



## The FCO Cockpit Global Bubble Status Report January 2022



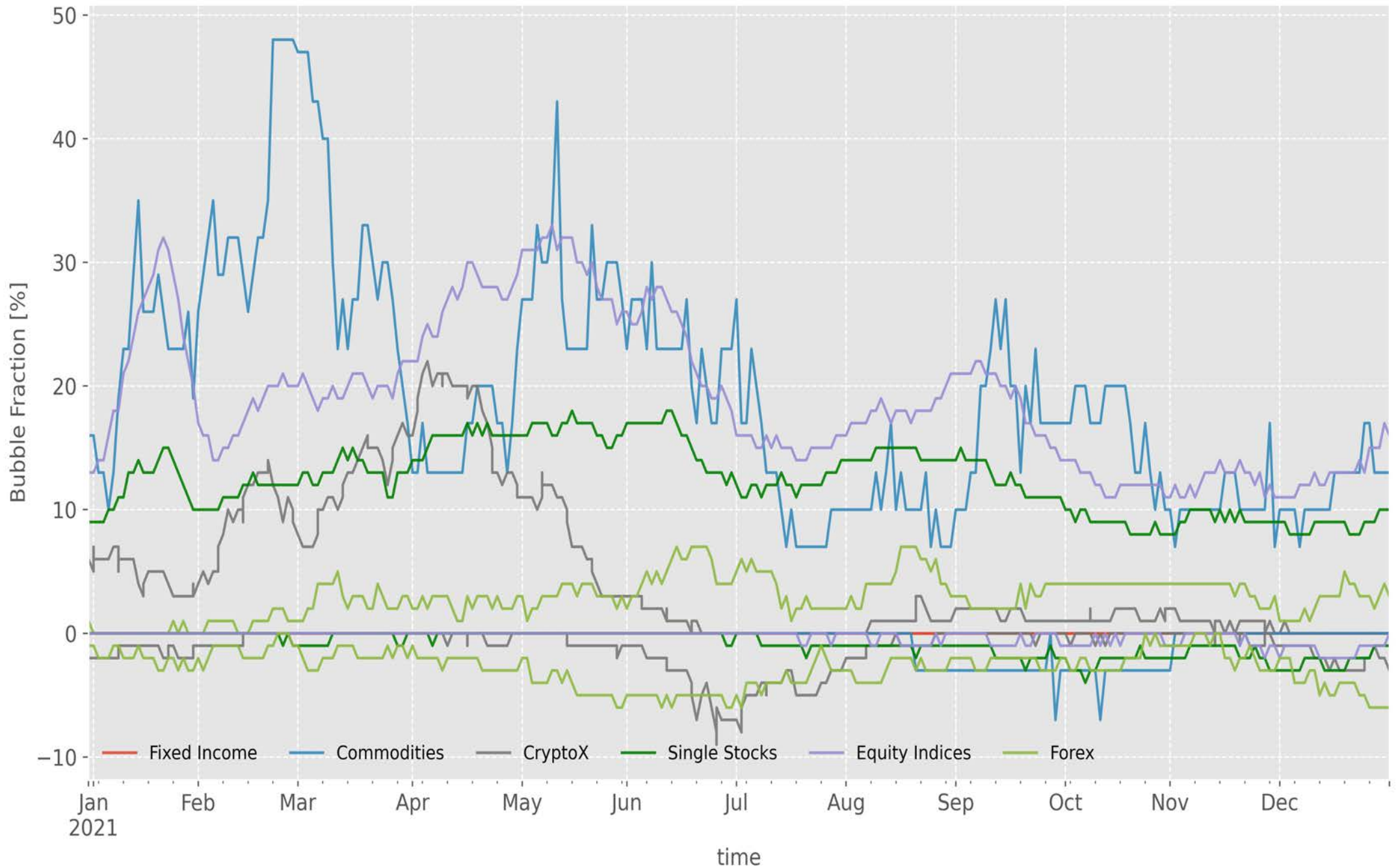
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# Purpose and Benefits

- ▶ The **Financial Crisis Observatory (FCO)** monthly report discusses the historical evolution of bubbles in and between different asset classes and geographies. The purpose of the FCO report is to ascertain which asset classes and sectors are **crowded** and to what degree they develop contagion risks.
- ▶ Today, the report is **used by 600+ institutions world-wide**, including universities, think tanks, sovereign wealth funds, hedge funds, family offices, private banks and pension funds.
- ▶ It delivers the big picture in terms of growing bubbles and instabilities in today's financial markets for **Chief Investment Officers, Senior Researchers, Fund Managers**, and **Independent Financial Advisors**, and all parties with **investment performance responsibility** or **managing financial risks**.
- ▶ The report is the result of an extensive analysis applied to the historical time series of about 450 systemic assets and about 850 single stocks. The systemic assets are bond, equity and commodity indices, as well as a selection of currency pairs. The single stocks are mainly US and European equities. The data is from Thomson Reuters.
- ▶ The appendix shows bubbles indicators of other major assets of possible interest.

Fraction of Positive / Negative Bubble Signals for different Asset Classes



# General Results as of 2021-12-31

	Region	Analyzed Assets	Fraction of Pos. Bubbles [%]	Fraction of Neg. Bubbles [%]
<b>Fixed Income</b>		33	0	0
<b>Commodities</b>		30	13	0
<b>Single Stocks</b>		1615	10	1
	Europe	943	8	1
	United States	659	13	1
<b>Equity Indices</b>		857	16	0
	Europe	53	8	0
	United States	376	19	0
	Global	383	17	1
<b>Forex</b>		99	3	6
<b>CryptoX</b>		465	0	3

- ▶ This month, the fixed income sector continues to show zero bubble signals.
- ▶ In the commodities sector, the positive bubble fraction has experienced a substantial increase of 6 percent to 13%, while the negative bubble activity remains zero.
- ▶ The positive bubble signals in the single stocks and equity indices sectors has respectively increased by 1 and 5 percent to 10% and 16%, and the respective negative bubble signals both remain nearly zero.
- ▶ In the Forex sector, the negative bubble signal has risen to 6% following its resurgence last month, whereas the positive bubble fraction remain roughly unchanged at a very low level.
- ▶ While the overall bubble activity in the CryptoX sector has been extremely low, the negative bubble signal has slightly increased to 3% this month.



2021 was characterised by two new COVID-19 variants, meme stocks and short-squeeze, SPAC, supply-chain risk, crypto-assets mania (dogecoin, NFT, etc.), climate risk exposure (i.e., hurricane, flood, etc.), green energy tide, real estate price and rent increase, energy crunch, Metaverse, decade-high inflation, etc. In 2022, we expect the Federal Reserve will keep tapering its buying program (and then rise interest rate), which will impact the valuation-anchor (i.e., US 10-year Treasury yield) and, therefore, all asset classes. In addition, global herd immunity may not very far, due to the new highly infectious and lowly virulent COVID-19 Omicron variant. However, it is still too early to say that the pandemic will end in 2022, but we can say that the pandemic has accelerated many things, e.g. digital transformation (e-commerce and Metaverse), population decline (e.g. birthrate has seen a dramatic drop in China), debt trap, "greenflation", etc.

**Fixed income:** The 10-year yield started at 0.91% and finished in 2021 above the 1.5% threshold. We expect the Treasury yield to move modestly higher in 2022 based on the current inflation situation, as the Fed is still the "dominate force" impacting the market. In line with our January 2021 FCO monthly report, we suggest to strategically reduce the allocation of bonds in portfolios and increase the allocation of the alternative asset classes (e.g., industrial and logistic REITs) to hedge against the inflation risk.

**Equity:** In line with our January 2021 report, the tech giants FAAMG (+Tesla) still dominate the S&P500, driving up the S&P500 to around 27% in 2021. The Nasdaq and Stoxx Euro 600 recorded returns of 21.39% and 22.25%, respectively. FTSE 100 had a 14.30% annual return while both Shanghai Composite Index and NIKKEI 225 increased by less than 5% in 2021. The US market is the biggest winner globally, with the astonishing liquidity injection from the Fed Reserve.

**Two interesting remarks for the US market:** 1) the tech giants are the main absorbers of the liquidity injected by the Federal Reserve. Now, Apple has passed above \$ 3 trillion in capitalisatino, MSFT is about \$2.5 trillion, Google is close to \$ 2 trillion, Amazon is \$1.7 trillion, Facebook and Tesla are around \$1 trillion. 2) Only very few hedge funds can beat or be close the S&P500 benchmark (only three are better), and most of the hedge funds' returns are way behind the index, including Bridgewater, AQR, Millennium, Two Sigma, Point 72, etc. So it seems any funds that underweighted those tech giants could not generate excess returns. In other words, the idiosyncratic risks of those handful companies are dominating the market, creating more market fragility. Consistent with our long-term view, equity markets are likely to go through a big correction when the central banks "turn off the faucet" and raise the interest rates.

We identify three major risk sources from **Emerging Markets:**

- 1) The slowdown of the property industry in China: We expect the Chinese government to implement significant stimulations early this year to support the economy; we also expect many mergers and acquisitions in the real estate sector. However, how to handle the "Triple Pressures," i.e., Shrinking demand, Supply shocks, and weakening expectation, are challenging and urgent questions for the Chinese government.
- 2) The economic crisis of the Middle East and North Africa (MENA): The combination of weak commodity prices (especially the oil price), domestic political instability, continuous intra-regional conflicts, and military engagement, stalled and indebted economics, corrupted government, as well as the COVID-19 pandemic deteriorates the economic health of MENA countries, leading to currency crisis of some middle east countries. We expect the economic problem of MENA will remain a challenge for the foreseeable future.
- 3) The lack of vaccination in developing countries: At least 90% of the population in 67 low-income countries do not have a chance to get COVID-19 vaccination, making them the hotbeds of more new variant viruses. For instance, the Delta and Omicron variants come from developing countries (India and South Africa).

In 2021, investing was easy since you only needed to manage your portfolio based on the Federal Reserve's balance sheet. However, in 2022, investing will be very hard since you have to manage your portfolio based on the Federal Reserve's balance sheet. In other words, we will be very surprised that the prices of all asset classes do not go up if the Fed Reserve "prints" more, on top of the 4 trillion dollars over the past 20 months, and we will also be not surprised to see the market go down if the "printed money" is taken back by the Federal Reserve in 2022.

# FCO Market Outlook

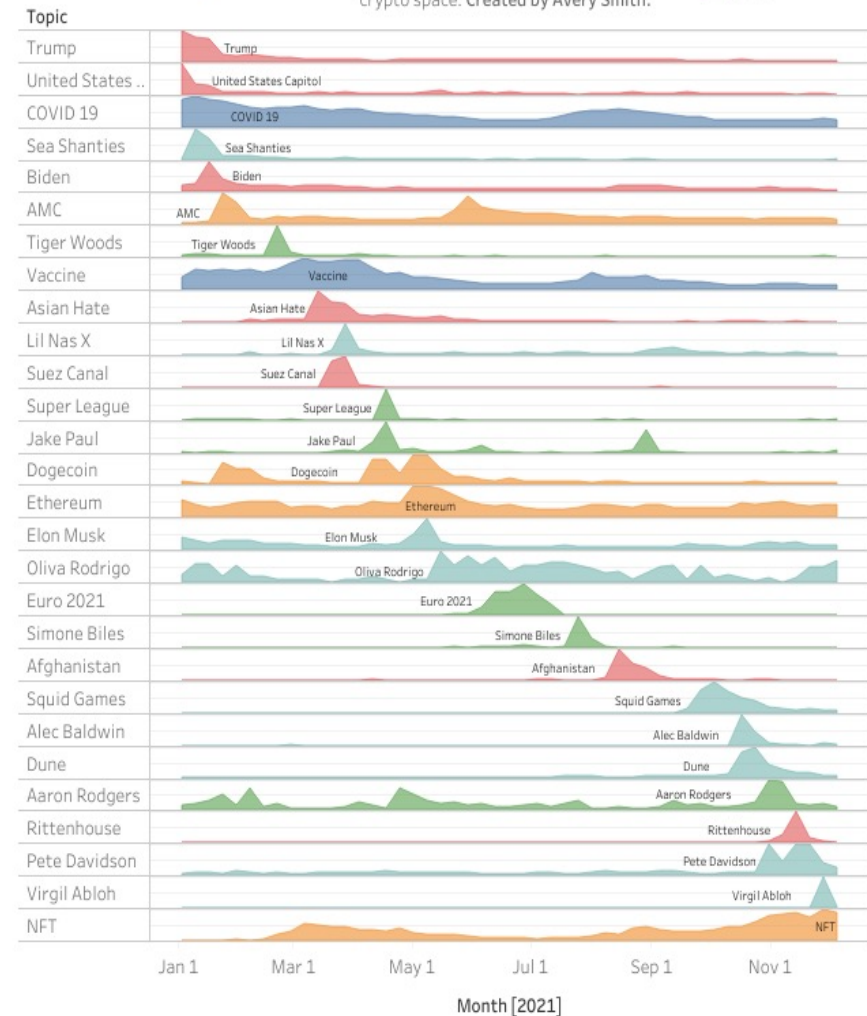
## The Story of 2021

as told by Google Trends

2021 has been yet again another crazy year. The 24-hour newscycle is stronger than ever. Another year with COVID-19 dominating the headlines; masks, vaccines, and variants. Huge rise in the crypto space. Created by Avery Smith.

**Category**

- Covid
- Finance
- Politics
- Pop Culture
- Sports



# How to read the graphs and tables

## DS LPPLS Multi-Scale Confidence Indicators:

- ▶ The graphs below use our extended methodology of the DS LPPLS Confidence Indicator to the so-called Multi-Scale Confidence Indicators (MCI). The MCI are finer version of the Confidence Indicator, computed in the same way, however based on different, sets of fit windows that describe different “timescales of thinking” of investors. More specifically, we base the computation of the MCI on the following window sets:
  - Super-Short (SS) Scale: [40,183] days
  - Short (S) Scale: [40,365] days
  - Medium (M) Scale: [365,730] days
  - Long (L) Scale: [730,1460] days
- ▶ These different sets range from few months up to several years. For each range, LPPLS signals are computed over all contained fit windows in steps of 1 day. The resulting signals are aggregated into four corresponding versions of the Confidence Indicator. These MCI range from very reactive (SS,S) to more stable (M,L) versions. Observing them simultaneously allows understanding the formation and evolution of speculative bubbles in more detail.
- ▶ Based on these four new indicators, the indicator plots show the detailed positive and negative bubble indicator timeseries for all four of them. In the asset tables, we report only the strongest of the four in the column “DS LPPLS Confidence”. The new column “strongest signal” indicates which of the four indicator this corresponds to.

# How to read the graphs and tables

## Additional Bubble Metrics:

- ▶ We show the top positive and negative bubble signals, as well as the corresponding bubble characteristics.
- ▶ The “**bubble CAGR**” ( $bg$ ) measures the annualized compound bubble growth ( $bg$ ) of the price during a bubble phase, as implied by the size ( $bs$ ) and duration ( $bd$ ) of a bubble.

$$bg = \exp\left(\frac{\ln(bs+1)}{bd}\right)$$

- ▶ The **bubble size** since the bubble start  $t_1$  is  $bs = \frac{p_t}{p_1} - 1$  and the bubble duration is  $bd = t - t_1$
- ▶ By estimation of the start time  $t_1$  and the predicted end time  $t_c$  of a bubble, the **progress of the bubble** at the current time  $t$  is computed as:

$$bp = \frac{t-t_1}{t_c-t_1}$$

- ▶ Thus, the bubble progress measures the percentage of time until the predicted end of the bubble that has passed so far (i.e. until  $t$ ) since the beginning of the bubble. The numerator is the **current bubble duration** and the divisor  $t_c - t_1$  is the “**implied bubble duration**”, implied by the LPPLS model.

