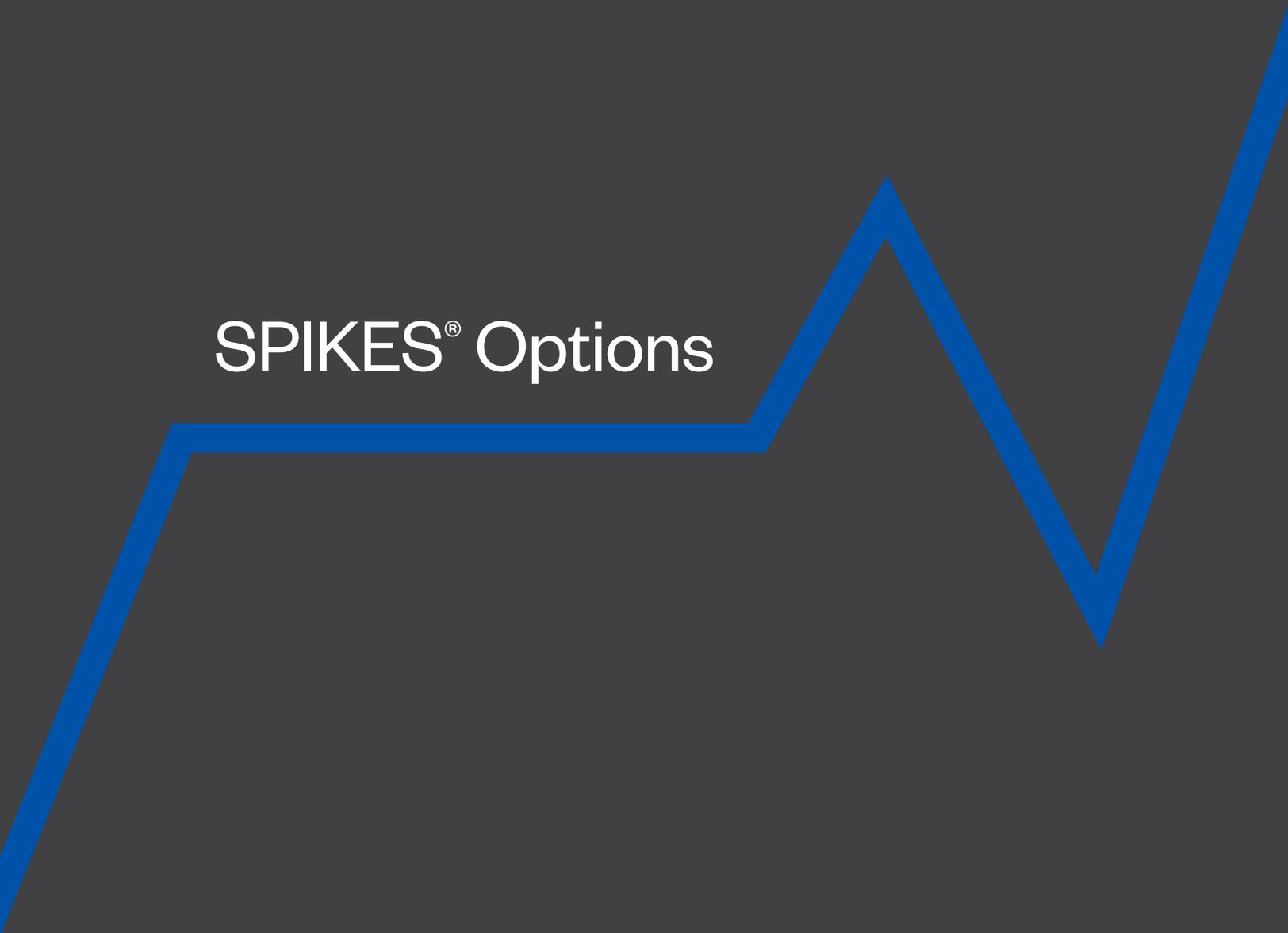
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Please visit mioxoptions.com/spikes for more information and additional resources. For direct questions relating to SPIKES Options and Futures, please contact sales@tradespikes.com.



SPIKES[®] Options

OPTIONS

Summary

SPIKES[®] Options Summary

SPIKES Volatility Index

The SPIKES Volatility Index (index symbol: SPIKE) is a measure of the expected 30-day volatility in the SPDR[®] S&P 500[®] ETF (SPY). SPY is the largest exchange traded fund in the world and tracks the most watched stock index in the United States.

SPIKES is built using the popular variance swap methodology and uses live SPY option prices to calculate volatility. This is consistent with the way the trading community is used to modelling risk and hedging exposure.

SPIKES Options

SPIKES Options are trading on MIAX[®] - one of the fastest and most efficient options platforms in the world, offering fully electronic execution.

The SPIKES Index and volatility products offer a number of unique features designed to produce highly accurate, robust data and create a transparent and open auction settlement process.

MIAX is proud to partner with T3 Index to offer SPIKES Volatility products - for more confident volatility trading.

The SPIKES Formula

SPIKES has a defined rules-based approach to selecting components—a series of options on the SPY—and weighting them to derive a single price for the index. The general formula for the SPIKES Index is as follows:

$$\text{SPIKES} = 100 \times \sqrt{\left(\frac{t_1}{t_M} \frac{t_2 - t_M}{t_2 - t_1} \sigma_1^2 + \frac{t_2}{t_M} \frac{t_M - t_1}{t_2 - t_1} \sigma_2^2 \right)}$$

- t_1 Time (in seconds) to near-term expiration
- σ_1 Estimated volatility computed by variance swap formula, near-term
- t_2 Time (in seconds) to next-term expiration
- σ_2 Estimated volatility computed by variance swap formula, next-term
- t_M Number of seconds in 30 days (30 x 86,400 = 2,592,000)

The formula for expected T-term variance is as follows:

$$\sigma^2 = \frac{1}{T} \left[2e^{RT} \sum_i \frac{\Delta K_i p_i}{K_i^2} - \left(\frac{e^{RT} (p_{ATM}^c - p_{ATM}^p)}{K_{ATM}} \right)^2 \right]$$

- T Time to options expiration (in years, with 1-second precision)
- $K_i p_i$ A list of unique SPY options strikes, ordered from lowest to highest, and corresponding SPY options prices; of a call if $K_i > K_{ATM}$; and of a put if $K_i < K_{ATM}$; if $K_i = K_{ATM}$ then an average between the ATM SPY put and call prices
- ΔK_i Half the difference between the strikes on either side of K_i ;

$$\Delta K_i = \frac{(K_{i+1} - K_{i-1})}{2}$$

- p_{ATM}^c Price of the at-the-money (ATM) SPY call option
- p_{ATM}^p Price of the ATM SPY put option
- K_{ATM} Strike closest to the point where linearly interpolated SPY call and put prices intersect

- For the last (highest and lowest) selected strikes, ΔK_i is simply the absolute difference between K_i and the nearest selected option's strike
- R Risk-free interest rate to option's expiration

SPIKES Options: Summary

Calculation Process

SPIKES is calculated using only standard options on the SPY that expire on the third Friday of each calendar month. Although weekly options on SPY are available, these are **not** used in the calculation of SPIKES.

The following process is used to calculate SPIKES:

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Select two SPY expirations	Apply “Price Dragging” technique	Select option inputs	Apply variance swap formula	Calculate SPIKES
Select the two SPY expiration months. The SPIKES calculation begins with the universe of regular monthly SPY options and selects the first monthly expiration with more than two full days to expiry and the next monthly expiration.	Apply “Price Dragging” technique to determine option price inputs. Price Dragging uses eligible trades, bids, and offer prices to reduce erratic movements of the index value that could result from illiquid out-of-the-money options.	Select option inputs. For each expiration, choose the at-the-money and all out-of-the-money options, limited by truncation.	Apply variance swap formula. For each expiration, the volatility is estimated using the variance swap formula, with the selected options’ prices weighted according to the formula [2] above.	Calculate SPIKES. Compute the 30-day weighted average of the near- and next-expiration variances, take the square root, and multiply by 100 as illustrated in the formula [1] above.

MIAX Settlement Auction

SPIKES Special Settlement Auction (a modified Opening Process)

The SPIKES Special Settlement Auction occurs on MIAX Options in the SPY options that have 30 days to expiration on the Wednesday that is 30 days prior to the third Friday of the calendar month immediately following the month in which the contract expires. If that Wednesday or the expiration Friday that is 30 days following that Wednesday is a holiday, the final settlement date for the contract shall be on the business day immediately preceding that Wednesday.

Before and during the opening process for each relevant SPY option, MIAX Options will disseminate robust imbalance information over its AIS feed. Anyone (members and non-members) may subscribe to the AIS feed.

New liquidity types called Settlement Auction Only (SAO) orders and SAO eQuotes were created for this process.

SPIKES Combination Orders

MIAX Options now allows SPIKES Combination Orders – orders to buy or sell one or more SPIKES options series and the offsetting number of SPIKES Combinations to be delta neutral – with ratios of up to eight to one. SPIKES Combinations are the purchase (or sale) of a SPIKES call option and sale (or purchase) of a SPIKES put option with the same expiry and strike.

Combo Linked to Future (CLF)

The “Combo Linked to Future” (CLF) is a strategy type that is available for trading in two distinct segments. It will incorporate both a Related Futures Cross (RFC) on MIAX for the options component and either an Exchange for Related Position (“EFRP”) on MGEX or most likely the Exchange of Contract for Related Position (“ECRP”) on other futures exchanges. These simultaneous execution types allow for the exchange of SPIKES (SPK) futures for SPIKES option combinations. Other highly correlated futures may also be eligible for trading versus SPIKES option combinations. Please see the [CLF](#) document for a brief description and [MIAX](#) or [MGEX](#) rulebooks for additional details.