## New Ranking Methodology:

- ▶ We rank top positive and negative bubble signals from our database according to the **geometric average** of the confidence indicator, the bubble CAGR and the bubble progress:

$$ga = (ci \cdot bg \cdot bp)^{1/3}$$

- ▶ This geometric average considers the strength of the bubble signal, the intensity of the bubble (compound growth), as well as the maturity of the bubble. These three metrics characterize the most relevant “dimensions” of a bubble and thus, the geometric average is a reasonable choice to rank bubble signals.



# Fixed Income

No bubbles to report

# Commodities

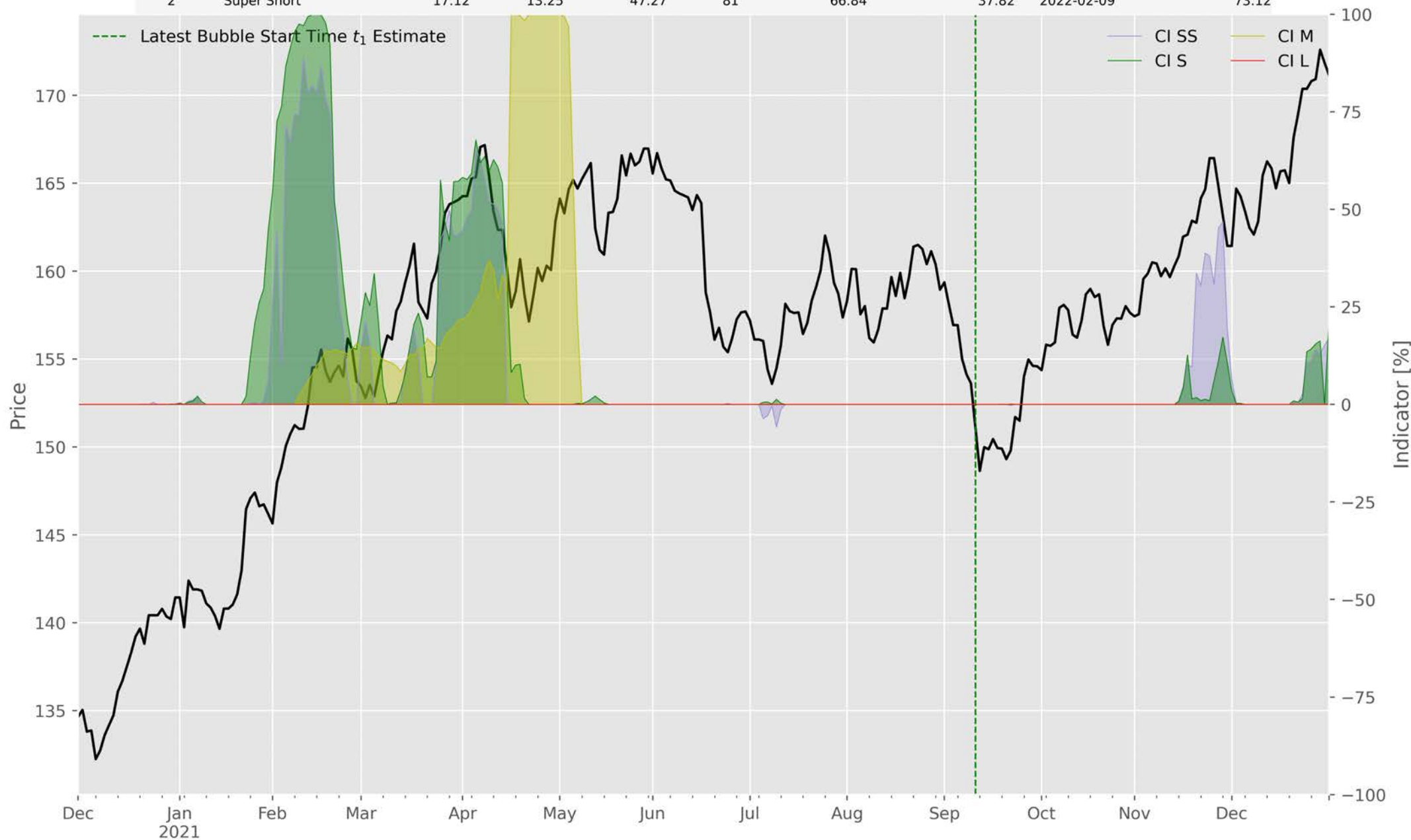
## Mlcx Live Cattle Spot Index

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci, bg, bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Short Term	41.27	23.54	23.54	252	89.99	44.38	2022-01-28	99.98



## MLcx Livestock Spot Index

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
2	Super Short	17.12	13.25	47.27	81	66.84	37.82	2022-02-09	73.12



# Single Stocks

## Sage Group

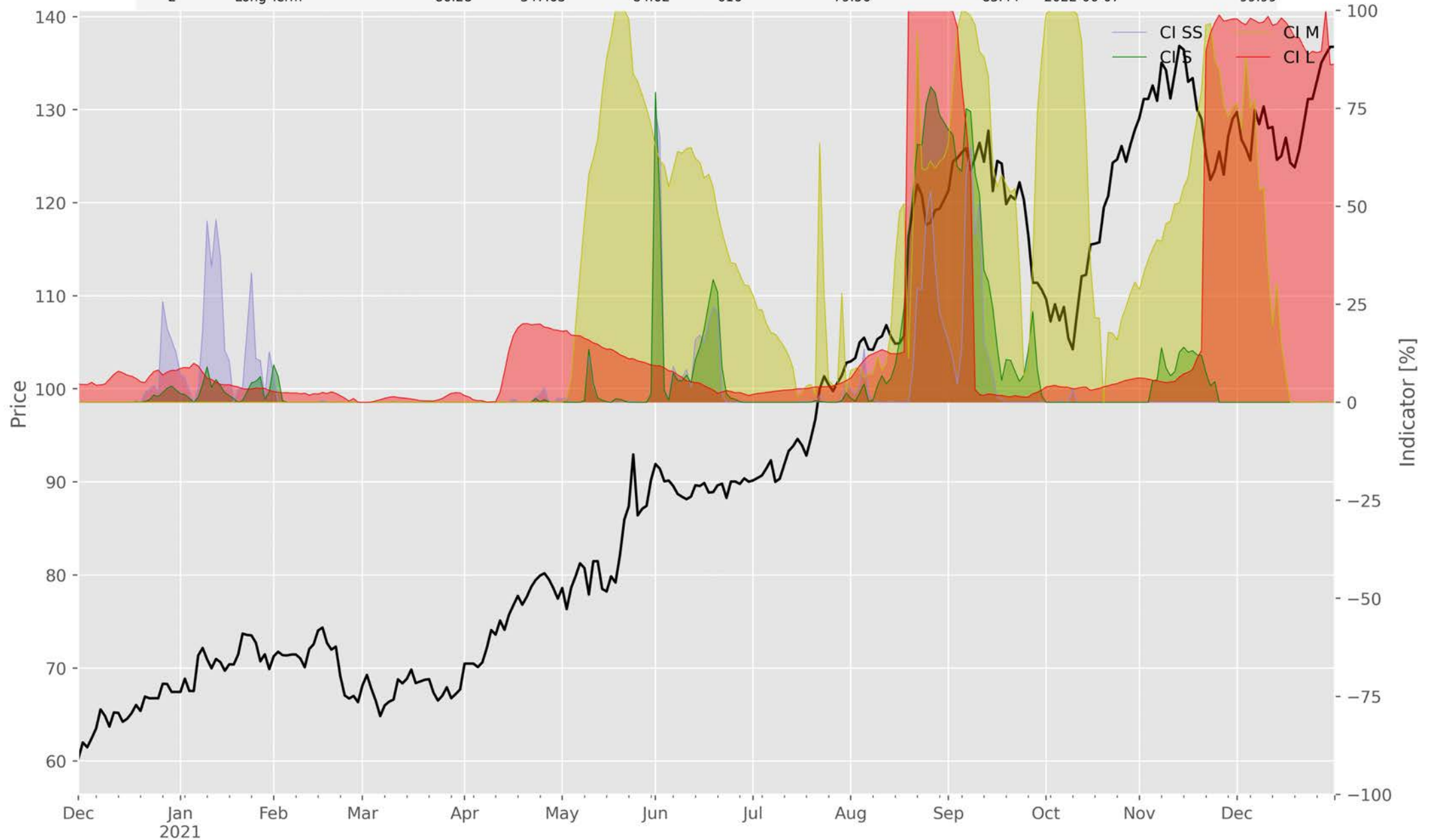
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci, bg, bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Super Short	64.86	21.73	111.87	66	85.97	85.44	2022-01-11	99.98





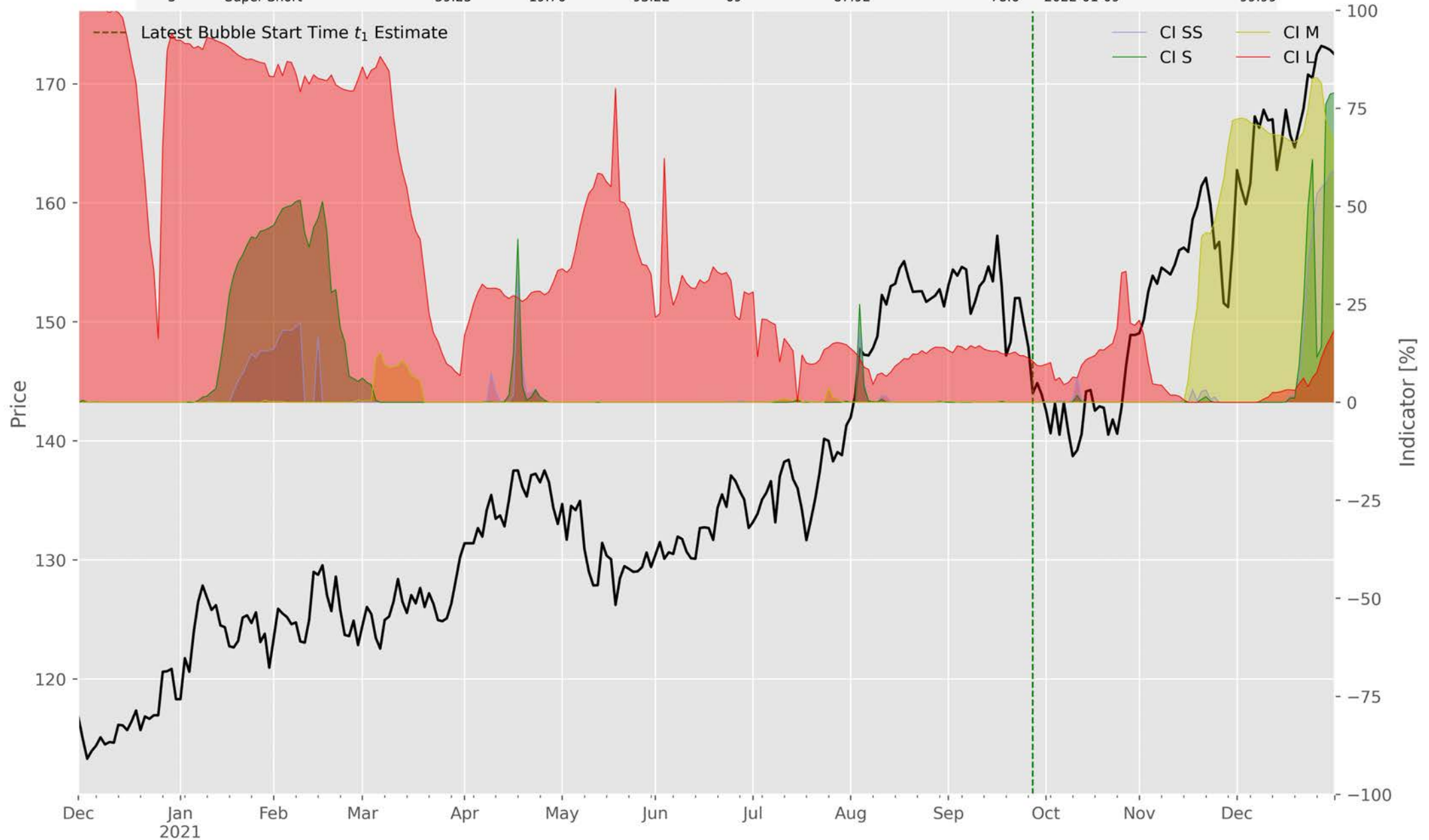
## Nibe Industrier

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
2	Long Term	86.28	347.63	84.62	616	79.56	83.44	2022-06-07	99.99



# Schneider Electric

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
3	Super Short	59.25	19.76	93.22	69	87.92	78.6	2022-01-09	99.99



## Pharol Sgps

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci, bg, bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Super Short	100	-18.9	-61.7	55	92.64	82.99	2022-01-04	99.99



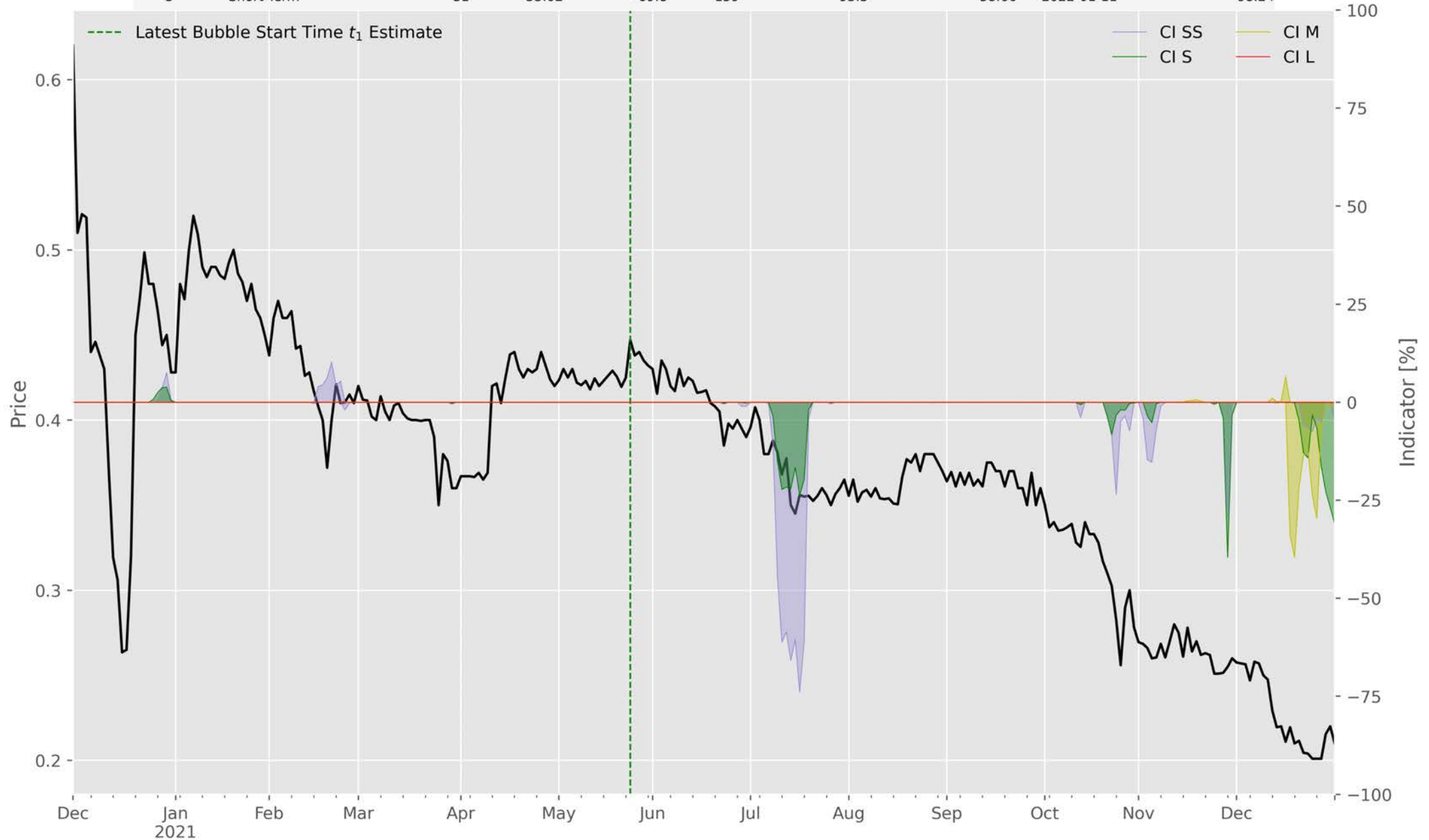
## Ubisoft Entertainment Cat A

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\bar{t}_c$	[%]
2	Medium Term	84.16	-44.11	-36.04	328	87.91	64.37	2022-02-14	65.58



# Nyrstar

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
3	Short Term	31	-53.02	-69.8	159	93.3	58.66	2022-01-11	98.24





## Skyline Champion

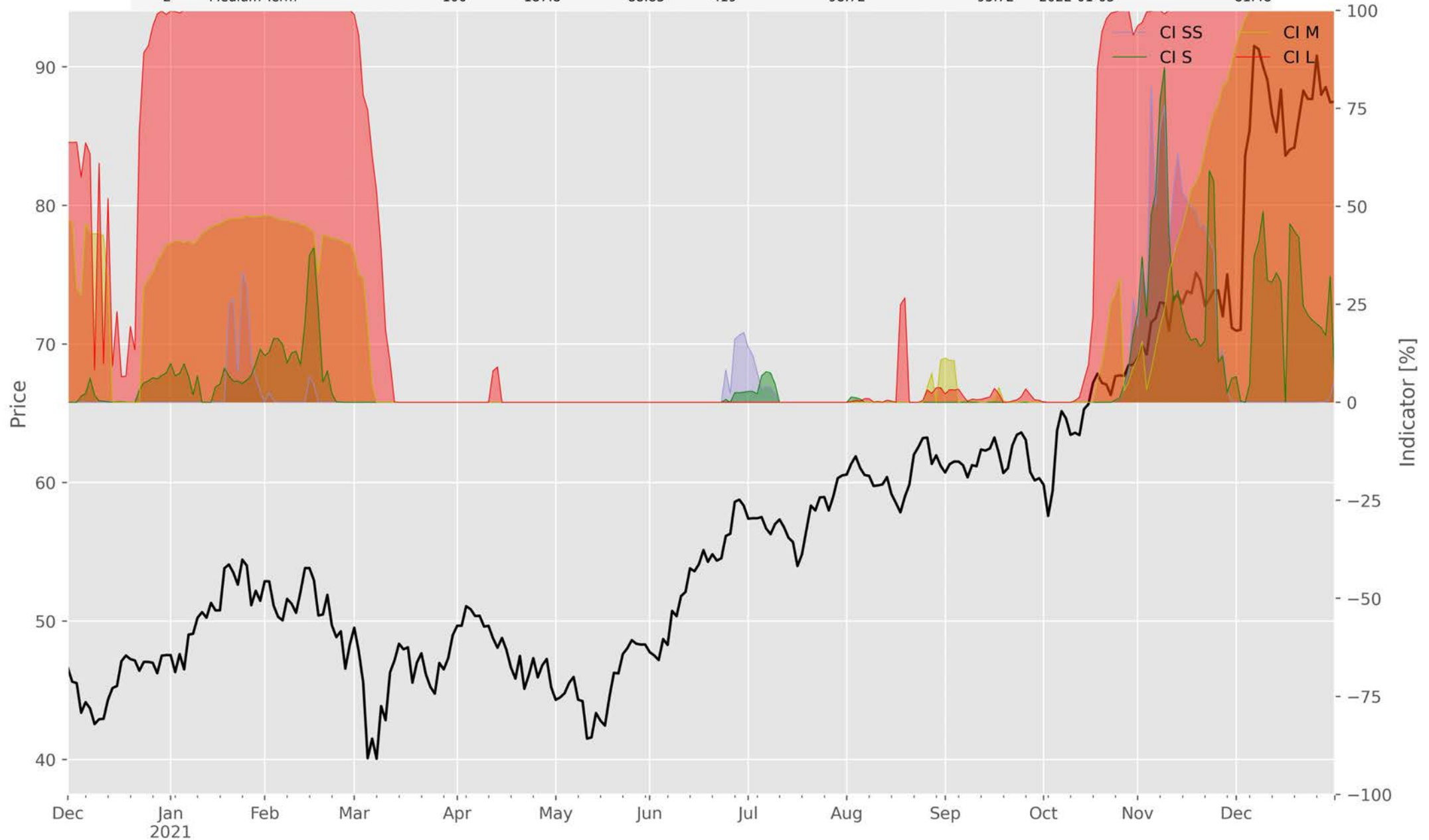
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	$(ci, bg, bp)$	$\hat{t}_c$	[%]
1	Medium Term	91.69	338.53	133.18	440	78.94	98.78	2022-04-27	96.73





# Marvell Technology

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
2	Medium Term	100	187.8	88.85	419	98.72	95.72	2022-01-05	81.48



## Crown Castle Intl.

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
3	Super Short	65.94	22.92	134.54	61	97.46	95.27	2022-01-02	99.99



# Biogen

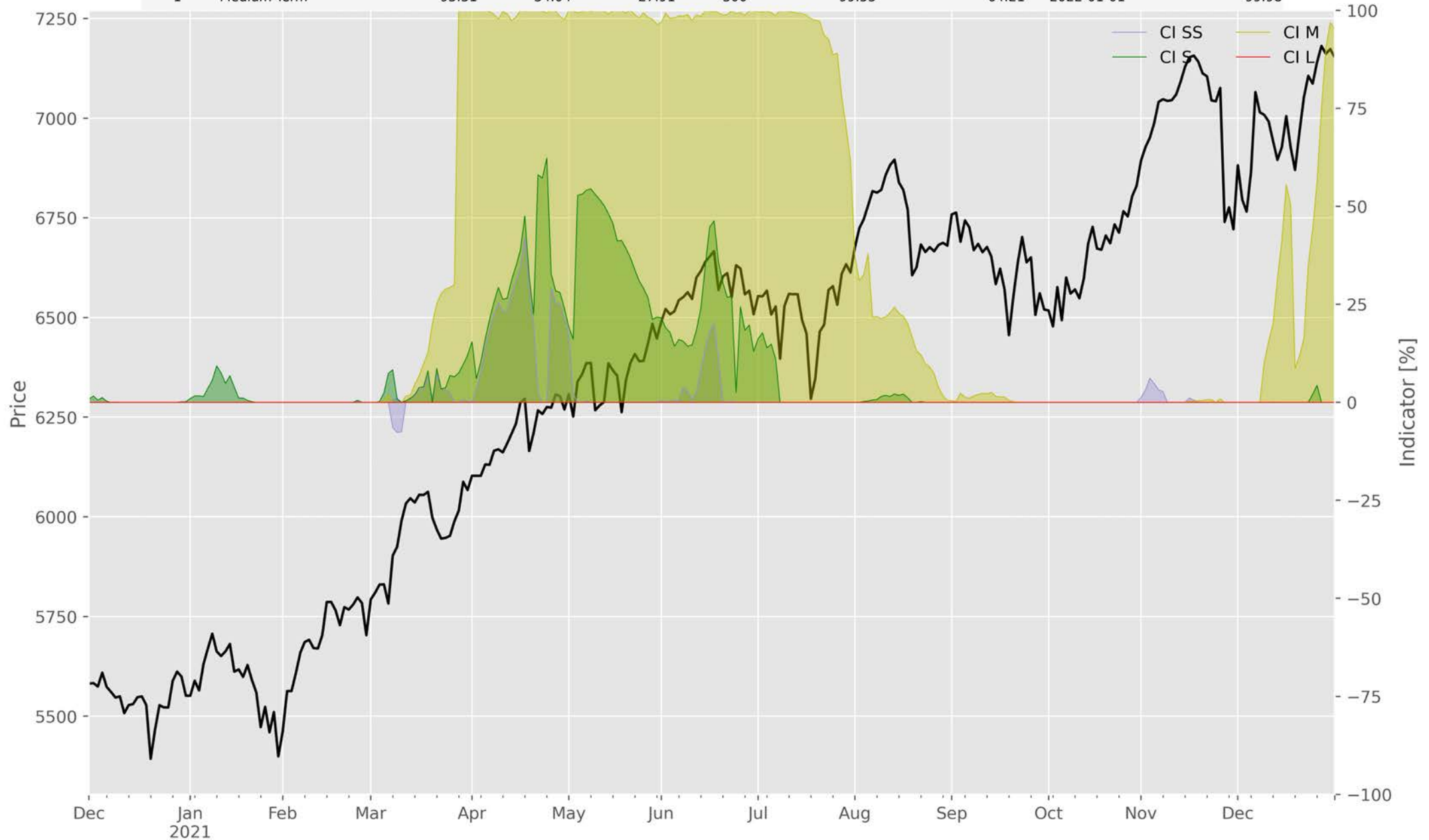
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Short Term	20.45	-39.39	-56.88	150	66.73	42.66	2022-03-16	85.4



# Equity Indices

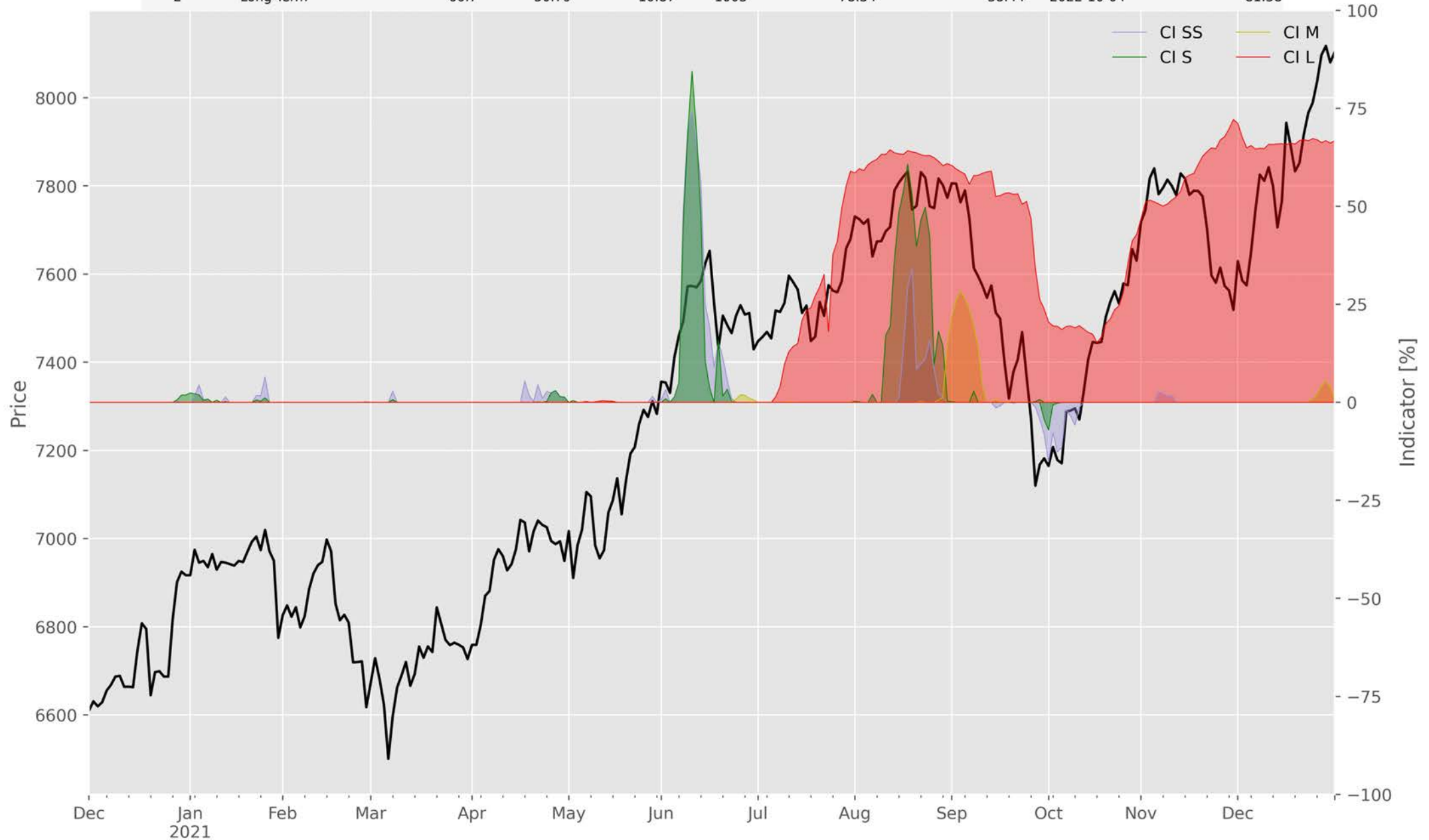
## France Cac 40

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
1	Medium Term	95.31	34.04	27.91	300	99.53	64.21	2022-01-01	99.98



## Msci Switzerland U\$

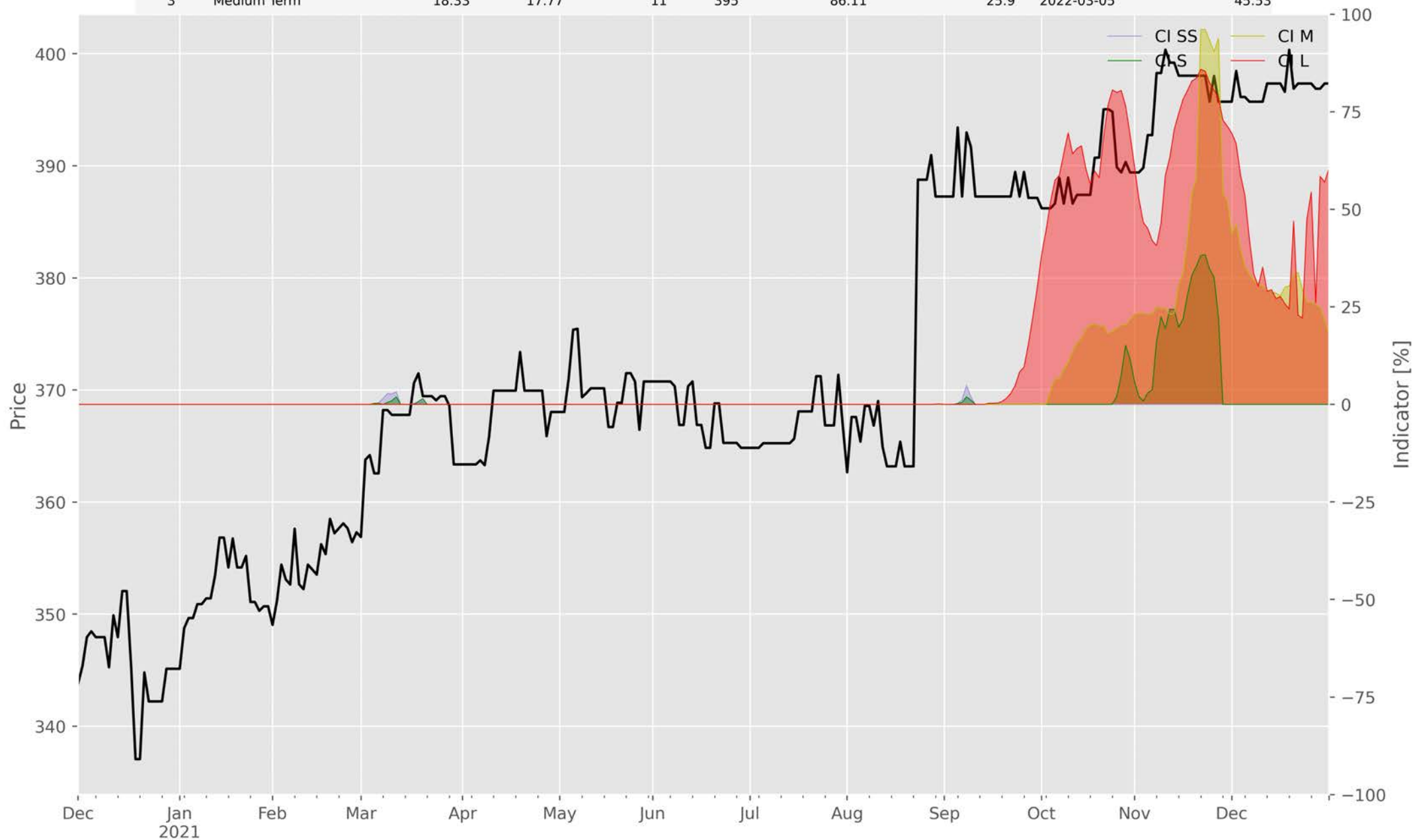
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
2	Long Term	66.7	50.79	10.87	1003	78.34	38.44	2022-10-04	81.38