Trading fees

See SPIKES Options [rate card](#) at www.miaxoptions.com/spikes

SPIKES Options: Summary

The information in this document is provided for information purposes only, and is not intended to provide, and should not be relied on for financial or legal advice. The information herein is presented “as is” and without representations or warranties of any kind. The Parties shall not be liable for loss or damage, direct, indirect or consequential, arising from any use of the Data or action taken in reliance upon the Data.

Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of Characteristics and Risks of Standardized Options. Copies are available from your broker, by calling 1-888-OPTIONS or from The Options Clearing Corporation at www.theocc.com.

No statement within this document should be construed as a recommendation to buy or sell a security or futures contract or to provide investment advice.

SPIKES is a registered trademark of T3 Index. Certain aspects of the methodology and related functionality of SPIKES is owned by MIH and may be covered by one or more patents or pending patent applications.



For more information about SPIKES Options & SPIKES Futures contact Sales at:

sales@tradespikes.com • 609-897-8177

OPTIONS

Contract Specifications



SPIKES® Options Contract Specifications

Description	SPIKES measures changes in expected volatility of the SPDR® S&P® ETF (commonly known and referred to by its ticker symbol, SPY)
Symbol	SPIKE
CUSIP	84851L107
Multiplier	\$100
Strike Interval	Minimum strike price intervals are set at \$0.50 where the strike price is less than \$15, \$1 or greater where the strike price is between \$15 and \$200, and \$5 or greater where the strike price is greater than \$200
Minimum Trading Increment	\$0.05 for series trading below \$3 and \$0.10 for series trading at or above \$3 Complex Orders and PRIME Price Improvement Auctions are in \$0.01 increments
Expiration Date	The Wednesday that is thirty days prior to the third Friday of the calendar month immediately following the expiring month
Expiration Month	Up to twelve expiration months. Short-term, quarterly and LEAPS may also be available
Exercise Style	European
Last Trading Day	Trading will ordinarily cease at 4:15 p.m. (New York Time) on the Tuesday preceding an expiration Wednesday
Settlement Type	Cash
Settlement Value Symbol	SPKOS
Settlement Value*	The exercise and settlement value will be calculated on Wednesday at 9:30 a.m. (New York time) using opening prices, and if no trade has occurred, the mid-point of the opening market for the SPY options used in the calculation of the Index at that time. The exercise-settlement amount will be equal to the difference between the settlement value and the exercise price of the option, multiplied by \$100. Exercise will result in the delivery of cash on the business day following expiration.
Settlement of Exercise	Next business day following expiration
Position and Exercise Limits	No position and exercise limits
Trading Hours	9:30 a.m. - 4:15 p.m. Eastern Time (New York time)

* For more information refer to [Settlement Process for SPIKES Derivatives](#) document.



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OPTIONS

Expiration Dates

SPIKES® Options and Futures Expiration Dates

Monthly expirations are available for SPIKES Options and Futures. SPIKES Options and Futures expire on the Wednesday that is thirty days prior to the third Friday of the calendar month immediately following the expiring month and are AM settled. If that Wednesday or the Friday that is thirty days following that Wednesday is an Exchange holiday, the final settlement value shall be calculated on the business day immediately preceding that Wednesday.

Contract Month	Futures Product Code	Synthetic Futures Product Code	1st Trade Date Futures ² and Options	Last Trade Date Futures* (8:00am CT)	Last Trade Date Options * (3:15pm CT)	SPIKES Settlement Date (8:30am CT)	SPY Options Expiry For Settlement
Jan-2021	SPKF1	SKSF1	7/23/2020 ²	1/20/2021	1/19/2021	1/20/2021	2/19/2021
Feb-2021	SPKG1	SKSG1	8/20/2020 ²	2/17/2021	2/16/2021	2/17/2021	3/19/2021
Mar-2021	SPKH1	SKSH1	9/17/2020 ²	3/17/2021	3/16/2021	3/17/2021	4/16/2021
Apr-2021	SPKJ1	SKSJ1	10/22/2020 ²	4/21/2021	4/20/2021	4/21/2021	5/21/2021
May-2021	SPKK1	SKSK1	11/19/2020 ²	5/19/2021	5/18/2021	5/19/2021	6/18/2021
Jun-2021	SPKM1	SKSM1	12/17/2020 ²	6/16/2021	6/15/2021	6/16/2021	7/16/2021
Jul-2021	SPKN1	SKSN1	1/21/2021	7/21/2021	7/20/2021	7/21/2021	8/20/2021
Aug-2021	SPKQ1	SKSQ1	2/18/2021	8/18/2021	8/17/2021	8/18/2021	9/17/2021
Sep-2021	SPKU1	SKSU1	3/18/2021	9/15/2021	9/14/2021	9/15/2021	10/15/2021
Oct-2021	SPKV1	SKSV1	4/22/2021	10/20/2021	10/19/2021	10/20/2021	11/19/2021
Nov-2021	SPKX1	SKSX1	5/20/2021	11/17/2021	11/16/2021	11/17/2021	12/17/2021
Dec-2021	SPKZ1	SKSZ1	6/17/2021	12/22/2021	12/21/2021	12/22/2021	1/21/2022
Jan-2022	SPKF2	SKSF2	7/22/2021	1/19/2022	1/18/2022	1/19/2022	2/18/2022
Feb-2022	SPKG2	SKSG2	8/19/2021	2/16/2022	2/15/2022	2/16/2022	3/18/2022
Mar-2022	SPKH2	SKSH2	9/16/2021	3/15/2022	3/14/2022	3/15/2022	4/14/2022 ³
Apr-2022	SPKJ2	SKSJ2	10/21/2021	4/20/2022	4/19/2022	4/20/2022	5/20/2022
May-2022	SPKK2	SKSK2	11/18/2021	5/18/2022	5/17/2022	5/18/2022	6/17/2022
Jun-2022	SPKM2	SKSM2	12/23/2021	6/15/2022	6/14/2022	6/15/2022	7/15/2022
Jul-2022	SPKN2	SKSN2	1/20/2022	7/20/2022	7/19/2022	7/20/2022	8/19/2022
Aug-2022	SPKQ2	SKSQ2	2/17/2022	8/17/2022	8/16/2022	8/17/2022	9/16/2022
Sep-2022	SPKU2	SKSU2	3/16/2022	9/21/2022	9/20/2022	9/21/2022	10/21/2022
Oct-2022	SPKV2	SKSV2	4/21/2022	10/19/2022	10/18/2022	10/19/2022	11/18/2022
Nov-2022	SPKX2	SKSX2	5/19/2022	11/16/2022	11/15/2022	11/16/2022	12/16/2022
Dec-2022	SPKZ2	SKSZ2	6/16/2022	12/21/2022	12/20/2022	12/21/2022	1/20/2023
Jan-2023	SPKF3	SKSF3	7/21/2022	1/18/2023	1/17/2023	1/18/2023	2/17/2023
Feb-2023	SPKG3	SKSG3	8/18/2022	2/15/2023	2/14/2023	2/15/2023	3/17/2023
Mar-2023	SPKH3	SKSH3	9/22/2022	3/22/2023	3/21/2023	3/22/2023	4/21/2023
Apr-2023	SPKJ3	SKSJ3	10/20/2022	4/19/2023	4/18/2023	4/19/2023	5/19/2023
May-2023	SPKK3	SKSK3	11/17/2022	5/17/2023	5/16/2023	5/17/2023	6/16/2023
Jun-2023	SPKM3	SKSM3	12/22/2022	6/21/2023	6/20/2023	6/21/2023	7/21/2023

* Trading ceases at 8:00am on the Last Trading Day for an expiring contract.

¹ Synthetic prices are available via the MIAx® Product Feed (MPF).

² The highlighted dates are the current listings for both options and futures, however, the first trade date for these listings as it relates to futures is 12/14/20

³ 4/15/2022 is an exchange holiday, Good Friday



For more information about SPIKES Options & SPIKES Futures contact Sales at:
sales@tradespikes.com • 609-897-8177

OPTIONS

Rate Card

SPIKES[®] Options Rate Card

SPIKES¹

Simple and Complex Fees ⁷						
Origin	Simple/Complex ⁶ Maker	Simple/Complex ⁶ Taker	Simple/Opening	Combination ^{3,4}	Simple Large Trade Discount Threshold ⁵	Complex Large Trade Discount Threshold ⁵
Priority Customer	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Market Maker	\$0.00	\$0.20 ²	\$0.15	\$0.01	First 10,000 contracts	First 25,000 contracts
Non-MIAX [®] Market Maker	\$0.10	\$0.25	\$0.15	\$0.01	First 10,000 contracts	First 25,000 contracts
Broker Dealer	\$0.10	\$0.25	\$0.15	\$0.01	First 10,000 contracts	First 25,000 contracts
Firm Proprietary	\$0.00	\$0.20 ²	\$0.15	\$0.01	First 10,000 contracts	First 25,000 contracts
Public Customer that is Not a Priority Customer	\$0.10	\$0.25	\$0.15	\$0.01	First 10,000 contracts	First 25,000 contracts

¹ SPIKES is a "Proprietary Product." The term "Proprietary Product" means a class of options that is listed exclusive on the Exchange. See MIAX Rule 100.

² Taker fees for options with a premium price of \$0.10 or less will be charged \$0.05 per contract.

³ A "SPIKES Combination" is a purchase (sale) of a SPIKES call option and sale (purchase) of a SPIKES put option having the same expiration date and strike price.

⁴ The SPIKES Combination portion of a SPIKES Multi-leg Order will be charged at the Combination rate and other legs will be charged at the Complex rate. All fees are per contract per leg.