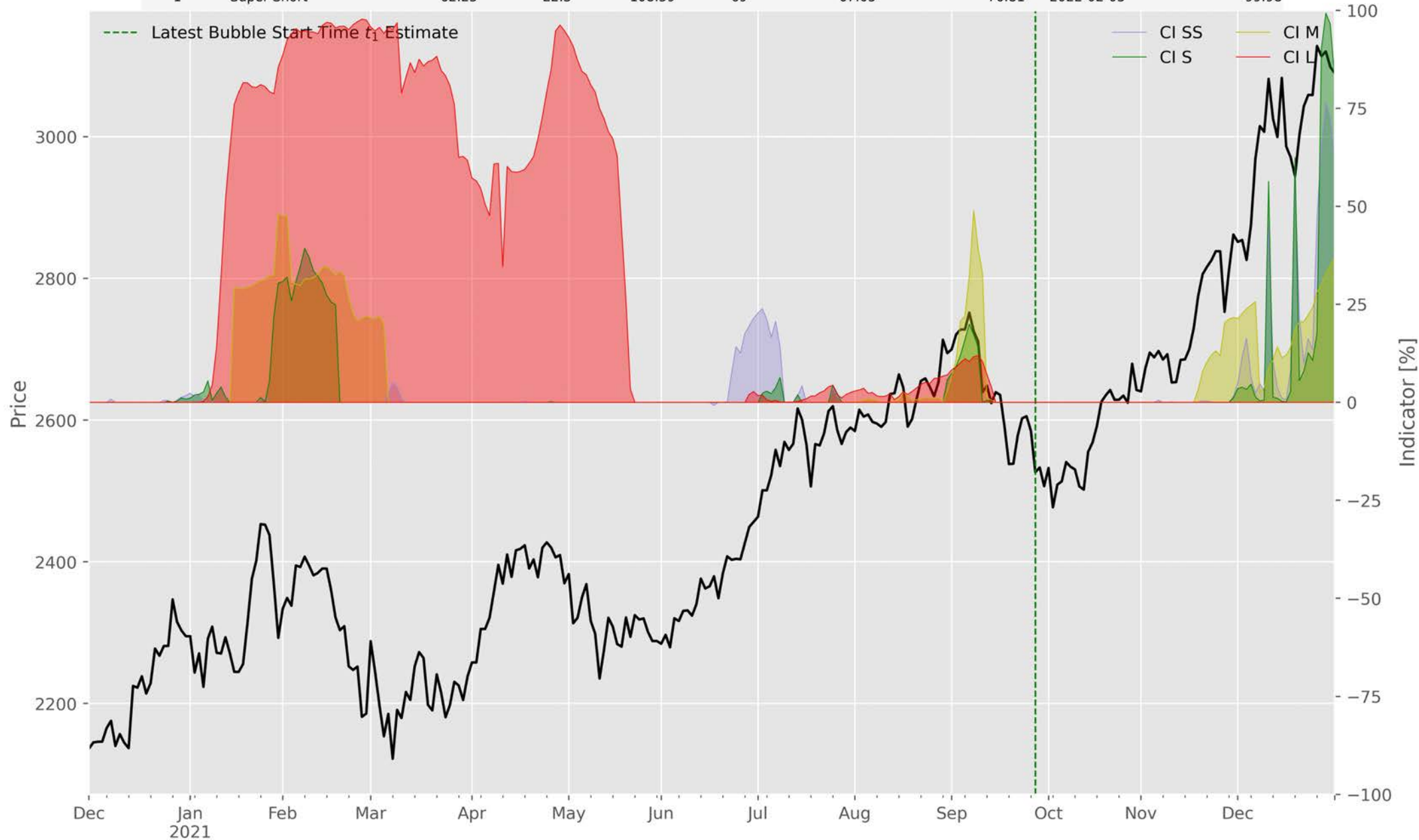
## Slovakia Sax 16

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
3	Medium Term	18.33	17.77	11	395	86.11	25.9	2022-03-05	45.53



## S&P1500 Technology Hware & Equip

Rank	Strongest Signal	DS-LPPLS Confidence $ci$ [%]	Bubble Size $bs$ [%]	Bubble CAGR $bg$ [%]	Duration [days]	Bubble Progress $bp$ [%]	Geometric Average ( $ci, bg, bp$ )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Super Short	62.25	22.3	108.59	69	67.05	76.81	2022-02-03	99.98



## S&P500 Household & Personal Prod

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
2	Super Short	82.61	14.13	55.88	75	92.27	75.24	2022-01-06	99.99



## S&P1500 Household & Personal Prod

Rank	Strongest Signal	DS-LPPLS Confidence $ci$ [%]	Bubble Size $bs$ [%]	Bubble CAGR $bg$ [%]	Duration [days]	Bubble Progress $bp$ [%]	Geometric Average ( $ci, bg, bp$ )	Critical Time $\hat{t}_c$	Scenario Probability [%]
3	Super Short	83.33	12.89	48.7	77	93.13	72.3	2022-01-06	99.99



## S&P1500 Housewares & Specialties

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Short Term	17.84	-24.77	-33.94	173	66.73	34.31	2022-03-27	61.53





## S&P Global 1200 H/H Products

Rank	Strongest Signal	DS-LPPLS Confidence $ci$ [%]	Bubble Size $bs$ [%]	Bubble CAGR $bg$ [%]	Duration [days]	Bubble Progress $bp$ [%]	Geometric Average ( $ci, bg, bp$ )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Super Short	80	14.29	91.03	52	96.39	88.87	2022-01-02	99.98





## Msci World Hh Prd \$

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
2	Super Short	82.08	13.22	80.45	53	95.61	85.79	2022-01-02	99.99



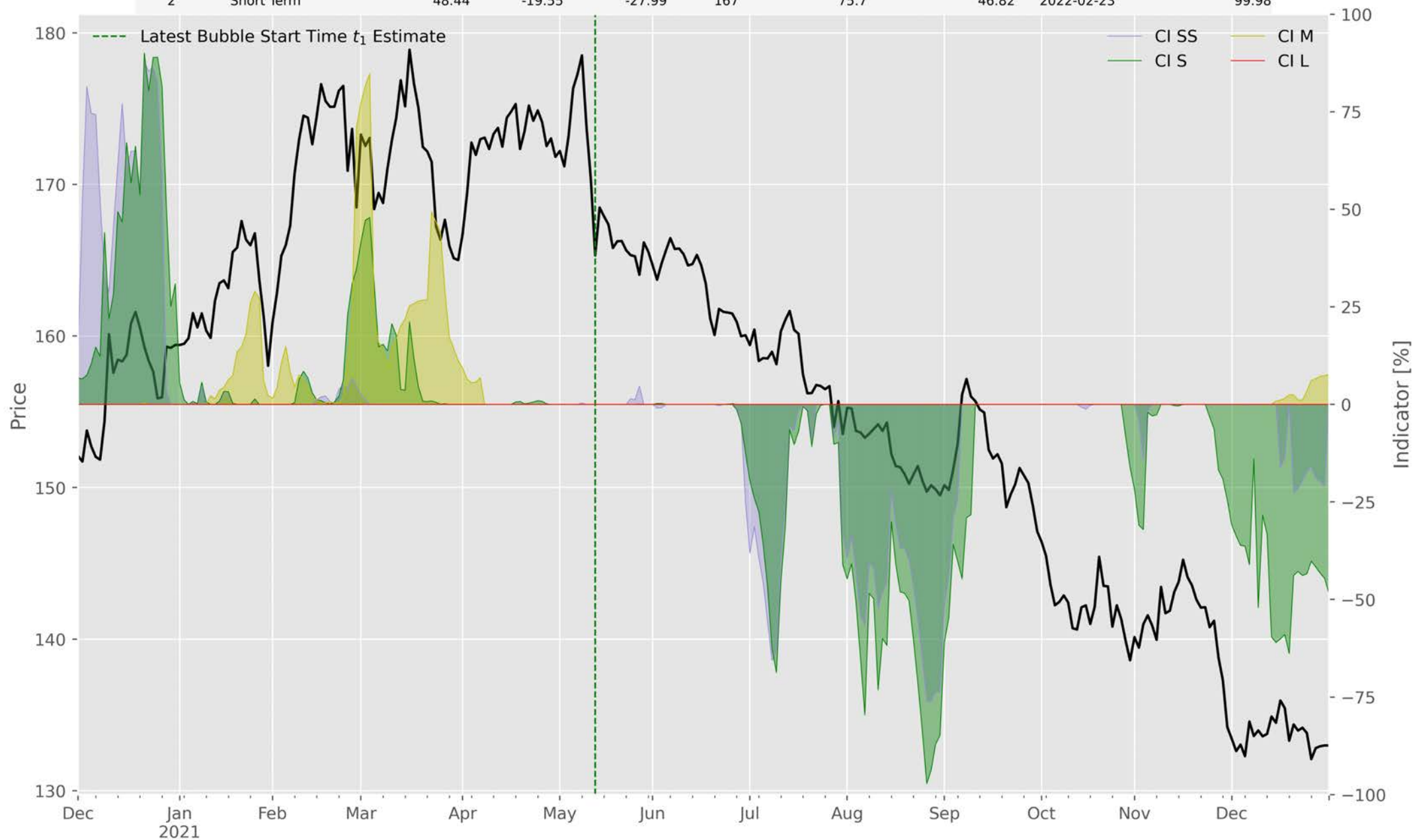
## S&P Global 1200 W/L Telecom Svs

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Short Term	54.46	-21.91	-23.39	234	86.59	47.96	2022-02-05	95.79



## Msci World W/L T/Cm Svs \$

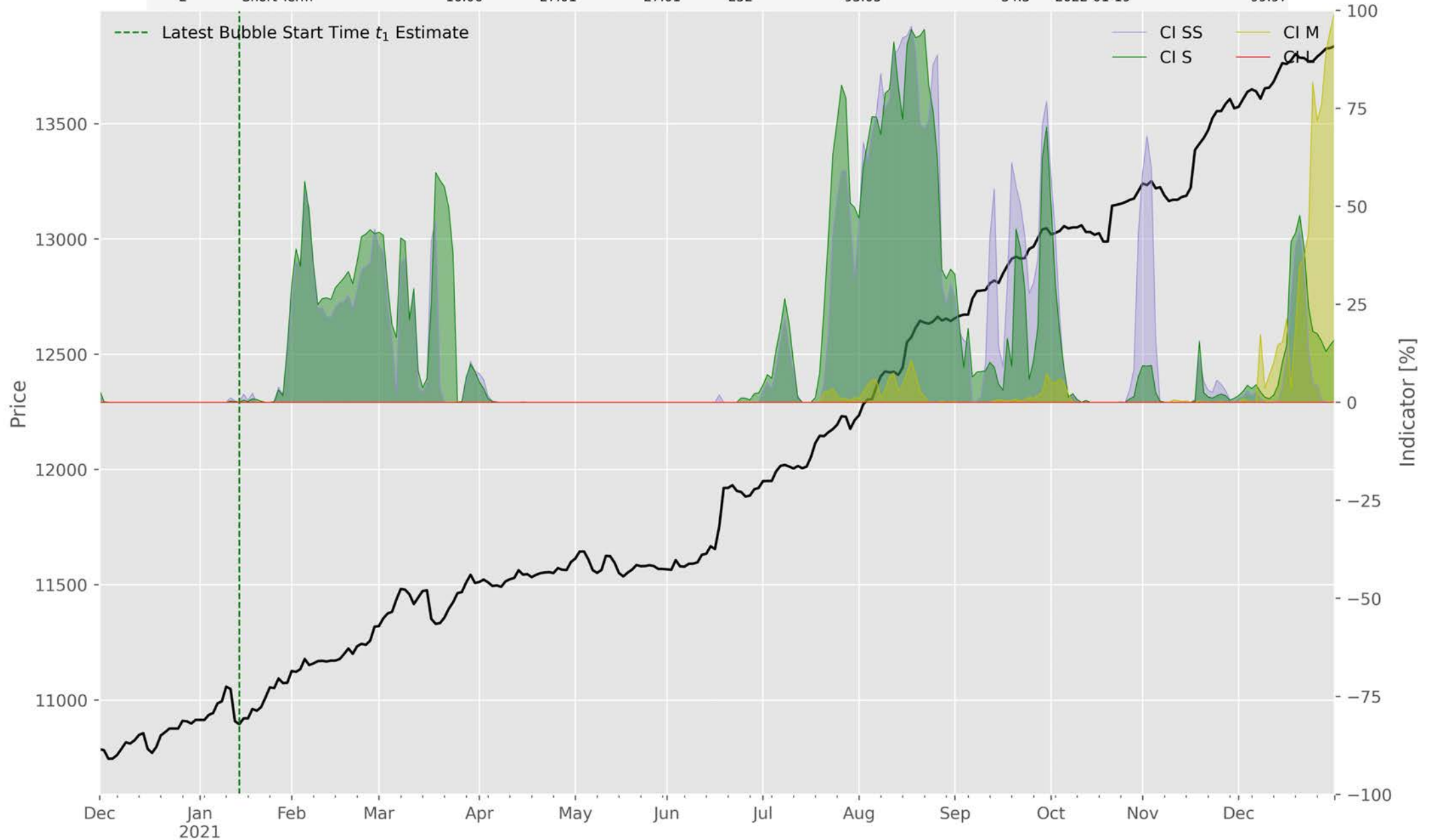
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	$(ci, bg, bp)$	$\hat{t}_c$	[%]
2	Short Term	48.44	-19.55	-27.99	167	75.7	46.82	2022-02-23	99.98



# Forex

## Jpm Venezuela Reer Ppi (2010=100)

Rank	Strongest Signal	DS-LPPLS Confidence $ci$ [%]	Bubble Size $bs$ [%]	Bubble CAGR $bg$ [%]	Duration [days]	Bubble Progress $bp$ [%]	Geometric Average ( $ci, bg, bp$ )	Critical Time $\hat{t}_c$	Scenario Probability [%]
2	Short Term	16.06	27.01	27.01	252	93.05	34.3	2022-01-19	99.97



## Jpm Switzerland Reer Ppi (2010=100)

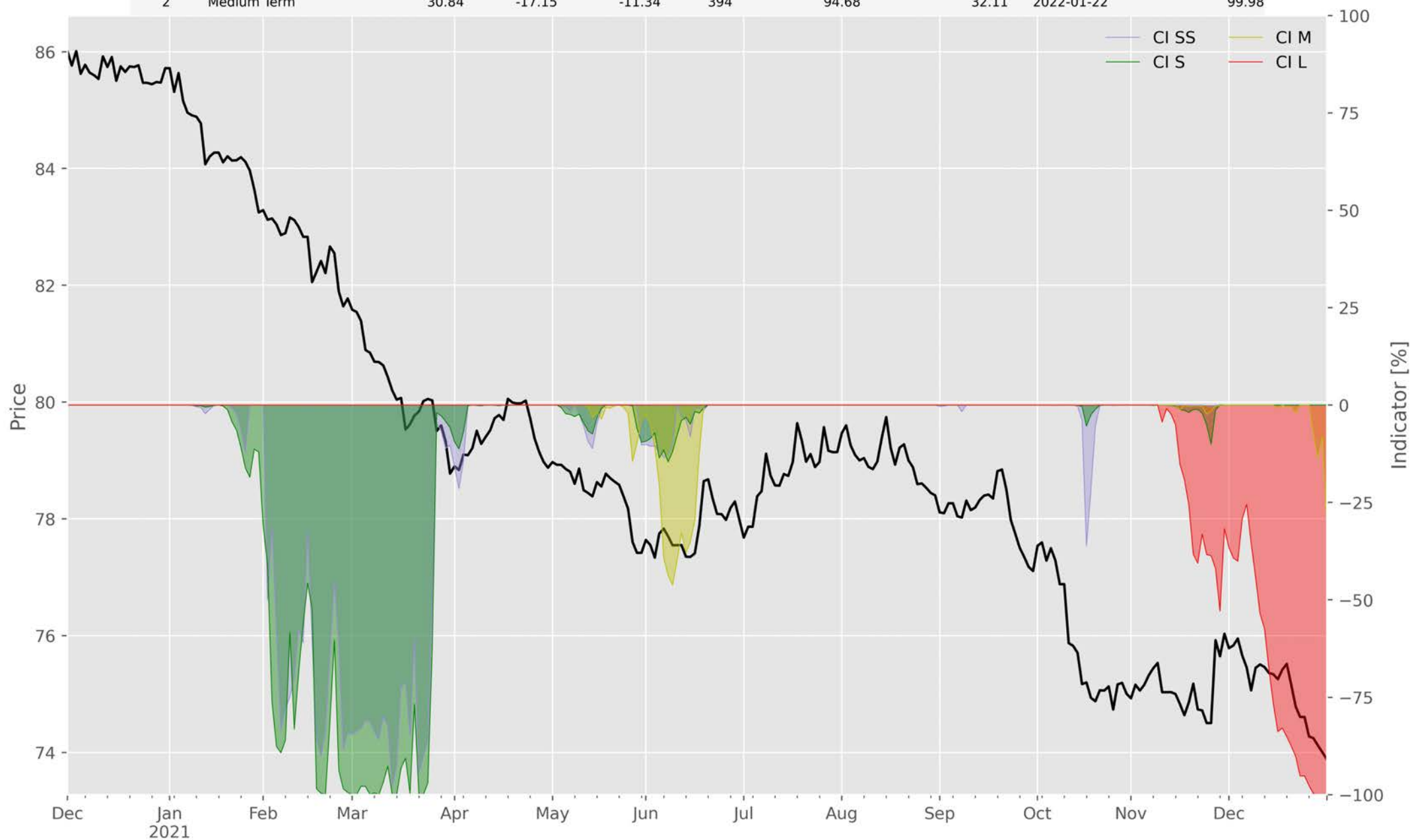
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Medium Term	48.88	-13.87	-9.98	358	94.91	35.9	2022-01-19	99.69





## Jpm Japan Reer Ppi (2010=100)

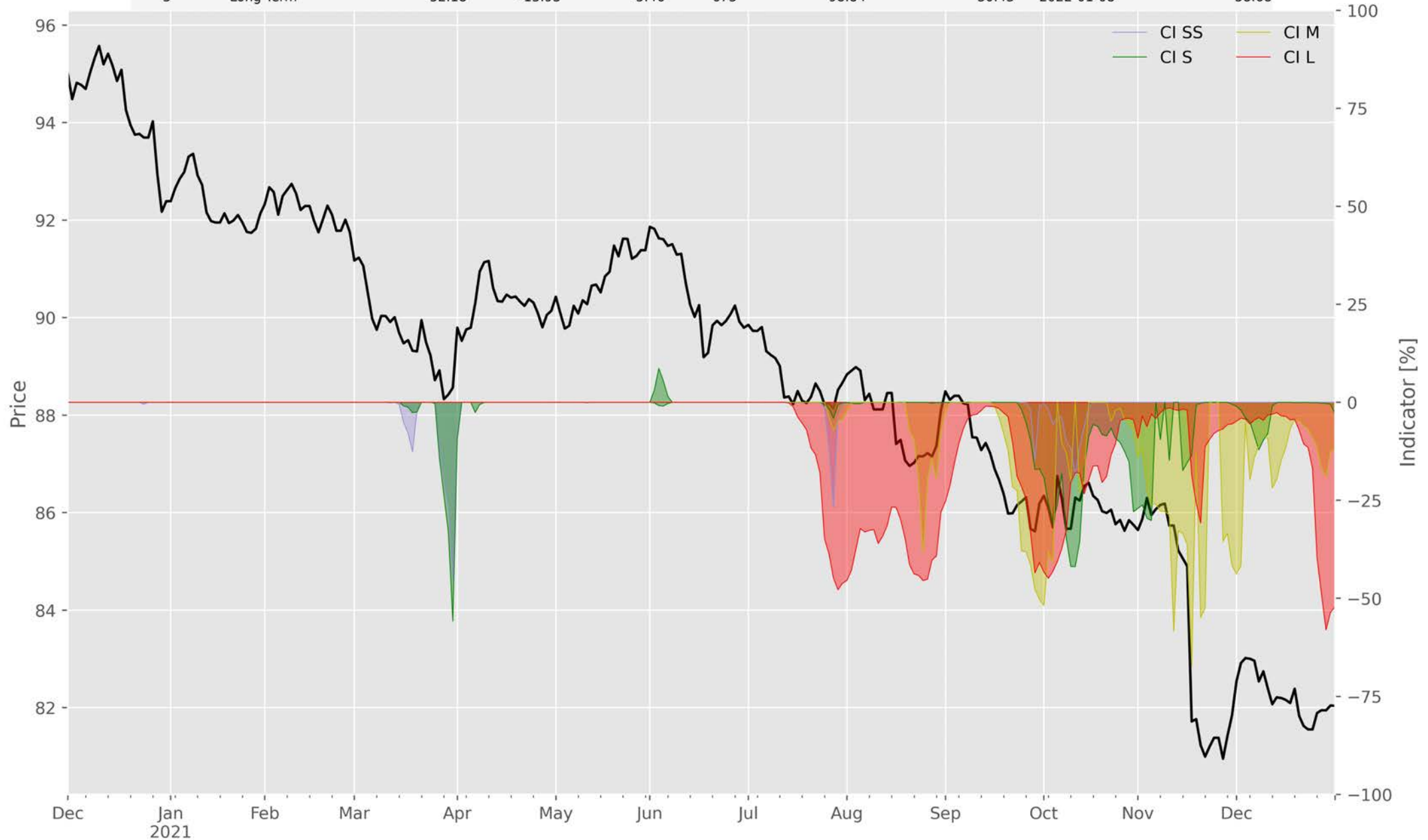
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\tilde{t}_c$	[%]
2	Medium Term	30.84	-17.15	-11.34	394	94.68	32.11	2022-01-22	99.98





## Jpm Poland Reer Ppi (2010=100)

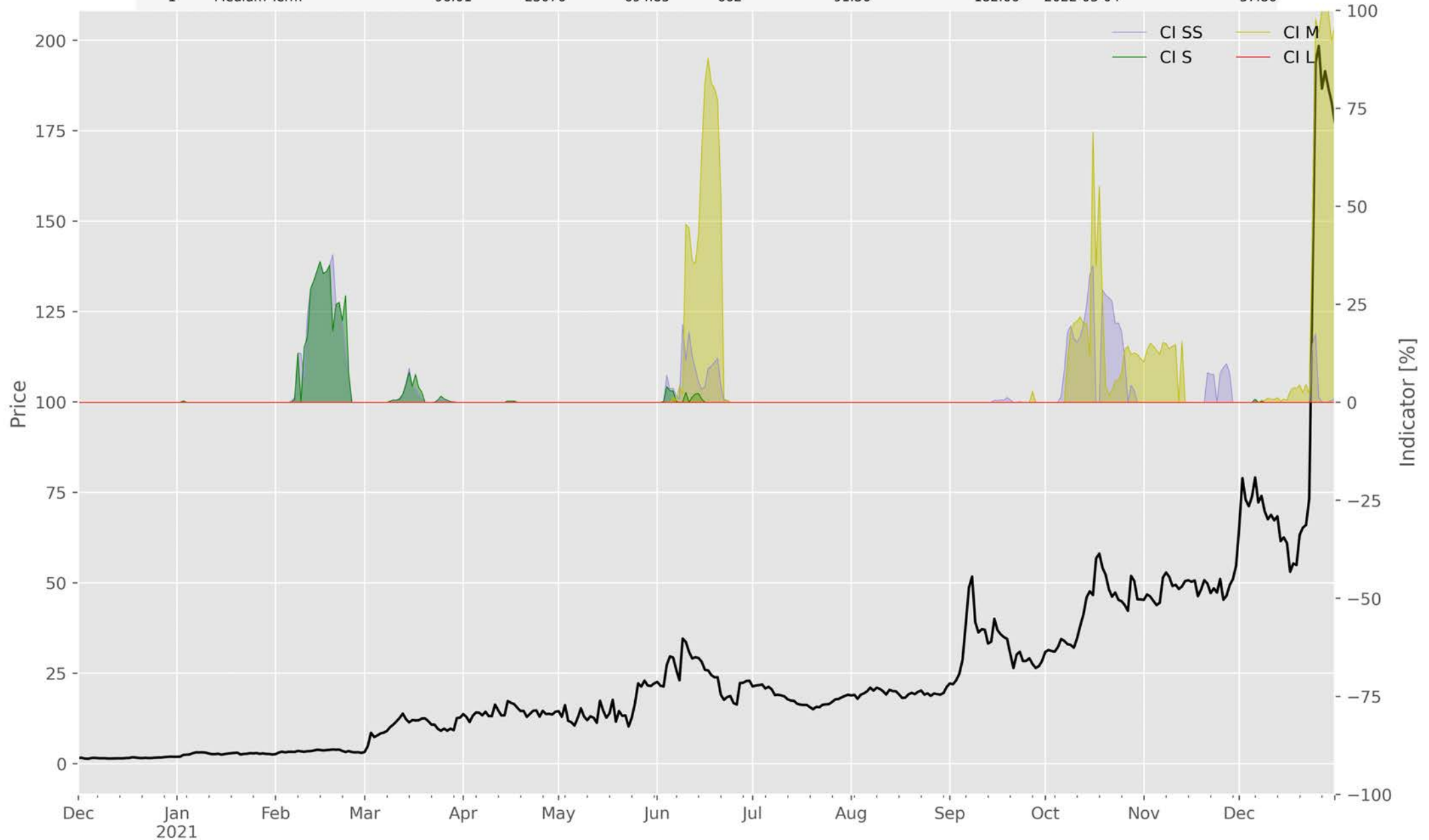
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	( $ci, bg, bp$ )	$\hat{t}_c$	[%]
3	Long Term	52.18	-13.93	-5.46	673	98.84	30.43	2022-01-08	58.68



# CryptoX

## Chrono.tech/USD

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Medium Term	96.01	23076	694.85	662	91.36	182.66	2022-03-04	57.86



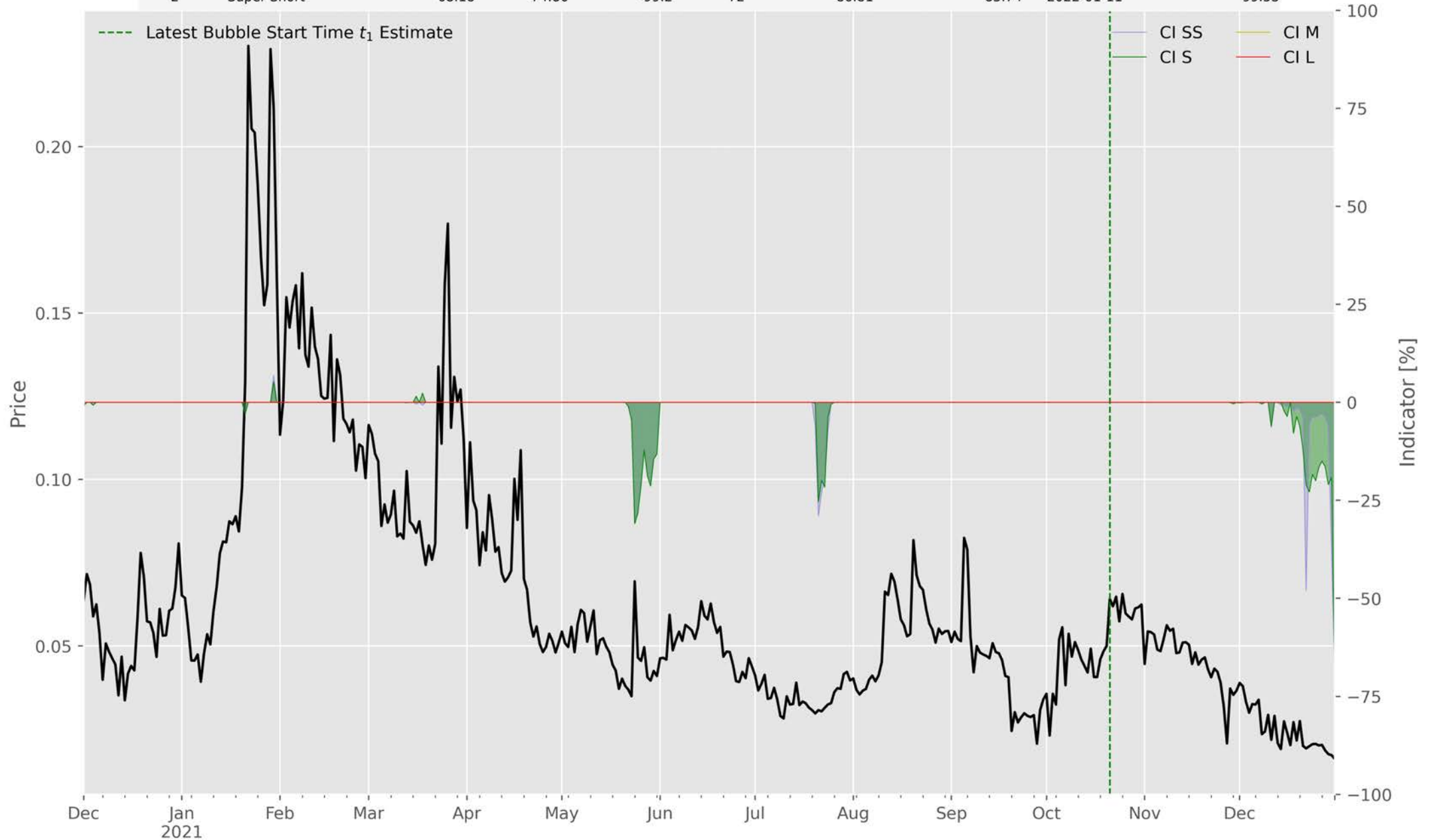
# SmileyCoin/USD

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci</i> , <i>bg</i> , <i>bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
1	Super Short	93.85	-70.16	-96.49	91	97.5	95.93	2022-01-02	99.96



## GlobalBoost-Y/USD

Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average ( <i>ci, bg, bp</i> )	Critical Time $\hat{t}_c$	Scenario Probability [%]
2	Super Short	68.18	-74.86	-99.2	72	86.81	83.74	2022-01-11	99.53



## Waves/USD

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		$ci$ [%]	$bs$ [%]	$bg$ [%]	[days]	$bp$ [%]	$(ci, bg, bp)$	$\hat{t}_c$	[%]
3	Super Short	48.57	-47.32	-84.05	88	96.18	73.23	2022-01-03	96.41