⁵ Tied to Single Order/Quote ID. For any single order/quote, no fee shall apply to the number of contracts executed above the Simple or Complex Large Trade Discount Threshold. This discount does not apply to Priority Customer orders, Maker orders, SPIKES Opening orders, and the Surcharge. The Complex Large Trade Discount does not apply to SPIKES Combination Orders.

⁶ For quotes/orders in a Complex Auction, Priority Customer Complex Orders will receive the Complex Maker rate. Origins that are not a Priority Customer will be charged the applicable Complex Taker rate.

⁷ An Index License Surcharge ("Surcharge") of \$0.075 will apply to any contract that is executed by an Origin except Priority Customer. The Surcharge applies per contract side per leg. The Surcharge will be waived for the "Waiver Period" which, for purposes of this Section 1(a)(xi) of the Fee Schedule, means the period of time from the launch of trading of SPIKES options until such time that the Exchange submits a filing to terminate the Waiver Period. The Exchange will issue a Regulatory Circular announcing the end of the Waiver Period at least fifteen (15) days prior to the termination of the Waiver Period and effective date of such Surcharge.

Market Turner Incentive Program

The term “Market Turner” means a Market Maker simple quote (not eQuote) that establishes and maintains the new MIAX best bid (the “MBB”) or the MIAX best offer (“MBO”) in a SPIKES option. Under the Market Turner Incentive Program, the Exchange will pay a per contract rebate to the Market Turner for each contract that executes as the MBB (MBO). The amount of the rebate shall be (i) \$0.20 per executed contract, for options having a premium price greater than \$0.10, or (ii) \$0.05 per executed contract, for options having a premium price of \$0.10 or less.

PRIME cPRIME Fees ⁷						
Origin	Initiating	Contra	Responder	Break-up	PRIME Large Trade Discount Threshold ⁸	cPRIME Large Trade Discount Threshold ⁹
Priority Customer	\$0.00	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts
Market Maker	\$0.10	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts
Non-MIAX Market Maker	\$0.10	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts
Broker-Dealer	\$0.10	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts
Firm Proprietary	\$0.10	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts
Public Customer that is Not a Priority Customer	\$0.10	\$0.20	\$0.25	(\$0.15)	First 10,000 contracts	First 25,000 contracts

⁷ An Index License Surcharge (“Surcharge”) of \$0.075 will apply to any contract that is executed by an Origin except Priority Customer. The Surcharge applies per contract side per leg. The Surcharge will be waived for the “Waiver Period” which, for purposes of this Section 1(a)(x)(i) of the Fee Schedule, means the period of time from the launch of trading of SPIKES options until such time that the Exchange submits a filing to terminate the Waiver Period. The Exchange will issue a Regulatory Circular announcing the end of the Waiver Period at least fifteen (15) days prior to the termination of the Waiver Period and effective date of such Surcharge.

⁸ The transaction fee for SPIKES PRIME will be capped at 10,000 contracts from a single order, for the Agency Side and Contra Side independently. Contracts greater than the threshold will not be charged the transaction fee but will continue to be charged the Surcharge. Responder fees and Break-up Credits will not be capped.

⁹ The transaction fee for SPIKES cPRIME will be capped at 25,000 contracts that are traded per strategy from a single order, for the Agency Side and for the Contra Side independently. Contracts greater than the threshold will not be charged the transaction fee but will continue to be charged the Surcharge. Responder fees and Break-up Credits will not be capped. The cPRIME Large Trade Discount does not apply to SPIKES Combination Orders.

SPIKES Options: Rate Card

For SPIKES in PRIME, MIAX will assess the Responder to PRIME Auction Fee to: (i) a PRIME AOC Response that executes against a PRIME Order, and (ii) a PRIME Participating Quote or Order that executes against a PRIME Order. MIAX will apply the PRIME Break-up credit to the EEM that submitted the PRIME Order for agency contracts that are submitted to the PRIME Auction that trade with a PRIME AOC Response or a PRIME Participating Quote or Order that trades with the PRIME Order.

For SPIKES in cPRIME, all fees and credits are per contract per leg for Complex and Combination volume. Further, MIAX will assess the Responder to cPRIME Auction Fee to: (i) a cPRIME AOC Response that executes against a cPRIME Order, and (ii) a cPRIME Participating Quote or Order that executes against a cPRIME Order. MIAX will apply the cPRIME Break-up credit to the EEM that submitted the cPRIME Order for agency contracts that are submitted to the cPRIME Auction that trade with a cPRIME AOC Response or a cPRIME Participating Quote or Order that trades with the cPRIME Order.

Combinations in cPRIME				
Origin	Initiating	Contra	Responder	Break-up
Priority Customer	\$0.00	\$0.01	\$0.01	(\$0.01)
Market Maker	\$0.01	\$0.01	\$0.01	(\$0.01)
Non-MIAX Market Maker	\$0.01	\$0.01	\$0.01	(\$0.01)
Broker Dealer	\$0.01	\$0.01	\$0.01	(\$0.01)
Firm Proprietary	\$0.01	\$0.01	\$0.01	(\$0.01)
Public Customer that is Not a Priority Customer	\$0.01	\$0.01	\$0.01	(\$0.01)

SPIKES Settlement Day: SPY Options Opening Auction Fees	
Origin	SPY Options Orders ¹⁰
Priority Customer	\$0.00
Market Maker	\$0.03
Non-MIAX Market Maker	\$0.06
Broker-Dealer	\$0.06
Firm Proprietary	\$0.03
Public Customer that is Not a Priority Customer	\$0.06

Market Maker Incentives: MIAX has waived certain non-transaction fees applicable to Market Makers that trade solely in Proprietary Products (including options on the SPIKES Index) until December 31, 2021. This includes Membership Application Fees, monthly Market Maker Trading Permit Fees, Member Application Programming Interface (“API”) Testing and Certification Fees, and monthly MEI Port Fees, as defined below. Please see MIAX Options [Fee Schedule](#) for details.

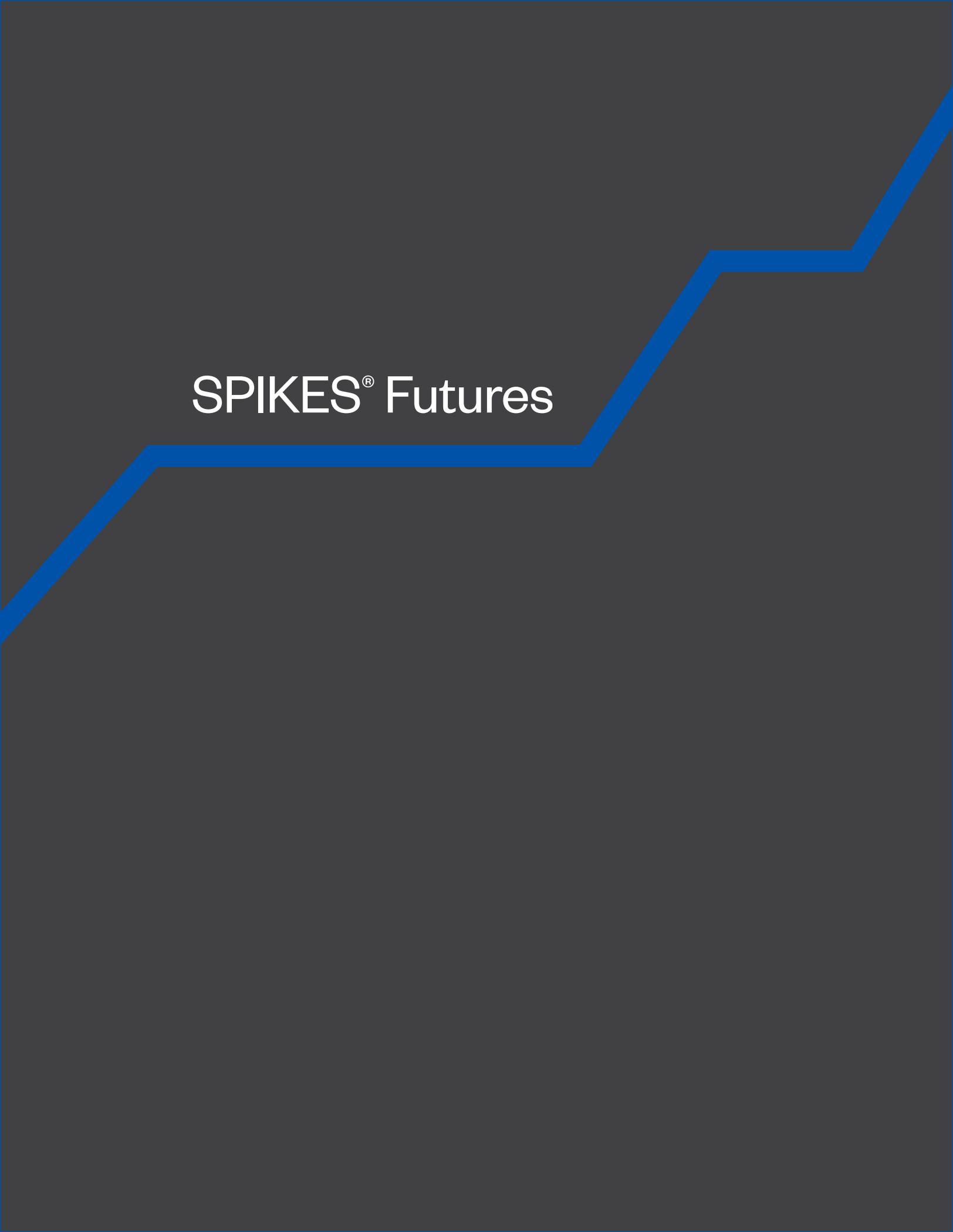
DISCLAIMER

The SPIKES Rate Card provides a summary of the SPIKES transaction charges assessed by MIAX as of the publication date. The complete, official, and current MIAX [Fee Schedule](#) is available at www.miaxoptions.com/fees. In the event of any conflict between the SPIKES Rate Card and the MIAX Fee Schedule, the charges set forth in the MIAX Fee Schedule prevail.

¹⁰ These fees will be charged to each side of all trades occurring in the SPY opening in the expiration month used to determine SPIKES settlement on settlement day only; in lieu of any other fees in the Fee Schedule.



For more information about SPIKES Options & SPIKES Futures contact Sales at:
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SPIKES[®] Futures

FUTURES

Incentive Program

SPIKES® Futures Incentive Program & Fee Free Trading

Exchange Fees for SPIKES Futures are ZERO as of April 1, 2021

Program Overview

This program is open to all market participants.

1 – Fee Free Trading

Dates	3-month period from April 1, 2021 – June 30, 2021
Eligibility	All market participants in SPIKES Futures (SPK). MGEX will waive exchange fees ¹ .

2 – Quoting Size Rebate Program

Dates	3-month period from April 1, 2021 – June 30, 2021
Eligibility	<p>Participation is open to all, no sign-up required. To qualify for the month, Participant must, during Regular Trading Hours (RTH):</p> <ul style="list-style-type: none"> - Provide a two-sided market (bid and offer) subject to a width requirement 70% of the time in the front (2) months² - Have a minimum Participant Average Quote Size (*AQS) of at least (2) contracts

* AQS is calculated averaging the size of the bid and the size of the offer, over the term, where the participant quote meets a certain width requirement.

3 – Volume Rebate Program

Dates	3-month period from April 1, 2021 – June 30, 2021
Eligibility	<p>Participation is open to all, no sign-up required. To qualify for the month, Participant must, during RTH:</p> <ul style="list-style-type: none"> - Provide a two-sided market (bid and offer) subject to a width requirement 50% of the time in the front (2) months - Execute a minimum of 5% of the total Exchange *QCS

* Qualified Contract Sides (QCS), for both the Participant (numerator) and the exchange (denominator) are counted for all SPK trades executed on the exchange during RTH in the standard order book, the TAS order book, and the complex order book, but excludes contracts executed in the Block and/or EFRP mechanisms.

¹ Regular clearing fees assessed by the MGEX clearing house will be assessed

² Contact sales@tradespikes.com for more information concerning the specific quoting requirements.

SPIKES Futures: Incentive Program

Incentive Pool Details

Quoting Size Rebate Program

Incentive Pool Rebate:

- Total \$60,000
- Pro-rata allocation of the pool is based on each Participant AQS as a percent of total sum of all qualified Participant's AQS

Volume Rebate Program

Incentive Pool Rebate:

- Pro-rata allocation of the pool is based on Participant's QCS volume. Participant is eligible to receive the pro-rata distribution of volume rebate pool each month
- Participant QCS divided by the Exchange QCS

Pool Schedule:

Month	Allocation	Pool Size Cap
1	\$5.00 for each QCS executed during the month	\$200,000 for the month
2	\$3.00 for each QCS executed during the month	\$200,000 for the month
3	\$2.00 for each QCS executed during the month	\$200,000 for the month

DISCLAIMER

This SPIKES Futures Incentive Program description provides a summary of the SPIKES Futures Incentive Program and/or the SPIKES Market Maker Program and certain transaction fees assessed by MGEX as of the publication date. The complete, official, and current MGEX Fee Schedule for SPIKES Futures is available at: <http://www.mgex.com/spikes.html>. The complete and official SPIKES Futures Incentive Program and/or SPIKES Market Maker Program is described in and subject to a filing made by MGEX with the CFTC. In the event of any conflict between this description and the MGEX Fee Schedule or the CFTC filing, the MGEX Fee Schedule and CFTC filing prevail. Fees and incentives are subject to change.



For more information about SPIKES Options & SPIKES Futures contact Sales at:

sales@tradespikes.com • 609-897-8177 or contact MGEX directly: mgex@mgex.com • 612-321-7101

FUTURES

Summary

SPIKES[®] Futures Summary

SPIKES Volatility Index

The SPIKES Volatility Index (index symbol: SPIKE), is a measure of the expected 30-day volatility in the SPDR[®] S&P 500[®] ETF (SPY). SPY is the largest exchange traded fund in the world and tracks the most watched stock index in the United States.

SPIKES is built using the popular variance swap methodology and uses live SPY option prices to calculate volatility. This is consistent with the way the trading community is used to modelling risk and hedging exposure.

SPIKES Futures

SPIKES Futures are offered by MGEX via the CME GLOBEX[®] platform, and are cleared by MGEX.

The SPIKES Index and volatility products offer a number of unique features designed to produce highly accurate, robust data and create a transparent and open auction settlement process.

MIAX[®] is proud to partner with T3 Index and MGEX to offer SPIKES Futures - for more confident volatility trading.

The SPIKES Formula

SPIKES has a defined rules-based approach to selecting components—a series of options on the SPY—and weighting them to derive a single price for the index. The general formula for the SPIKES Index is as follows:

$$\text{SPIKES} = 100 \times \sqrt{\left(\frac{t_1}{t_M} \frac{t_2 - t_M}{t_2 - t_1} \sigma_1^2 + \frac{t_2}{t_M} \frac{t_M - t_1}{t_2 - t_1} \sigma_2^2 \right)}$$

- t_1 Time (in seconds) to near-term expiration
- σ_1 Estimated volatility computed by variance swap formula, near-term
- t_2 Time (in seconds) to next-term expiration
- σ_2 Estimated volatility computed by variance swap formula, next-term
- t_M Number of seconds in 30 days (30 x 86,400 = 2,592,000)

The formula for expected T-term variance is as follows:

$$\sigma^2 = \frac{1}{T} \left[2e^{RT} \sum_i \frac{\Delta K_i p_i}{K_i^2} - \left(\frac{e^{RT} (p_{ATM}^c - p_{ATM}^p)}{K_{ATM}} \right)^2 \right]$$

- T Time to options expiration (in years, with 1-second precision)
- $K_i p_i$ A list of unique SPY options strikes, ordered from lowest to highest, and corresponding SPY options prices; of a call if $K_i > K_{ATM}$; and of a put if $K_i < K_{ATM}$; if $K_i = K_{ATM}$ then an average between the ATM SPY put and call prices
- ΔK_i Half the difference between the strikes on either side of K_i

$$\Delta K_i = \frac{(K_{i+1} - K_{i-1})}{2}$$

- p_{ATM}^c Price of the at-the-money (ATM) SPY call option
- p_{ATM}^p Price of the ATM SPY put option
- K_{ATM} Strike closest to the point where linearly interpolated SPY call and put prices intersect

- For the last (highest and lowest) selected strikes, ΔK_i is simply the absolute difference between K_i and the nearest selected option's strike
- R Risk-free interest rate to option's expiration

SPIKES Futures: Summary

Calculation Process

SPIKES is calculated using only standard options on the SPY that expire on the third Friday of each calendar month. Although weekly options on SPY are available, these are **not** used in the calculation of SPIKES.

The following process is used to calculate SPIKES:

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Select two SPY expirations	Apply “Price Dragging” technique	Select option inputs	Apply variance swap formula	Calculate SPIKES
Select the two SPY expiration months. The SPIKES calculation begins with the universe of regular monthly SPY options and selects the first monthly expiration with more than two full days to expiry and the next monthly expiration.	Apply “Price Dragging” technique to determine option price inputs. Price Dragging uses eligible trades, bids, and offer prices to reduce erratic movements of the index value that could result from illiquid out-of-the-money options.	Select option inputs. For each expiration, choose the at-the-money and all out-of-the-money options, limited by truncation.	Apply variance swap formula. For each expiration, the volatility is estimated using the variance swap formula, with the selected options’ prices weighted according to the formula [2] above.	Calculate SPIKES. Compute the 30-day weighted average of the near- and next-expiration variances, take the square root, and multiply by 100 as illustrated in the formula [1] above.

MIAX Settlement Auction

SPIKES Special Settlement Auction (a modified Opening Process)

The SPIKES Special Settlement Auction occurs on MIAX Options in the SPY options that have 30 days to expiration on the Wednesday that is 30 days prior to the third Friday of the calendar month immediately following the month in which the contract expires. If that Wednesday or the expiration Friday that is 30 days following that Wednesday is a holiday, the final settlement date for the contract shall be on the business day immediately preceding that Wednesday.

Before and during the opening process for each relevant SPY option, MIAX Options will disseminate robust imbalance information over its AIS feed. Anyone (members and non-members) may subscribe to the AIS feed.

New liquidity types called Settlement Auction Only (SAO) orders and SAO eQuotes were created for this process.

MIAX Options now allows SPIKES Combination Orders – orders to buy or sell one or more SPIKES options series and the offsetting number of SPIKES Combinations to be delta neutral – with ratios of up to eight to one. SPIKES Combinations are the purchase (or sale) of a SPIKES call option and sale (or purchase) of a SPIKES put option with the same expiry and strike.

Combo Linked to Future (CLF)

The “Combo Linked to Future” (CLF) is a strategy type that is available for trading in two distinct segments. It will incorporate both a Related Futures Cross (RFC) on MIAX for the options component and either an Exchange for Related Position (“EFRP”) on MGEX or most likely the Exchange of Contract for Related Position (“ECRP”) on other futures exchanges. These simultaneous execution types allow for the exchange of SPIKES (SPK) futures for SPIKES option combinations. Other highly correlated futures may also be eligible for trading versus SPIKES option combinations. Please see the [CLF](#) document for a brief description and [MIAX](#) or [MGEX](#) rulebooks for additional details.

Trading fees

For trading fees, see [SPIKES Futures Rate Card](#) or the [MGEX fee schedule](#) for SPIKES Futures.