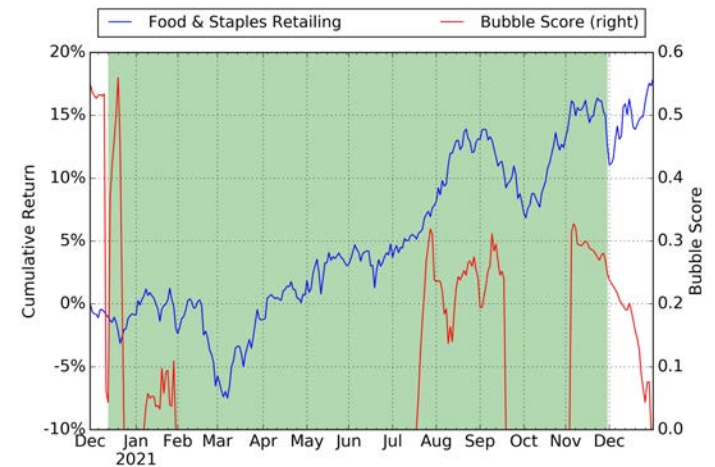
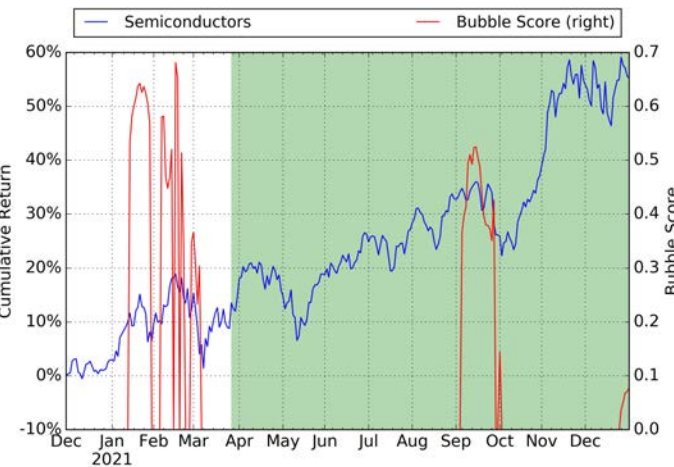
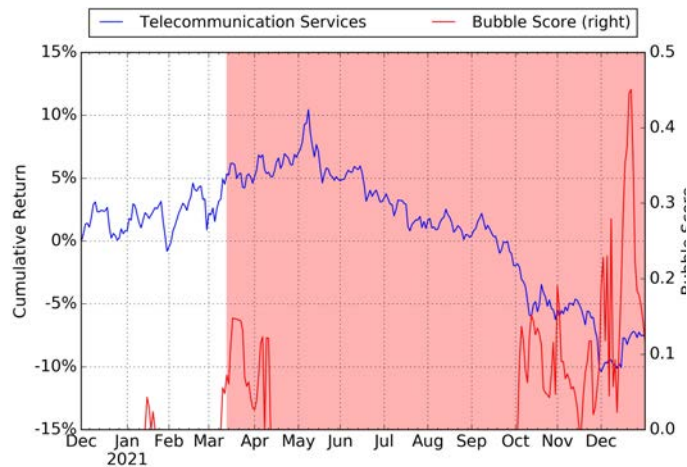


# Sectors

GICS Industry Group Name	Yearly Return		Bubble Size		Bubble Score		Value Score		Growth Score	
	Jan 1st	Dec 1st	Jan 1st	Dec 1st	Jan 1st	Dec 1st	Jan 1st	Dec 1st	Jan 1st	Dec 1st
Pharmaceuticals, Biotechnology & Life Sciences	13.5%	11.6%	0.0%	0.0%	0.0%	0.0%	62.6%	62.2%	56.7%	56.8%
Consumer Services	11.4%	3.5%	0.0%	0.0%	0.0%	0.0%	22.0%	25.6%	60.6%	59.0%
Retailing	11.5%	16.7%	0.0%	0.0%	0.0%	0.0%	19.2%	18.7%	46.2%	46.8%
Transportation	12.4%	9.2%	0.0%	0.0%	0.0%	0.0%	46.9%	44.1%	55.8%	55.7%
Consumer Durables & Apparel	16.7%	18.8%	0.0%	0.0%	0.0%	0.0%	32.0%	33.0%	49.9%	49.3%
Semiconductors & Semiconductor Equipment	39.0%	53.7%	36.7%	0.0%	7.7%	0.0%	59.3%	57.5%	43.4%	43.4%
Technology Hardware & Equipment	33.3%	31.9%	0.0%	0.0%	0.0%	0.0%	77.5%	78.1%	56.7%	56.4%
Automobiles & Components	21.7%	43.7%	0.0%	0.0%	0.0%	0.0%	45.7%	49.2%	47.2%	45.1%
Telecommunication Services	-9.7%	-12.1%	-12.3%	-14.6%	-11.5%	-17.8%	61.4%	60.2%	43.4%	42.7%
Energy	18.0%	26.6%	0.0%	0.0%	0.0%	0.0%	50.0%	50.4%	69.6%	69.8%
Software & Services	23.3%	23.3%	0.0%	0.0%	0.0%	0.0%	39.4%	37.1%	50.6%	51.1%
Materials	7.4%	8.9%	0.0%	0.0%	0.0%	0.0%	49.7%	49.7%	50.9%	50.8%
Health Care Equipment & Services	18.3%	14.3%	0.0%	0.0%	0.0%	0.0%	53.3%	49.3%	51.9%	51.6%
Capital Goods	9.9%	9.7%	0.0%	0.0%	0.0%	0.0%	49.6%	48.4%	48.8%	49.6%
Media & Entertainment	24.8%	20.6%	0.0%	0.0%	0.0%	0.0%	27.6%	27.5%	33.7%	33.7%
Commercial & Professional Services	25.0%	22.0%	0.0%	0.0%	0.0%	0.0%	32.2%	31.2%	52.5%	53.1%
Food & Staples Retailing	17.4%	13.9%	0.0%	13.9%	0.0%	24.9%	40.7%	38.9%	61.1%	61.1%
Household & Personal Products	8.1%	-1.2%	0.0%	0.0%	0.0%	0.0%	29.8%	29.3%	54.4%	54.2%
Food, Beverage & Tobacco	13.9%	2.7%	0.0%	0.0%	0.0%	0.0%	49.0%	49.2%	56.6%	56.7%
Utilities	6.2%	1.7%	0.0%	0.0%	0.0%	0.0%	43.6%	44.2%	53.8%	53.4%
Insurance	12.1%	12.4%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Real Estate	28.2%	19.4%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Diversified Financials	24.8%	30.9%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Banks	17.6%	25.6%	0.0%	0.0%	0.0%	0.0%	-	-	-	-

# Sectors

- ▶ We use the MSCI World Industry Group Indices to calculate bubble size and bubble score of the corresponding sectors. To determine the value scores and growth scores of the sectors, we average over the corresponding values for each stock of a given sector, weighted by market cap.
- ▶ This month we observe two industry group indices with a medium bubble score: *Semiconductors & Semiconductor Equipment* (positive bubble) and *Telecommunication Services* (negative bubble). This means that the bubbles are not yet matured and it is likely that they continue to develop.
- ▶ The industry group *Food & Staples Retailing* that was identified with a medium positive bubble signal last month has gone up again after a correction, with the disappearance of the bubble signals. This means that the index has ended its previous market regime.



# Portfolio Construction & Performance

- ▶ Here we illustrate the methodology of the portfolio construction process based on the results of our previous analyses.
- ▶ For individual stocks that we identified in the 4 quadrants, we constructed 4 portfolios based on the 4 quadrants defined in the last report. Each portfolio consists of all the stocks listed in the corresponding quadrant.
  1. **Trend-Following Long Stock Portfolio (TFLSP)** is made of the stocks that have a **positive** bubble signal as well as a **strong** value score. For instance, TFLSP November consists of all the stocks listed in quadrant 1, identified in slide 37 of November 2017 FCO Report.
  2. **Trend-Following Short Stock Portfolio (TFSSP)** is made of the stocks that have a **negative** bubble signal as well as a **weak** value score.
  3. **Contrarian Long Stock Portfolio (CLSP)** is made of the stocks that have a **negative** bubble signal as well as a **strong** value score.
  4. **Contrarian Short Stock Portfolio (CSSP)** is made of the stocks that have a **positive** bubble signal as well as a **weak** value score.

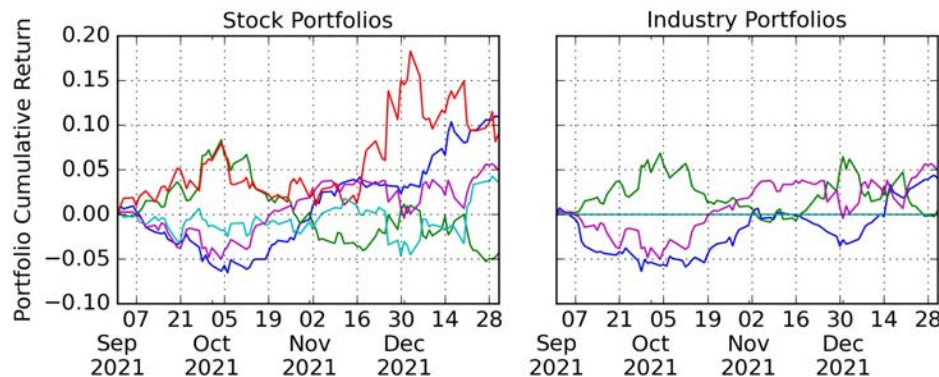
# Portfolio Construction & Performance

- ▶ At the same time, we also classified 20 industries into 4 quadrants, and constructed 4 type of industry portfolios based on the 4 industry quadrants. Each portfolio consists of all the stocks in the industries listed in the corresponding quadrant. Following the same definitions as above, we have Trend-Following Long Industry Portfolio (TFLIP), Trend-Following Short Industry Portfolio (TFSIP), Contrarian Long Industry Portfolio (CLIP), and Contrarian Short Industry Portfolio (CSIP).
- ▶ In each month, we initiated 8 new portfolios based on the updated results. The performance of every 8 portfolios we initiated since November 2017 are presented in the next slide. All of the stocks in our portfolios are weighted by their market capitalizations and we don't consider transaction cost in the portfolio performance.

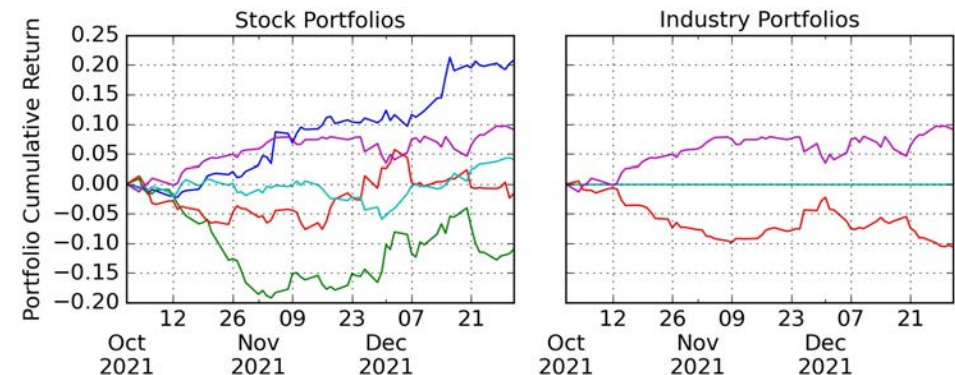
# Portfolio Construction & Performance

- ▶ The market has been flat with recent drawdowns due to the new wave of COVID-19 in the US and Europe. Trend-following long and trend-following short portfolios tend to have overperformed, and the contrarian long portfolio has shown good performance in the last month.
- ▶ Contrarian Portfolios are more delicate to use due to their sensitivity to timing the expected reversal and exhibit very volatile performances. We expect trend-following positions to perform in the months following the position set-up and then contrarian positions to over-perform over longer time scales over which the predicted corrections play out.

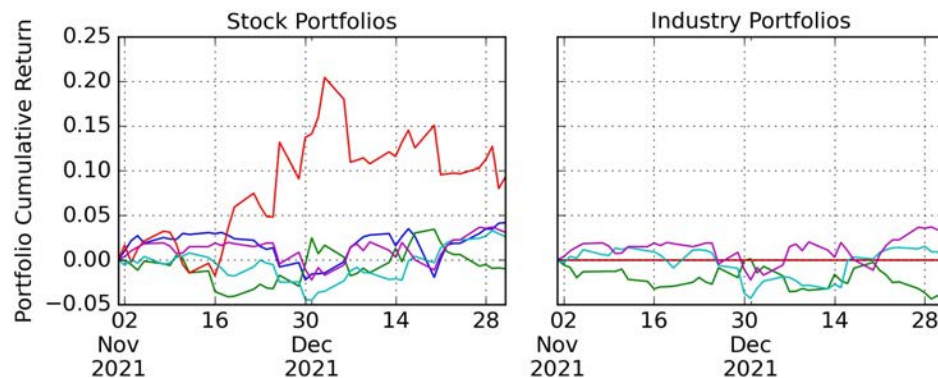
Portfolios Initiated in September 2021



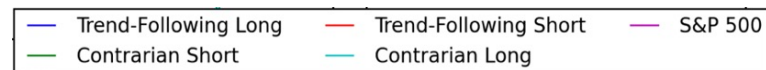
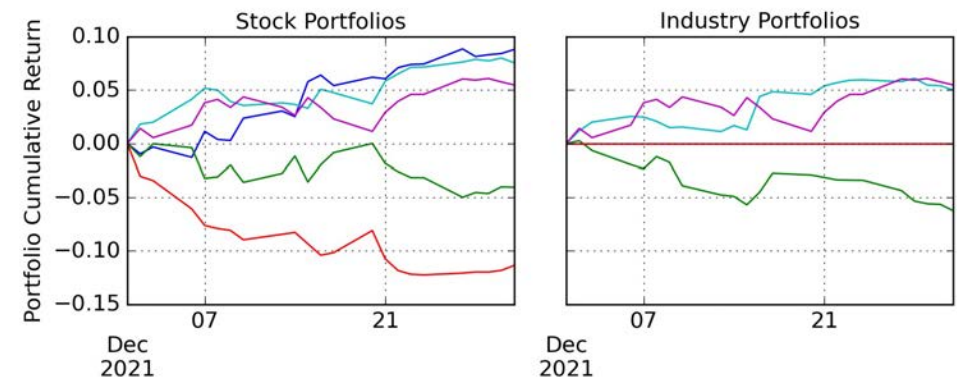
Portfolios Initiated in October 2021