SPIKES Futures: Summary

The information in this document is provided for information purposes only, and is not intended to provide, and should not be relied on for financial or legal advice. The information herein is presented “as is” and without representations or warranties of any kind. The Parties shall not be liable for loss or damage, direct, indirect or consequential, arising from any use of the Data or action taken in reliance upon the Data.

DISCLAIMER

Futures trading is not suitable for all investors, and involves the risk of loss. The risk of loss in futures can be substantial. You should, therefore, carefully consider whether such trading is suitable for you in light of your circumstances and financial resources. For additional information regarding futures trading risks, see the Risk Disclosure Statement set forth in CFTC Regulation §1.55(b). The information contained herein is provided for general education and information purposes only. No statement contained herein should be construed as a recommendation to buy or sell a security or future or to provide investment advice. SPIKES® is a registered trademark of T3 Index. Certain aspects of the methodology and related functionality of SPIKES® is owned by MIH and may be covered by one or more patents or pending patent applications.

No statement within this document should be construed as a recommendation to buy or sell a security or futures contract or to provide investment advice.

SPIKES® is a registered trademark of T3 Index. Certain aspects of the methodology and related functionality of SPIKES is owned by MIH and may be covered by one or more patents or pending patent applications.



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F U T U R E S

Contract Specifications

SPIKES® Futures Contract Specifications

Contract Name	SPIKES Volatility Index Future (SPK)																
Ticker Symbol	Trading of the SPK Futures Contract will be available electronically via the CME Globex® platform with ticker symbol SPK.																
Trading Hours	<p>The SPIKES futures will trade as follows (all hours listed in Central Time):</p> <table border="0"> <tr> <td>Extended Trading Session I:</td> <td>5:00 p.m. – 8:30 a.m. (Sunday – Friday)</td> </tr> <tr> <td> Pre-Open:</td> <td>4:00 p.m. – 5:00 p.m. (Sunday)</td> </tr> <tr> <td></td> <td>4:45 p.m. – 5:00 p.m. (Monday – Thursday)</td> </tr> <tr> <td>Regular Trading Session:</td> <td>8:30 a.m. – 3:15 p.m. (Monday – Friday)</td> </tr> <tr> <td>Extended Trading Session II:</td> <td>3:30 p.m. – 4:00 p.m. (Monday – Friday)</td> </tr> <tr> <td> Pre-Open:</td> <td>3:15 p.m. – 3:30 p.m. (Monday – Friday)</td> </tr> <tr> <td>TAS Futures:</td> <td>8:30 a.m. – 2:58 p.m. CT (Monday – Friday)</td> </tr> <tr> <td>Daily Settlement for SPIKES Futures:</td> <td>2:59:00 to 2:59:59 p.m. CT</td> </tr> </table>	Extended Trading Session I:	5:00 p.m. – 8:30 a.m. (Sunday – Friday)	Pre-Open:	4:00 p.m. – 5:00 p.m. (Sunday)		4:45 p.m. – 5:00 p.m. (Monday – Thursday)	Regular Trading Session:	8:30 a.m. – 3:15 p.m. (Monday – Friday)	Extended Trading Session II:	3:30 p.m. – 4:00 p.m. (Monday – Friday)	Pre-Open:	3:15 p.m. – 3:30 p.m. (Monday – Friday)	TAS Futures:	8:30 a.m. – 2:58 p.m. CT (Monday – Friday)	Daily Settlement for SPIKES Futures:	2:59:00 to 2:59:59 p.m. CT
Extended Trading Session I:	5:00 p.m. – 8:30 a.m. (Sunday – Friday)																
Pre-Open:	4:00 p.m. – 5:00 p.m. (Sunday)																
	4:45 p.m. – 5:00 p.m. (Monday – Thursday)																
Regular Trading Session:	8:30 a.m. – 3:15 p.m. (Monday – Friday)																
Extended Trading Session II:	3:30 p.m. – 4:00 p.m. (Monday – Friday)																
Pre-Open:	3:15 p.m. – 3:30 p.m. (Monday – Friday)																
TAS Futures:	8:30 a.m. – 2:58 p.m. CT (Monday – Friday)																
Daily Settlement for SPIKES Futures:	2:59:00 to 2:59:59 p.m. CT																
Contract Multiplier	The contract multiplier for each SPK Futures Contract is \$1,000 (USD).																
Contract Months	The months available for trading in the SPK Futures Contract will be the nearest six (6) consecutive months. The first trading day of the new 6th month contract will begin with the evening session on the settlement day of the expiring front month.																
Order Types	Order types for SPK Futures Contracts will include Limit, Market Order with Protection, Market to Limit, Stop Limit, and Stop Order with Protection.																
Calendar Spreads	Standard calendar spreads are available for trading in the SPK Futures Contract with reduced tick functionality. The individual legs and net prices may be in increments of 0.01 index points, which has a value of \$10.00.																
Block Trades	<p>Block Trades are permitted to be executed in the SPK Futures Contract given they meet minimum quantity thresholds. The Block Trade minimum threshold for the SPK Futures Contract is 200 contracts.</p> <p>Block Trades will include a minimum price increment of 0.01 index points which has a value of \$10.00.</p>																
Exchange for Related Position	<p>Exchange for Related Position (EFRP) transactions are permitted to be executed in the SPK Futures Contract provided certain criteria are met. The transaction must also be proven to be a bona fide EFRP transaction and must be submitted to the Exchange in accordance with applicable Rules.</p> <p>See MGEX Rule 719.00. for additional information related to EFRP transactions.</p>																
Minimum Price Increment	The minimum price increment in the SPK Futures Contract will be 0.05 index points, which has a value of \$50.00. For spread trades, the individual legs and net prices may be in increments of 0.01 index points, which has a value of \$10.00.																
Daily Price Limits	During the extended trading session each SPK Futures Contract will be subject to an upper price limit of 70% above the most current calculated reference value and a lower price limit of 30% below the most current calculated reference value. There are no price limits during the regular trading session.																

SPIKES Futures: Contract Specifications

Trading Halts	<p>Trading halts for SPK futures will go into effect following a NYSE Rule 80B trading halt in the cash equity market in the following convention:</p> <ul style="list-style-type: none">• Level 1: 15-minute trading halt following a 7% decline in the S&P 500® Index (unless the decline occurs after 2:25 p.m. (Central Time) or 11:25 a.m. (Central Time) in the case of early close).• Level 2: 15-minute trading halt following a 13% decline in the S&P 500 Index (unless decline occurs after 2:25 p.m. (Central Time) or 11:25 a.m. (Central Time) in the case of early close).• Level 3: Trading halt for the remainder of the trading session following a 20% decline in the S&P 500 Index, effective during all regular Hours of Trading. <p>Additionally, MGEX will take into consideration any trading halt in the SPDR® S&P® ETF Trust and/or the SPIKE Options Contract in determining whether to halt trading in the SPK Futures Contract.</p> <p>Trading halts in the SPK Futures Contract can also be triggered from a correlated trading halt in the CME E-mini S&P Futures Contract; however, these halts are limited to the trading times of 3:00 p.m. to 3:15 p.m. during the regular trading session, or 3:30 p.m. to 4:00 p.m. during the extended trading session.</p>
Last Trading Day/ Termination of Trading	<p>The Last Trading Day for the SPK Futures Contract will be at 8:00 a.m. on the Final Settlement Date.</p>
Final Settlement Date	<p>The Final Settlement Date for the SPK Futures Contract is generally a Wednesday 30 calendar days preceding the Expiration Date of the monthly SPY options. If that day is an Exchange holiday, then the Final Settlement Date will be the preceding business day. The Expiration Date for the monthly SPY options is the 3rd Friday of the month following the month in which the contract expires. If that day is an Exchange holiday, then the Expiration Date is the preceding business day.</p>
Final Settlement Value	<p>SPK Futures will cash settle to the Final SPIKES settlement value, as published by MIAx®, on the Final Settlement Date. Settlement of the SPK Futures Contract will result in the transfer of a cash settlement amount on the business day immediately following the Settlement Date. The cash settlement amount will be the final mark to market amount against the final settlement price of the SPK Futures Contract multiplied by \$1,000.00.</p>
Trade at Settlement Transactions (TAS)	<p>Trade at settlement transactions (TAS) for SPK Futures Contracts will be available during the regular trading session hours of 8:30 a.m. to 2:58 p.m.</p> <p>All TAS transactions will trade on CME's Globex platform with ticker symbol "SPT" and will be limited to price ranges from 0.50 index points below the daily settlement price to 0.50 index points above the daily settlement price. Minimum price increments will be 0.01 index points. All TAS orders will be required to be a day order, immediate or cancel order, or fill or kill order. Both single leg and calendar spread transactions are available for trading, however no block trades or ECRPs will be permitted in TAS transactions for SPK Futures Contracts.</p> <p>Last Trade Date for TAS transactions is at 2:58 p.m. the business day prior to the SPK Future Contract's Last Trading Day.</p>
Position Accountability	<p>The position accountability levels for SPK Futures Contracts are as follows:</p> <ul style="list-style-type: none">• Ownership or control at any time of more than 50,000 contracts net long or short in all SPK Futures Contracts combined.• Ownership or control of more than 30,000 contracts net long or net short in the expiring SPK Futures Contract, effective at the start of Hours of Trading for the Friday prior to the Final Settlement Date of the expiring SPK Futures Contract.• Ownership or control of more than 10,000 contracts net long or net short in the expiring SPK Futures Contract, effective at the start of the Hours of Trading for the Business Day immediately preceding the Final Settlement Date of the expiring SPK futures. <p>Trading for the Friday prior to the Final Settlement Date and for the business day immediately preceding the Final Settlement Date will be in effect upon commencement of the first range of the extended trading session (3:30 p.m. to 4:00 p.m.)</p>
Reportable Position and Volume Level	<p>Any open position level in the SPK Futures Contract at the close of trading on any trading day equal to, or in excess of, 200 contracts on either side of the market is required to be reported to the CFTC.</p> <p>A volume threshold account that has trading volume in the SPK Futures Contract during a single trading day equal to, or in excess of, 50 contracts is required to be reported to the CFTC.</p>



For more information about SPIKES Options & SPIKES Futures contact Sales at:
sales@tradespikes.com • 609-897-8177 or contact MGEX directly: **mgex@mgex.com • 612-321-7101**

FUTURES

Expiration Dates

SPIKES® Options and Futures Expiration Dates

Monthly expirations are available for SPIKES Options and Futures. SPIKES Options and Futures expire on the Wednesday that is thirty days prior to the third Friday of the calendar month immediately following the expiring month and are AM settled. If that Wednesday or the Friday that is thirty days following that Wednesday is an Exchange holiday, the final settlement value shall be calculated on the business day immediately preceding that Wednesday.

Contract Month	Futures Product Code	Synthetic Futures Product Code	1st Trade Date Futures ² and Options	Last Trade Date Futures* (8:00am CT)	Last Trade Date Options* (3:15pm CT)	SPIKES Settlement Date (8:30am CT)	SPY Options Expiry For Settlement
Jan-2021	SPKF1	SKSF1	7/23/2020 ²	1/20/2021	1/19/2021	1/20/2021	2/19/2021
Feb-2021	SPKG1	SKSG1	8/20/2020 ²	2/17/2021	2/16/2021	2/17/2021	3/19/2021
Mar-2021	SPKH1	SKSH1	9/17/2020 ²	3/17/2021	3/16/2021	3/17/2021	4/16/2021
Apr-2021	SPKJ1	SKSJ1	10/22/2020 ²	4/21/2021	4/20/2021	4/21/2021	5/21/2021
May-2021	SPKK1	SKSK1	11/19/2020 ²	5/19/2021	5/18/2021	5/19/2021	6/18/2021
Jun-2021	SPKM1	SKSM1	12/17/2020 ²	6/16/2021	6/15/2021	6/16/2021	7/16/2021
Jul-2021	SPKN1	SKSN1	1/21/2021	7/21/2021	7/20/2021	7/21/2021	8/20/2021
Aug-2021	SPKQ1	SKSQ1	2/18/2021	8/18/2021	8/17/2021	8/18/2021	9/17/2021
Sep-2021	SPKU1	SKSU1	3/18/2021	9/15/2021	9/14/2021	9/15/2021	10/15/2021
Oct-2021	SPKV1	SKSV1	4/22/2021	10/20/2021	10/19/2021	10/20/2021	11/19/2021
Nov-2021	SPKX1	SKSX1	5/20/2021	11/17/2021	11/16/2021	11/17/2021	12/17/2021
Dec-2021	SPKZ1	SKSZ1	6/17/2021	12/22/2021	12/21/2021	12/22/2021	1/21/2022
Jan-2022	SPKF2	SKSF2	7/22/2021	1/19/2022	1/18/2022	1/19/2022	2/18/2022
Feb-2022	SPKG2	SKSG2	8/19/2021	2/16/2022	2/15/2022	2/16/2022	3/18/2022
Mar-2022	SPKH2	SKSH2	9/16/2021	3/15/2022	3/14/2022	3/15/2022	4/14/2022 ³
Apr-2022	SPKJ2	SKSJ2	10/21/2021	4/20/2022	4/19/2022	4/20/2022	5/20/2022
May-2022	SPKK2	SKSK2	11/18/2021	5/18/2022	5/17/2022	5/18/2022	6/17/2022
Jun-2022	SPKM2	SKSM2	12/23/2021	6/15/2022	6/14/2022	6/15/2022	7/15/2022
Jul-2022	SPKN2	SKSN2	1/20/2022	7/20/2022	7/19/2022	7/20/2022	8/19/2022
Aug-2022	SPKQ2	SKSQ2	2/17/2022	8/17/2022	8/16/2022	8/17/2022	9/16/2022
Sep-2022	SPKU2	SKSU2	3/16/2022	9/21/2022	9/20/2022	9/21/2022	10/21/2022
Oct-2022	SPKV2	SKSV2	4/21/2022	10/19/2022	10/18/2022	10/19/2022	11/18/2022
Nov-2022	SPKX2	SKSX2	5/19/2022	11/16/2022	11/15/2022	11/16/2022	12/16/2022
Dec-2022	SPKZ2	SKSZ2	6/16/2022	12/21/2022	12/20/2022	12/21/2022	1/20/2023
Jan-2023	SPKF3	SKSF3	7/21/2022	1/18/2023	1/17/2023	1/18/2023	2/17/2023
Feb-2023	SPKG3	SKSG3	8/18/2022	2/15/2023	2/14/2023	2/15/2023	3/17/2023
Mar-2023	SPKH3	SKSH3	9/22/2022	3/22/2023	3/21/2023	3/22/2023	4/21/2023
Apr-2023	SPKJ3	SKSJ3	10/20/2022	4/19/2023	4/18/2023	4/19/2023	5/19/2023
May-2023	SPKK3	SKSK3	11/17/2022	5/17/2023	5/16/2023	5/17/2023	6/16/2023
Jun-2023	SPKM3	SKSM3	12/22/2022	6/21/2023	6/20/2023	6/21/2023	7/21/2023

* Trading ceases at 8:00am on the Last Trading Day for an expiring contract.

¹ Synthetic prices are available via the MIAx® Product Feed (MPF).

² The highlighted dates are the current listings for both options and futures, however, the first trade date for these listings as it relates to futures is 12/14/20

³ 4/15/2022 is an exchange holiday, Good Friday



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FUTURES

Rate Card

SPIKES® Futures Rate Card

SPIKES Futures Exchange and Clearing Fees - MGEX

ZERO EXCHANGE FEES FOR A LIMITED TIME ONLY					
Per Contract	Exchange	Clearing	Surcharge	Total Fee	Total Fee* with zero exchange fees
Future	\$0.25	\$0.20	-	\$0.45	\$0.20
TAS	\$0.25	\$0.20	-	\$0.45	\$0.20
EFRP/ECRP	\$0.25	\$0.20	\$0.50	\$0.95	\$0.70
Block Trades	\$0.25	\$0.20	\$0.50	\$0.95	\$0.70
Transfer Positions	\$0.25	\$0.20	-	\$0.45	\$0.20
Delivery/ Settlement	\$0.25	\$0.20	\$0.10	\$0.55	\$0.30
Give-Up*	-	-	\$0.10	\$0.10	

*For a limited time only, the \$0.25 exchange fees for SPIKES Futures are waived.

*Executing side only, same day.

The clearing fee is standard across all products at MGEX. Visit www.MGEX.com for more information

DISCLAIMER

The SPIKES Futures Rate Card provides a summary of the SPIKES Futures transaction charges assessed by MGEX as of the publication date. The complete, official, and current MGEX Fee Schedule for SPIKES Futures is available at: <http://www.mgex.com/spikes.html>. In the event of any conflict between the SPIKES Futures Rate Card and the MGEX Fee Schedule, the charges set forth in the MGEX Fee Schedule prevail. Fees are subject to change.

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FUTURES

How to Trade

SPIKES[®] Futures How to Trade

What is the SPIKES Volatility Index?

The SPIKES Volatility Index (index symbol: SPIKE), is a measure of the expected 30-day volatility in the SPDR[®] S&P 500[®] ETF (SPY). SPY is the largest exchange traded fund in the world and tracks the most watched stock index in the United States. SPIKES is built using the popular variance swap methodology and uses live SPY option prices to calculate volatility. This is consistent with the way the trading community is used to modelling risk and hedging exposure.

The SPIKES Index and volatility products offer a number of unique features designed to produce highly accurate, robust data and create a transparent and open auction settlement process.

Watch the introductory [video](#) and read our introduction to SPIKES document for more information.

What are SPIKES Futures?

SPIKES Futures (Ticker symbol: SPK) is offered by MGEX via the CME GLOBEX[®] platform, and are cleared by MGEX.

See SPIKES [Futures](#) Fact Sheet for more details.

Where do SPIKES Futures trade?

SPIKES Futures trade on MGEX, via the CME Globex[®] platform.

Visit the MGEX [website](#) for more information.

Where do SPIKES Futures clear?

All SPIKES futures clear and settle at MGEX.

Are there listed options available to trade on the SPIKES Index?

SPIKES cash settled options trade exclusively on MIAX[®] Options.

Visit the MIAX [website](#) for more information.

What are the Trading Hours for SPIKES Futures?

SPIKES Futures trade as follows (all hours listed in Central Time):

Extended Trading Session I:	5:00 p.m. – 8:30 a.m. (Sunday – Friday)
Pre-Open:	4:00 p.m. – 5:00 p.m. (Sunday)
	4:45 p.m. – 5:00 p.m. (Monday – Thursday)
Regular Trading Session:	8:30 a.m. – 3:15 p.m. (Monday – Friday)
Extended Trading Session II:	3:30 p.m. – 4:00 p.m. (Monday – Friday)
Pre-Open:	3:15 p.m. – 3:30 p.m. (Monday – Friday)

Do I need to be a member of MGEX to trade SPIKES Futures?

As of December 4, 2020, MGEX is no longer a membership organization, therefore a membership at MGEX is not required to trade SPIKES Futures. Please see the next question.

What is required to trade at MGEX?

A market participant must have an account with an MGEX Clearing Member or an account with an FCM and be permissioned to access MGEX markets via the Clearing Member.

See list of current [MGEX Clearing Members](#)

How do I access the Exchange?