Portfolios Initiated in November 2021



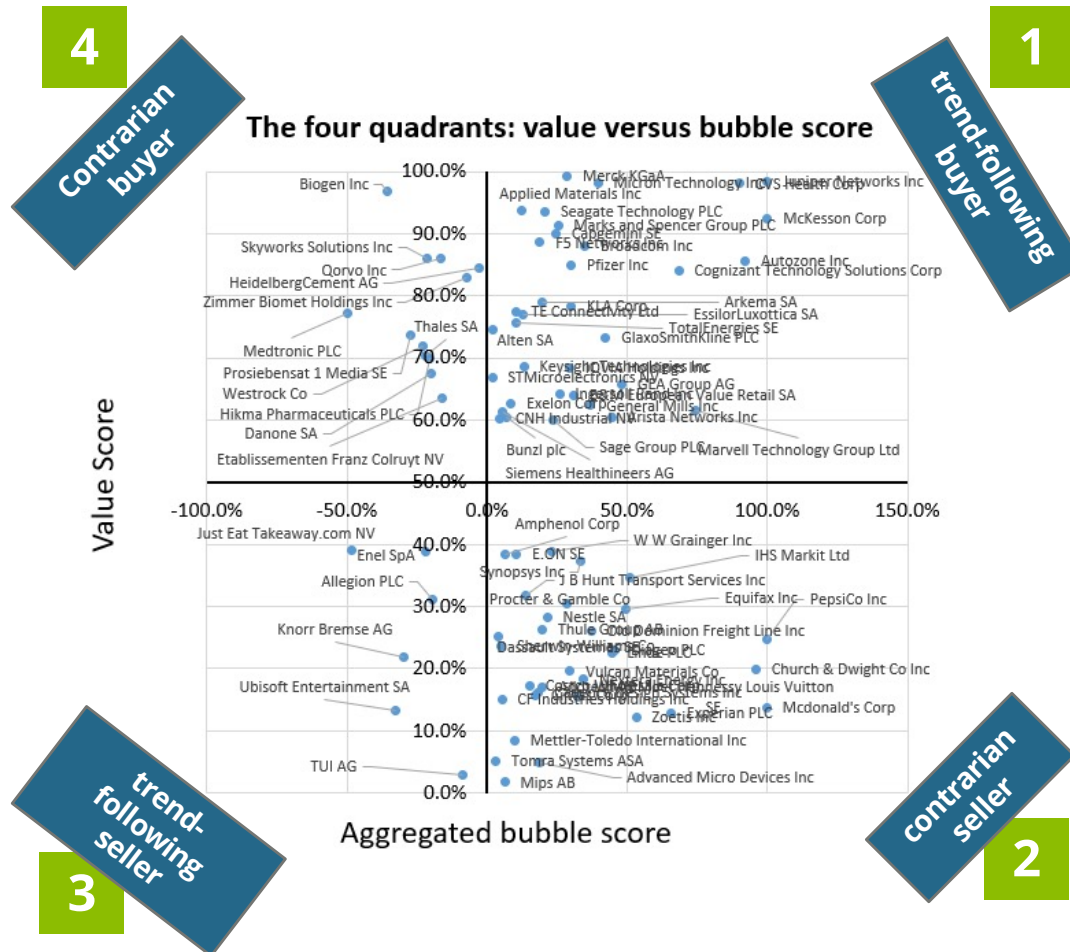
Portfolios Initiated in December 2021





# Single Stocks

We can divide the stocks into four quadrants<sup>1)</sup>



- **Quadrant 1:** Stocks with a strong value score are cheap relative to their earnings potential. The strong positive bubble signal should be interpreted as a momentum indicator possibly the consequence of a repricing based on the fundamentals. As an investor, one could be a **trend-following buyer**. E.g. Pfizer Inc.
- **Quadrant 2:** Stocks with a weak value score are expensive relative to their earnings potential. The strong positive bubble signal is an indication of sentiment and herding increasing the price until it is not linked to fundamentals anymore. As an investor, one could be a **contrarian seller**. E.g. HIS Markit Ltd
- **Quadrant 3:** These stocks are expensive relative to their earnings potential. On top of that, there are clear negative bubble signals. Such stocks should be considered as falling knives. As an investor, one could be a **trend-following seller**. E.g. TUI AG
- **Quadrant 4:** These stocks are cheap relative to their financial performance. The strong negative bubble signal is an indication of sentiment and herding. These stocks can be considered as over-sold. As an investor, one could be a **contrarian buyer**. E.g. Biogen Inc

<sup>1)</sup> A strong positive bubble signal is identified if bubble score is positive, and a strong negative bubble signal is identified if bubble score is negative.  
A strong value score is identified if value score is larger than 60%, and a weak value score is identified if value score is smaller than 40%.



# Single Stocks

- ▶ For 823 stocks, we calculate the **bubble warning indicators** as well as two financial strength indicators, which indicate the **fundamental value** of the stock and the **growth capability** respectively.
- ▶ To analyze the **financial strength of individual stocks**, we have two indicators. Both scores give a value between zero and one, one being the best of the set and zero the worst, so the higher the score, the higher the financial strength.
  - A **value score** that is based on the ROIC (Return on Invested Capital) taking into account the EV (Enterprise Value) to normalize for high/low market valuations and/or high/low debt; Value scores are calculated by comparing ROIC level versus EV/IC in each industry.
  - A **growth score** that has characteristics similar to the PEG ratio, which is the Price to Earnings ratio normalized by the expected growth of the EPS (Earnings per Share).
- ▶ The stocks are the constituents of the STOXX Europe 600, the S&P 500 and the Nasdaq 100 indices. From these, all doubles and stocks with incomplete data are removed. Because our financial strength indicators are specifically designed for corporates, all financial institutions are taken out of the set as well.

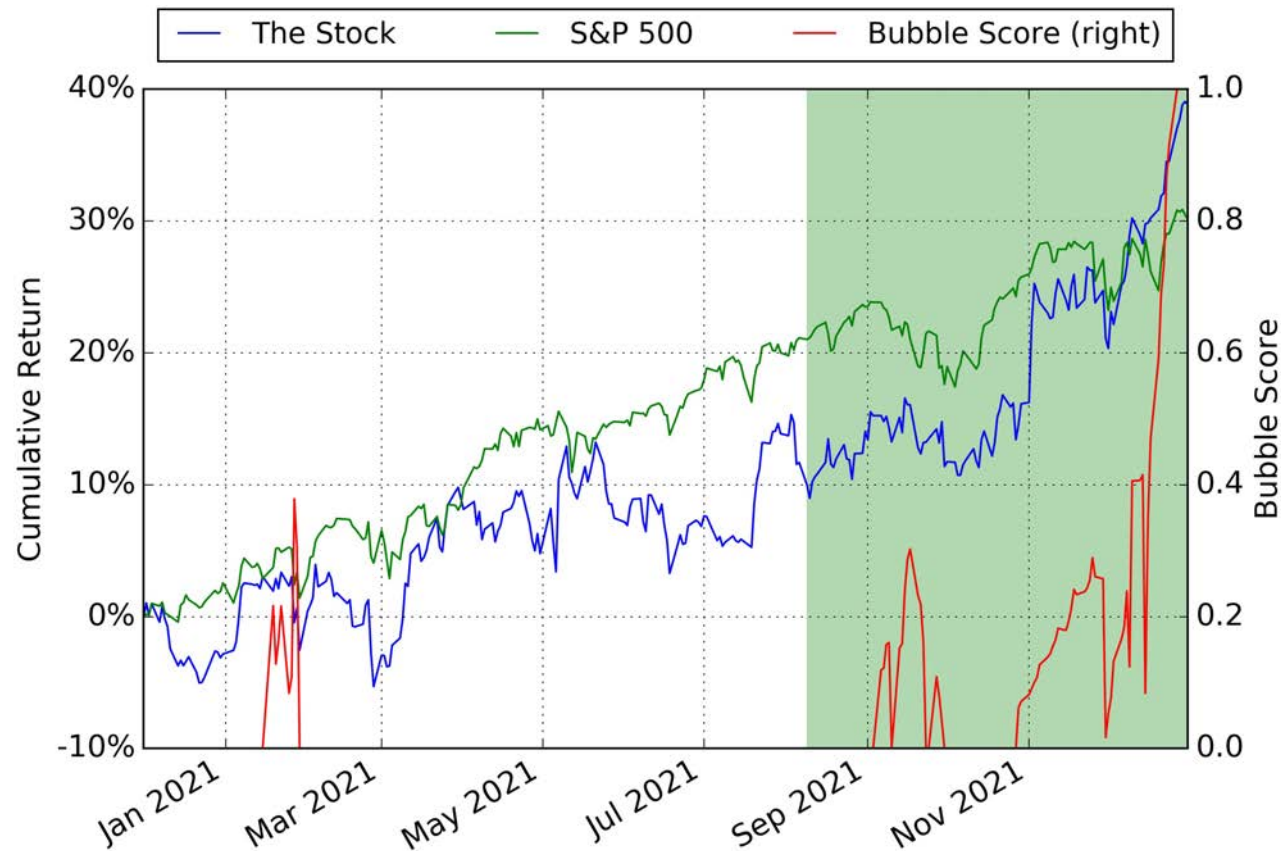
# Single Stocks

Quadrant 1 stocks: strong positive bubble signals with strong fundamentals

Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Applied Materials Inc	United States of America	Semiconductors & Semiconductor Equipment	60.5%	16.6%	Apr-21	12.5%	93.8%	60.5%
Seagate Technology PLC	Ireland; Republic of	Technology Hardware & Equipment	88.6%	32.5%	Jun-21	20.7%	93.4%	66.7%
Keysight Technologies Inc	United States of America	Technology Hardware & Equipment	40.9%	45.2%	Mar-21	13.1%	68.5%	38.3%
Ingersoll Rand Inc	United States of America	Capital Goods	34.3%	28.5%	May-21	25.8%	64.3%	26.0%
Exelon Corp	United States of America	Utilities	35.0%	29.7%	Jun-21	8.5%	62.7%	29.2%
Autozone Inc	United States of America	Retailing	66.5%	50.6%	Jun-21	92.2%	85.7%	14.6%
TE Connectivity Ltd	Switzerland	Technology Hardware & Equipment	24.2%	19.8%	Apr-21	10.2%	77.4%	39.2%
F5 Networks Inc	United States of America	Technology Hardware & Equipment	27.6%	31.1%	Apr-21	18.8%	88.6%	46.1%
IQVIA Holdings Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	49.0%	24.9%	Apr-21	29.4%	68.4%	58.9%
CVS Health Corp	United States of America	Health Care Equipment & Services	37.7%	25.1%	Jul-21	90.0%	98.1%	43.1%
KLA Corp	United States of America	Semiconductors & Semiconductor Equipment	48.3%	36.4%	Apr-21	30.0%	78.3%	39.1%
Broadcom Inc	United States of America	Semiconductors & Semiconductor Equipment	47.5%	38.0%	Aug-21	34.9%	88.0%	65.0%
Arista Networks Inc	United States of America	Technology Hardware & Equipment	85.7%	58.2%	Jun-21	44.4%	60.5%	58.1%
McKesson Corp	United States of America	Health Care Equipment & Services	35.5%	26.3%	Aug-21	100.0%	92.3%	62.0%
General Mills Inc	United States of America	Food, Beverage & Tobacco	21.6%	12.8%	Jun-21	37.0%	62.3%	37.3%
Pfizer Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	60.2%	57.0%	Apr-21	30.0%	84.9%	95.3%
Micron Technology Inc	United States of America	Semiconductors & Semiconductor Equipment	16.6%	32.6%	Aug-21	39.5%	98.2%	36.7%
Cognizant Technology Solutions Corp	United States of America	Software & Services	11.4%	15.9%	Aug-21	68.4%	84.0%	85.5%
Juniper Networks Inc	United States of America	Technology Hardware & Equipment	52.0%	34.2%	Jul-21	100.0%	98.3%	56.1%
Marvell Technology Group Ltd	United States of America	Semiconductors & Semiconductor Equipment	74.1%	54.4%	Jul-21	74.2%	61.6%	71.3%
B&M European Value Retail SA	Luxembourg	Retailing	24.5%	20.3%	Jul-21	30.9%	63.9%	13.9%
Capgemini SE	France	Software & Services	71.5%	40.1%	Apr-21	24.6%	89.9%	15.3%
GlaxoSmithKline PLC	United Kingdom	Pharmaceuticals, Biotechnology & Life Sciences	17.0%	14.8%	Jul-21	42.3%	73.3%	34.4%
Merck KGaA	Germany	Pharmaceuticals, Biotechnology & Life Sciences	54.4%	46.9%	Jun-21	28.5%	99.3%	73.5%
CNH Industrial NV	United Kingdom	Capital Goods	53.0%	43.9%	Feb-21	4.5%	60.3%	5.0%
Bunzl plc	United Kingdom	Capital Goods	15.8%	17.4%	Jan-21	7.0%	60.4%	18.3%
Arkema SA	France	Materials	32.2%	14.8%	May-21	19.8%	79.0%	17.6%
Sage Group PLC	United Kingdom	Software & Services	50.7%	42.8%	Mar-21	23.5%	60.0%	54.1%
Siemens Healthineers AG	Germany	Health Care Equipment & Services	50.3%	39.8%	Feb-21	5.6%	61.2%	66.0%
EssilorLuxottica SA	France	Consumer Durables & Apparel	45.5%	26.2%	Jun-21	12.6%	77.0%	60.9%
TotalEnergies SE	France	Energy	19.2%	22.1%	Feb-21	10.4%	75.7%	85.4%
GEA Group AG	Germany	Capital Goods	58.6%	39.1%	Jul-21	48.1%	65.7%	83.1%
Marks and Spencer Group PLC	United Kingdom	Retailing	73.9%	44.8%	Jun-21	25.3%	91.4%	89.4%
Alten SA	France	Software & Services	65.1%	19.7%	Jul-21	1.9%	74.5%	89.1%
STMicroelectronics NV	Switzerland	Semiconductors & Semiconductor Equipment	28.8%	41.5%	May-21	1.9%	66.8%	29.6%
Aalberts NV	Netherlands	Capital Goods	52.9%	52.9%	Jan-21	17.0%	63.1%	5.2%

# Single Stocks

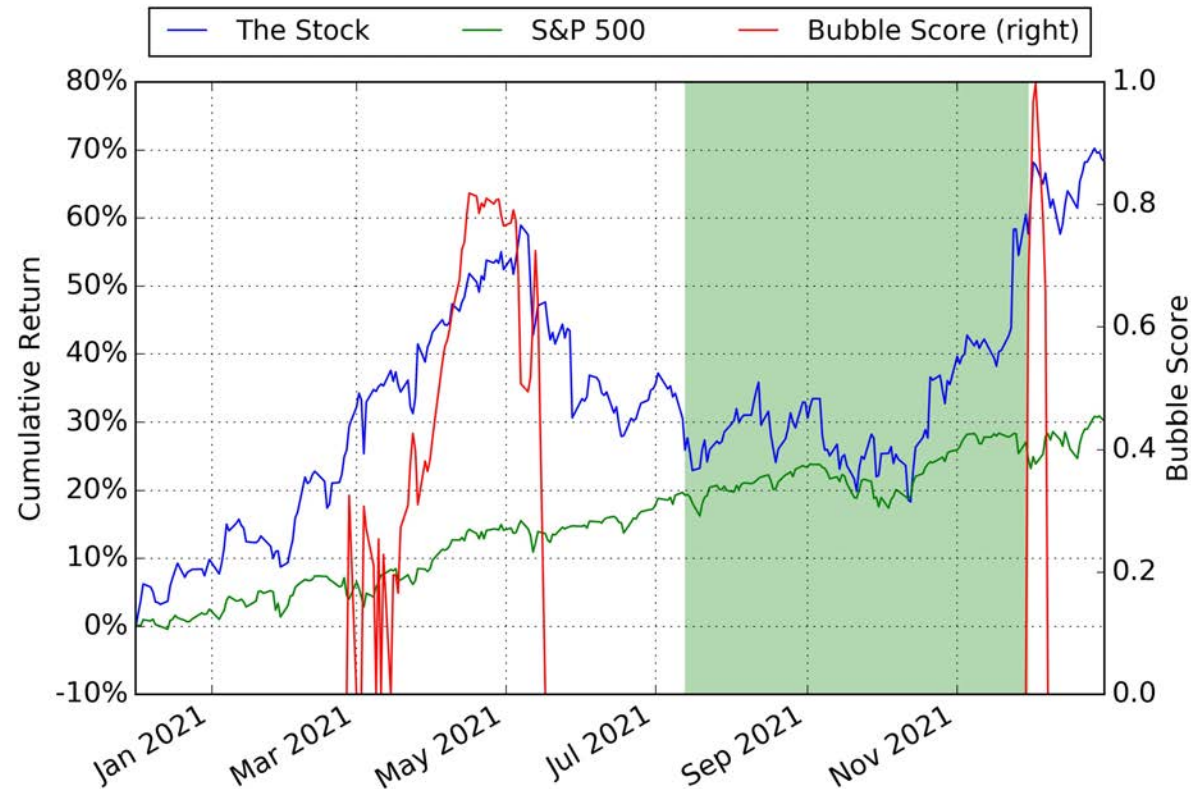
Quadrant 1 Stocks Current Month Example – McKesson Corp.



- The above graph shows the one-year cumulative return of the stock in blue (left hand scale), S&P 500 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this five-month bubble has reached 100% with a bubble size 26.3%.

# Single Stocks

## Quadrant 1 Stocks Last Month Example – HP Inc.



- ▶ The figure above plots the one-year cumulative return of the stock (blue), S&P 500 (green) and LPPLS Bubble Score (red lines on the right y-axis). The green shaded period delineates the time interval within which a strong positive bubble has been identified and reported last month. The stock had a small correction followed by increased volatility after our strong bubble signal last month, which supports the hypothesis that the fast-growing bubble regime of this stock from October to November has ended.