The MGEX Clearing Member and the market participant will choose how the participant will connect to the CME Globex® platform and the Clearing Member will offer connectivity methods to the market participants in question.

How do I access CME Globex®?

To access CME Globex® you or your broker needs a trading account with an MGEX Clearing Member or an account with an FCM who has a relationship with an MGEX Clearing Member. Clearing Members provide connectivity once you have an account.

CME connectivity/clearing firms/trading at CME

See complete list of [clearing firm members](#) from CME Group.

How to Connect to CME Globex® directly

See [webpage](#) on how to connect to CME Globex® directly.

CME Third Party Trading and Connection Solutions

See [webpage](#) for how to connect to CME through a broker.

MGEX's Strategic Partnership with CME Group

Read more about MGEX's partnership with CME.

Resources and Information for SPIKES Volatility Products

SPIKES Futures [Summary](#)

SPIKES Futures [contract specifications](#)

MGEX [rules](#) for SPIKES Futures

MIAX SPIKES Options [information](#)

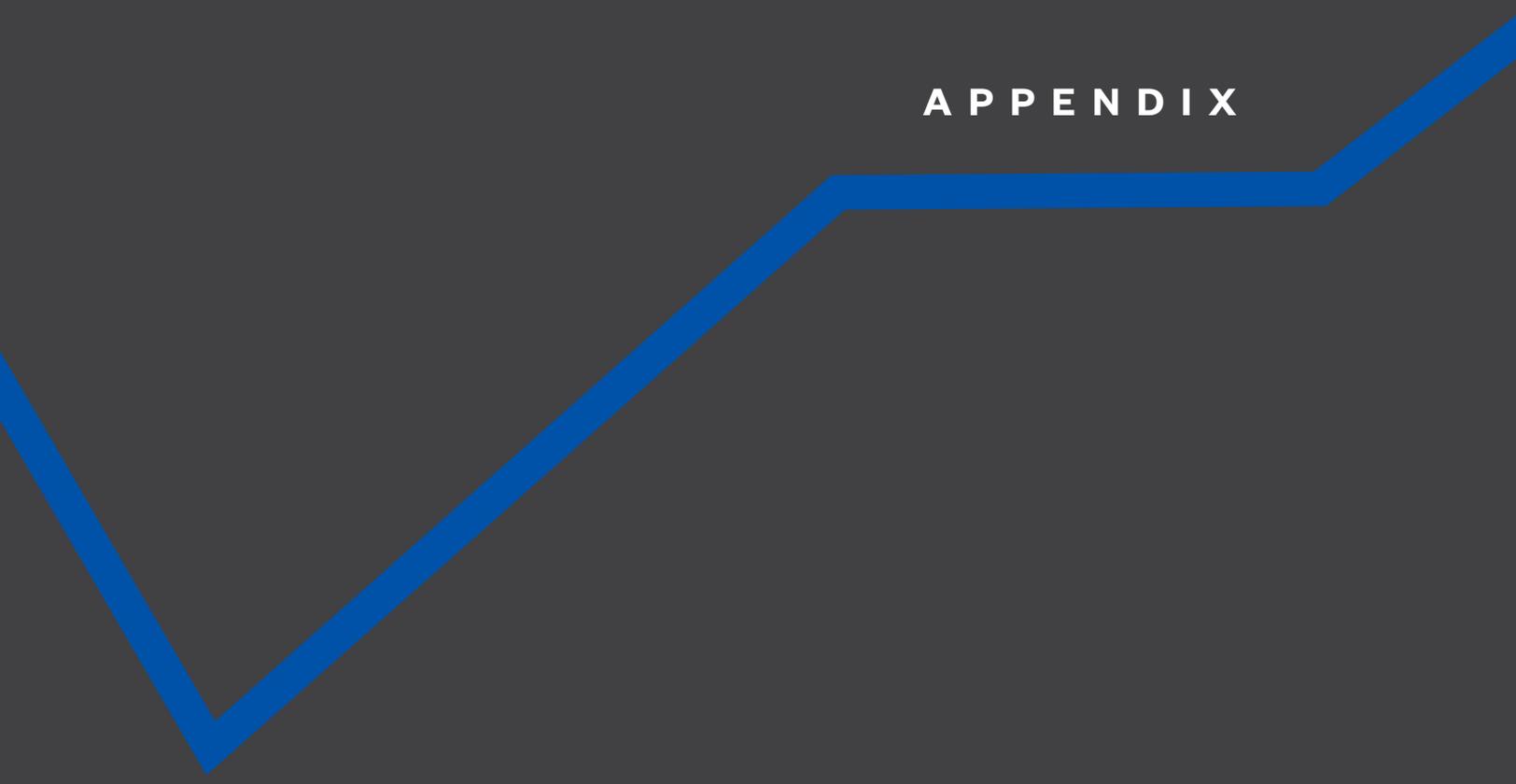
General SPIKES Information

- Historical SPIKES [Index data](#)
- SPIKES [Settlement data](#)
- SPIKES [Bulk Data Download](#)



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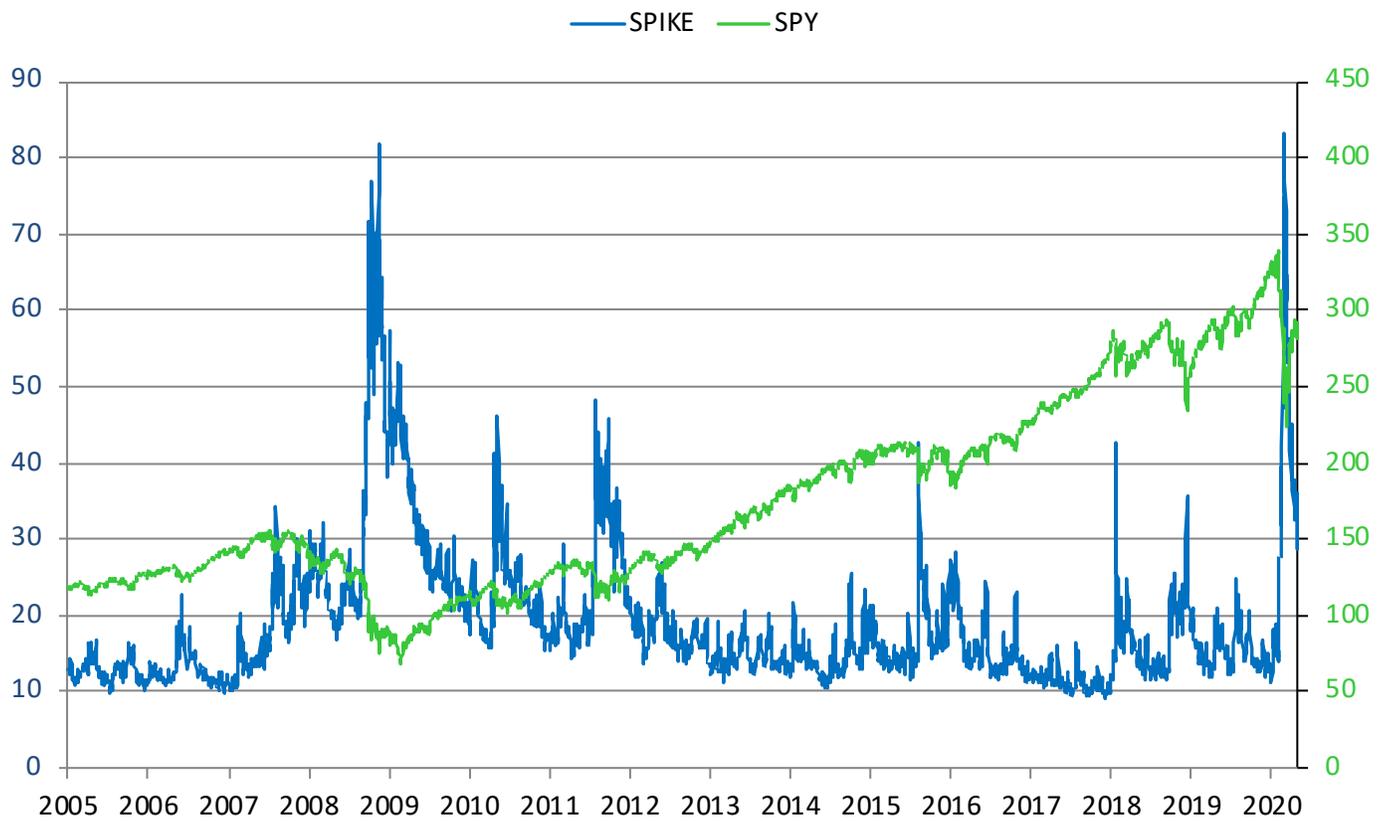
APPENDIX

A P P E N D I X

Charts

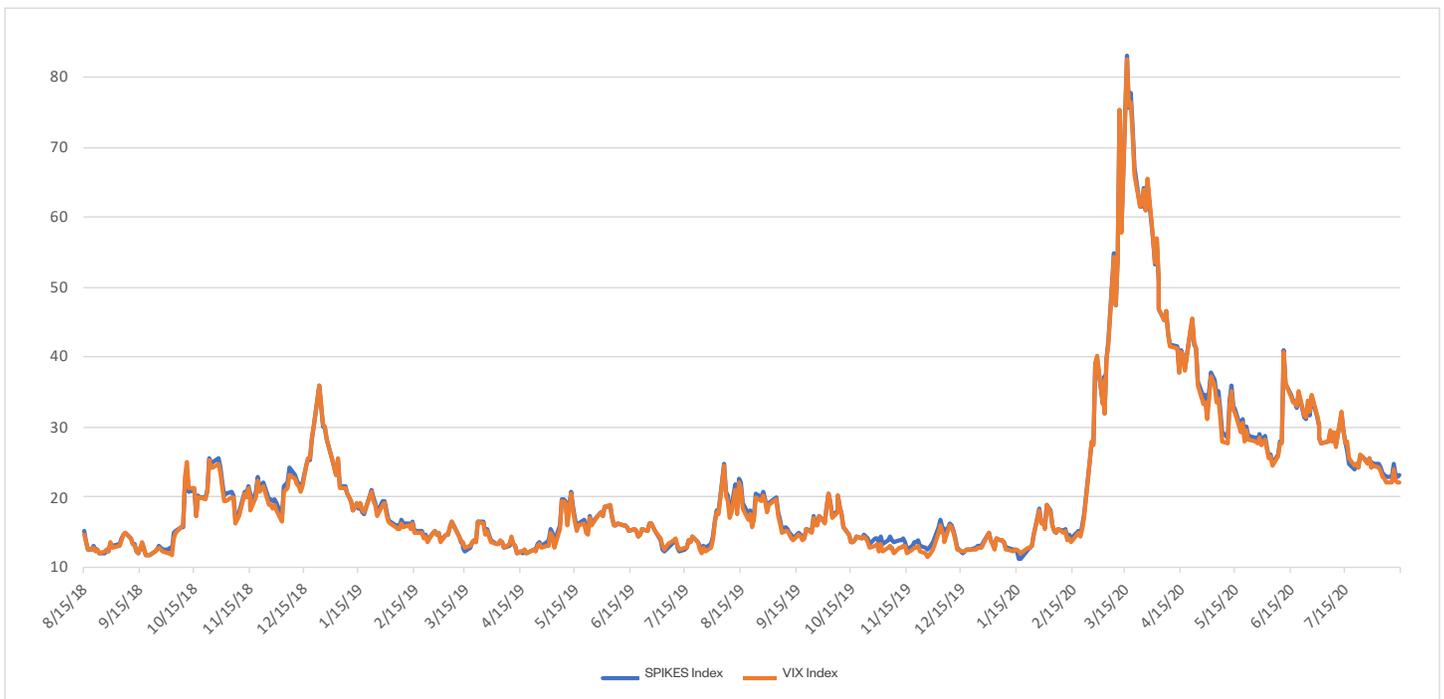
SPIKES and SPY Levels

Shown below is a view of the SPIKES index along with SPY ETF backdated to 2005.



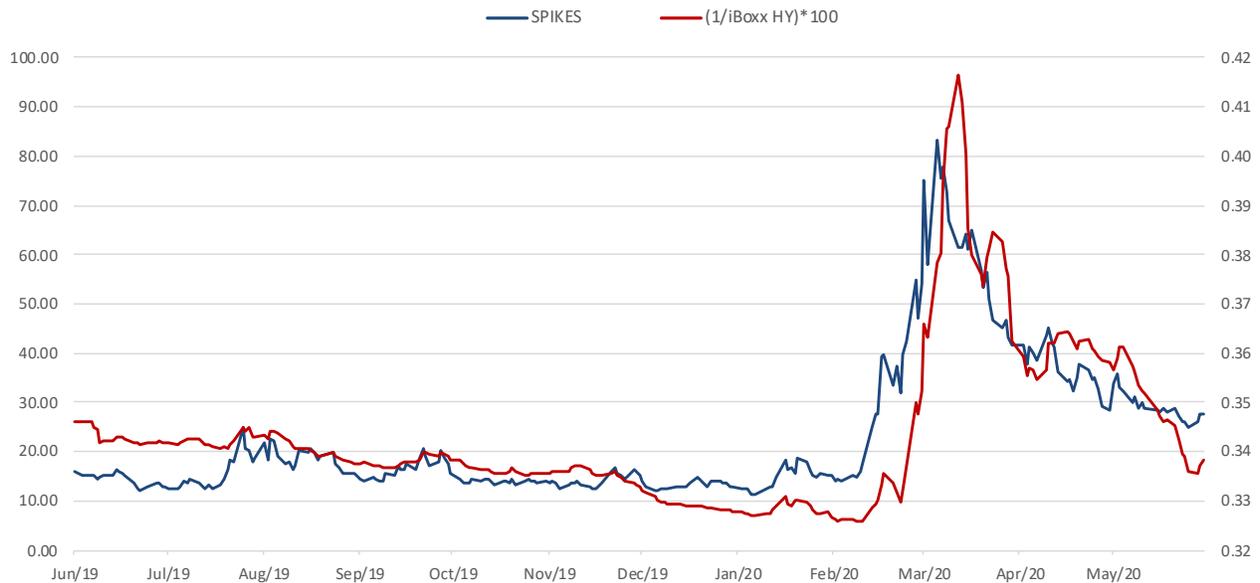
SPIKES Index compared with VIX Index (Daily, 2 Years)

The following chart demonstrates the close relationship between the SPIKES and VIX Volatility Indices. SPIKES is built on SPY options and VIX is computed using SPX options. The chart shows two years of daily closing data.



SPIKES vs Inverse iBoxx USD Liquid High Yield Index One Year Daily

Shown below is a chart of the SPIKES Volatility Index compared with the inverse of the iBoxx USD Liquid High Yield Index. This is the tracking index for the iShares ETF, HYG. With such a close relationship, there are many potential uses for SPIKES Volatility Products in a High Yield Bond or Credit portfolio. In the past, credit spreads have moved in tandem with SPIKES.



Reference: <https://cdn.ih.com/www/pdf/MKT-iBoxx-USD-Liquid-High-Yield-Index-Fact-Sheet.pdf>

DISCLAIMER

The charts referenced above compare the SPIKES® Volatility Index with the SPY ETF, the VIX Index and the iBoxx USD Liquid High Yield Index, respectively. While every attempt has been made to provide an accurate comparison of the data points used, there are no express or implied guarantees as to the accuracy or completeness of these comparisons. Readers should consult the complete, official, and current applicable product page of each of the above referenced products for more information. The data in these charts is provided solely for general education and information purposes. Past performance is not indicative of future results. No statement herein should be construed as a recommendation to buy or sell a security or futures contract or to provide investment advice.

A P P E N D I X

Additional Resources

Additional Resources

Exchanges: [MIAX[®]](#) | [MGEX](#)

Partners: [T3 Index](#)

SPIKES Information: [Learn more](#)

SPIKES E-News Sign Up: [Sign up](#)

SPIKES Analytics: [Spikes Analytics](#)

White Papers: [Peter Carr-SPIKES](#) | [Vrije White Paper-SPIKES](#)

Clearing: [TheOCC](#) | [MGEX Clearing House](#)

Regulators: [Securities and Exchange Commission \(SEC\)](#) | [Commodity Futures Trading Commission \(CFTC\)](#) | [FINRA](#)

Data Source: [Bloomberg](#) | [Thomson Reuters](#) | [LiveVol](#) | [Yahoo Finance](#) | [OPRA](#) |
[MIAX Product Feed \(MPF\)](#)

Podcasts: [The Options Insider \(Volatility Views\) Podcast](#)

MIAX Updates: [Latest News](#)

Contact Information: Sales@tradespikes.com | 609-897-8177

Social Media: Twitter: [@MIAXexchange](#) | LinkedIn: [MIAX Exchange Group](#)

Associations: [Futures Industry Association \(FIA\)](#) | [Institute for Financial Markets \(IFM\)](#) |
[National Futures Association \(NFA\)](#) | [Global Association of Risk Professionals \(GARP\)](#)

Contact sales@tradespikes.com to get started.



About MIH and the MIAX® Exchange Group

Miami International Holdings, Inc. (MIH) is the parent holding company of Miami International Securities Exchange, LLC (MIAX®), MIAX Pearl, LLC (MIAX Pearl®) and MIAX Emerald, LLC (MIAX Emerald® and together with MIAX and MIAX PEARL, the MIAX Exchange Group™), three national securities exchanges. MIH also owns a controlling interest in the Bermuda Stock Exchange.

MIAX, MIAX Pearl and MIAX Emerald options exchanges leverage the MIAX Exchange Group's industry-leading technology and infrastructure to provide their member firms with traditional pricing and pro rata allocation (MIAX), maker-taker pricing and price-time allocation (MIAX Pearl) market structures, and a hybrid market structure with maker-taker pricing and pro rata allocation (MIAX Emerald).

MIAX serves as the exclusive exchange venue for cash-settled options on the SPIKES® Volatility Index (Ticker: SPIKE), a measure of the expected 30-day volatility in the SPDR® S&P 500® ETF (SPY).

Under MIAX Pearl's exchange license, MIAX Pearl Equities™ provides its members with best-in-class performance through a combination of high determinism, low latency and high throughput. MIAX Pearl Equities has maker-taker pricing and a price-time allocation model.

The MIAX Exchange Group's executive offices and National Operations Center are located in Princeton, NJ, with additional offices located in Miami, FL.

To learn more about MIH and the MIAX Exchange Group visit www.MIAXOptions.com.

About MGEX

MGEX, a Designated Contract Market (DCM) and Derivatives Clearing Organization (DCO), was established in 1881 and is the only market for Hard Red Spring Wheat (HRSW), SPIKES Futures, National Corn Index (NCI), National Soybean Index (NSI), Hard Red Winter Wheat Index (HRWI), Hard Red Spring Wheat Index (HRSI), and Soft Red Winter Wheat Index (SRWI) futures and options, as well as for HRSW calendar spread options (CSOs). In addition, MGEX provides DCM, DCO and cash market services to business partners in an array of asset classes. To learn more about MGEX visit www.mgex.com.

About T3 Index

SPIKES has been developed by T3 Index, a research-driven financial indexing firm, specializing in volatility and option benchmarking. T3 Index is dedicated to developing investible, proprietary indices that track related strategies across a range of asset classes to transform the way people invest and manage risk.

For more information on T3 Index and their range of indices, visit www.t3index.com.

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