# Single Stocks

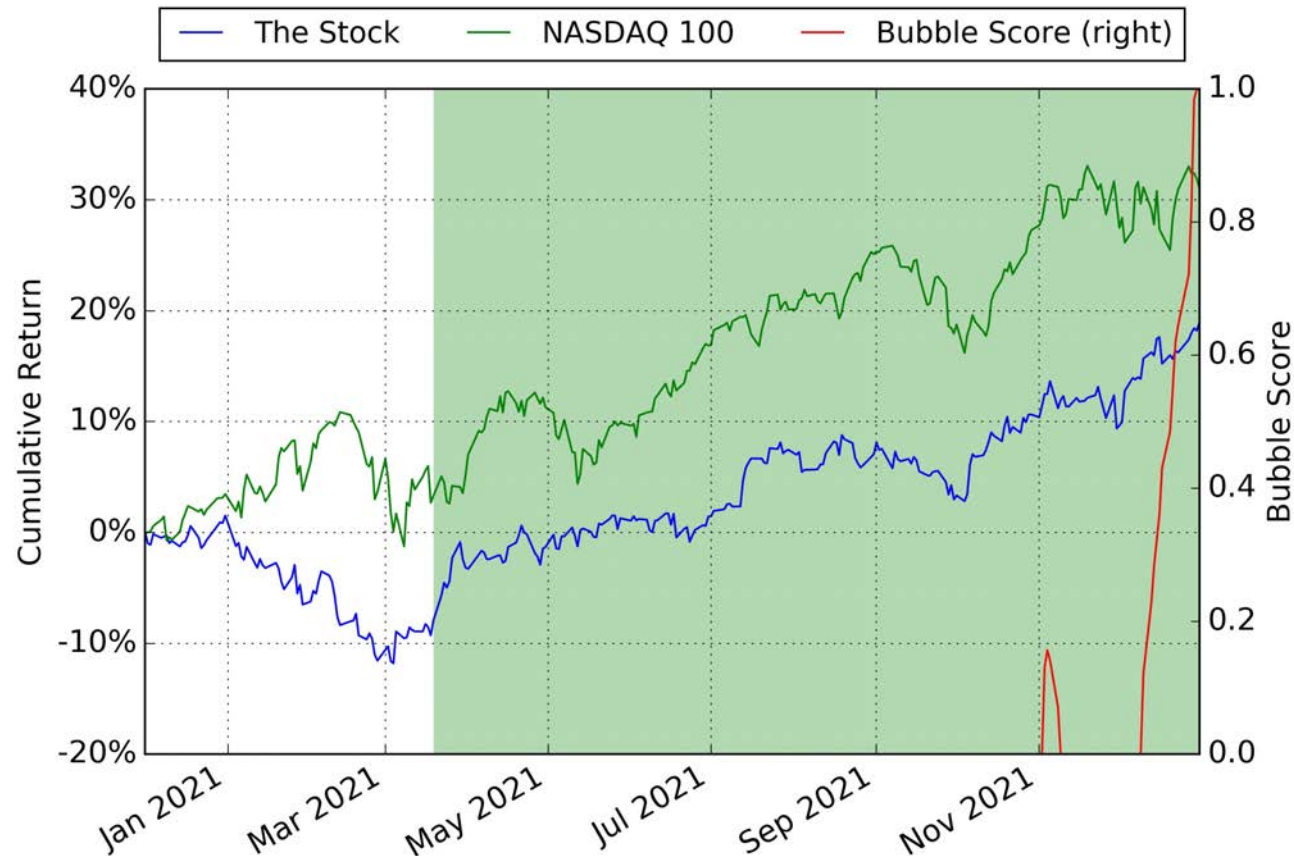
Quadrant 2 stocks: strong positive bubble signals with weak fundamentals

Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Linde PLC	United Kingdom	Materials	29.4%	19.4%	Jul-21	44.4%	22.5%	55.0%
Mcdonald's Corp	United States of America	Consumer Services	26.4%	11.6%	Aug-21	99.8%	13.7%	74.7%
Costco Wholesale Corp	United States of America	Food & Staples Retailing	54.7%	72.8%	Mar-21	15.2%	17.3%	48.7%
Advanced Micro Devices Inc	United States of America	Semiconductors & Semiconductor Equipment	56.8%	78.0%	Mar-21	18.8%	4.9%	59.7%
IHS Markit Ltd	United Kingdom	Commercial & Professional Services	55.6%	19.0%	Jun-21	50.9%	34.6%	53.2%
J B Hunt Transport Services Inc	United States of America	Transportation	37.0%	19.3%	May-21	13.9%	31.8%	52.7%
Sherwin-Williams Co	United States of America	Materials	45.1%	29.0%	Jul-21	5.1%	23.7%	66.6%
Cadence Design Systems Inc	United States of America	Software & Services	38.9%	40.4%	Apr-21	18.3%	16.2%	53.3%
PepsiCo Inc	United States of America	Food, Beverage & Tobacco	21.8%	21.7%	Mar-21	99.9%	24.7%	69.6%
CF Industries Holdings Inc	United States of America	Materials	56.3%	45.0%	Jun-21	5.2%	14.9%	20.8%
Nextera Energy Inc	United States of America	Utilities	14.1%	28.7%	Mar-21	34.4%	18.2%	69.9%
Equifax Inc	United States of America	Commercial & Professional Services	60.7%	25.2%	May-21	49.2%	29.6%	43.4%
Cintas Corp	United States of America	Commercial & Professional Services	32.0%	33.8%	Feb-21	17.3%	15.7%	49.6%
W W Grainger Inc	United States of America	Capital Goods	33.4%	34.4%	Feb-21	23.2%	38.9%	76.1%
Old Dominion Freight Line Inc	United States of America	Transportation	78.3%	71.1%	Feb-21	37.0%	26.1%	62.3%
Church & Dwight Co Inc	United States of America	Household & Personal Products	21.3%	22.4%	Aug-21	95.9%	19.8%	71.6%
Mettler-Toledo International Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	39.5%	50.5%	Feb-21	9.8%	8.5%	56.7%
Vulcan Materials Co	United States of America	Materials	28.5%	21.4%	Jul-21	29.6%	19.6%	61.8%
Amphenol Corp	United States of America	Technology Hardware & Equipment	30.1%	29.4%	Jun-21	6.3%	38.3%	44.7%
Procter & Gamble Co	United States of America	Household & Personal Products	19.2%	22.6%	Apr-21	28.5%	30.5%	46.7%
Zoetis Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	50.7%	20.9%	Aug-21	53.2%	12.2%	63.5%
Synopsys Inc	United States of America	Software & Services	43.3%	48.7%	Mar-21	33.5%	37.3%	70.0%
Addtech AB	Sweden	Capital Goods	83.1%	77.0%	Feb-21	19.8%	17.0%	85.7%
Nestle SA	Switzerland	Food, Beverage & Tobacco	27.0%	12.2%	Aug-21	21.4%	28.3%	65.6%
Mips AB	Sweden	Consumer Durables & Apparel	133.0%	79.4%	Apr-21	6.2%	1.7%	64.6%
Diageo PLC	United Kingdom	Food, Beverage & Tobacco	37.7%	16.6%	Jun-21	45.7%	23.0%	44.6%
Thule Group AB	Sweden	Consumer Durables & Apparel	68.0%	37.6%	Apr-21	19.7%	26.4%	53.0%
LVMH Moët Hennessy Louis Vuitton SE	France	Consumer Durables & Apparel	42.0%	42.0%	Jan-21	32.3%	15.4%	45.9%
Tomra Systems ASA	Norway	Commercial & Professional Services	55.4%	55.4%	Jan-21	3.1%	5.1%	61.6%
Experian PLC	Ireland; Republic of	Commercial & Professional Services	32.8%	33.7%	Apr-21	65.6%	12.8%	73.9%
Dassault Systemes SE	France	Software & Services	59.4%	37.0%	Apr-21	3.8%	25.2%	51.4%
E.ON SE	Germany	Utilities	36.4%	27.7%	Mar-21	10.5%	38.4%	28.4%



# Single Stocks

## Quadrant 2 Stocks Current Month Example – PepsiCo Inc.

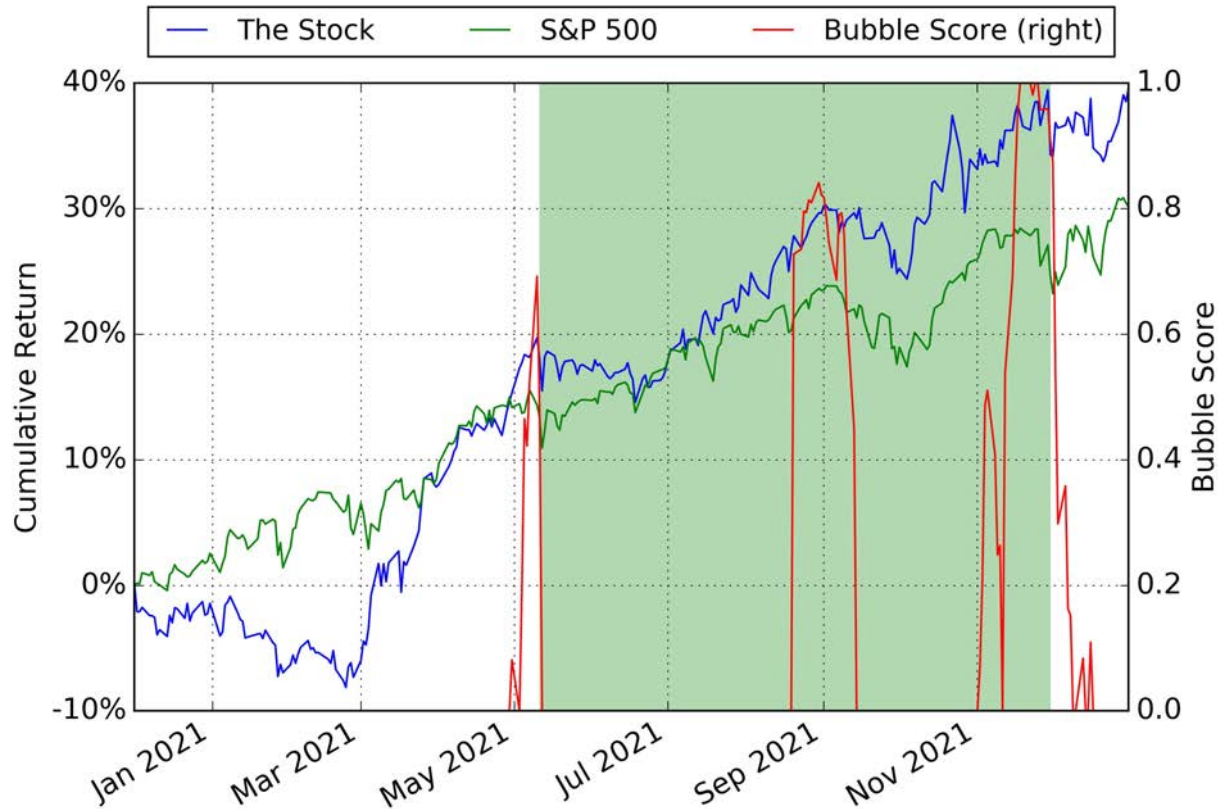


- The above graph shows the one-year cumulative return of the stock in blue (left hand scale), NASDAQ 100 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this ten-month bubble has reached 99.9% with a bubble size 21.7%. The strong positive bubble signal and weak fundamentals may indicate a high probability of correction in the future.



# Single Stocks

## Quadrant 2 Stocks Last Month Example – Waste Management Inc.



The figure above plots the one-year cumulative return of the stock (blue), S&P 500 (green) and LPPLS Bubble Score (red lines on the right y-axis). The green shaded period delineates the time interval within which a strong positive bubble has been identified and reported last month. The stock price has entered a volatile plateau in the past month, indicating a change of regime, which is in agreement with the LPPLS signal. The weak fundamentals suggests that risks for the stock price to exhibit future corrections.

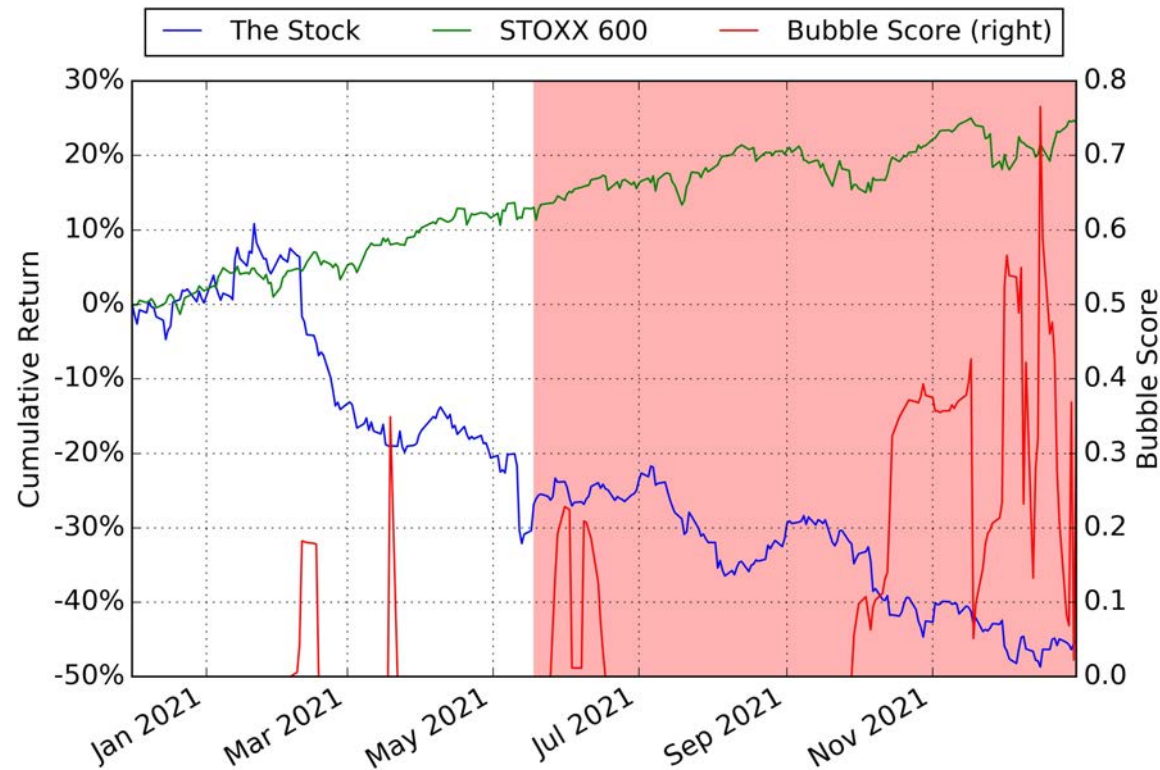
# Single Stocks

Quadrant 3 stocks: strong negative bubble signals with weak fundamentals

Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Allegion PLC	Ireland; Republic of	Capital Goods	13.2%	-5.5%	May-21	-19.7%	31.1%	31.0%
Ubisoft Entertainment SA	France	Media & Entertainment	-48.4%	-25.1%	May-21	-32.7%	13.2%	90.3%
TUI AG	Germany	Consumer Services	-22.6%	-39.1%	Feb-21	-8.6%	2.8%	99.9%
Just Eat Takeaway.com NV	Netherlands	Retailing	-50.2%	-35.3%	Jul-21	-48.3%	39.0%	77.0%
Knorr Bremse AG	Germany	Capital Goods	-24.9%	-24.9%	Jan-21	-29.5%	21.9%	90.0%
Enel SpA	Italy	Utilities	-21.1%	-21.1%	Jan-21	-22.0%	38.8%	12.0%
Simcorp A/S	Denmark	Software & Services	-16.6%	-12.9%	Jul-21	-15.8%	10.8%	82.3%

# Single Stocks

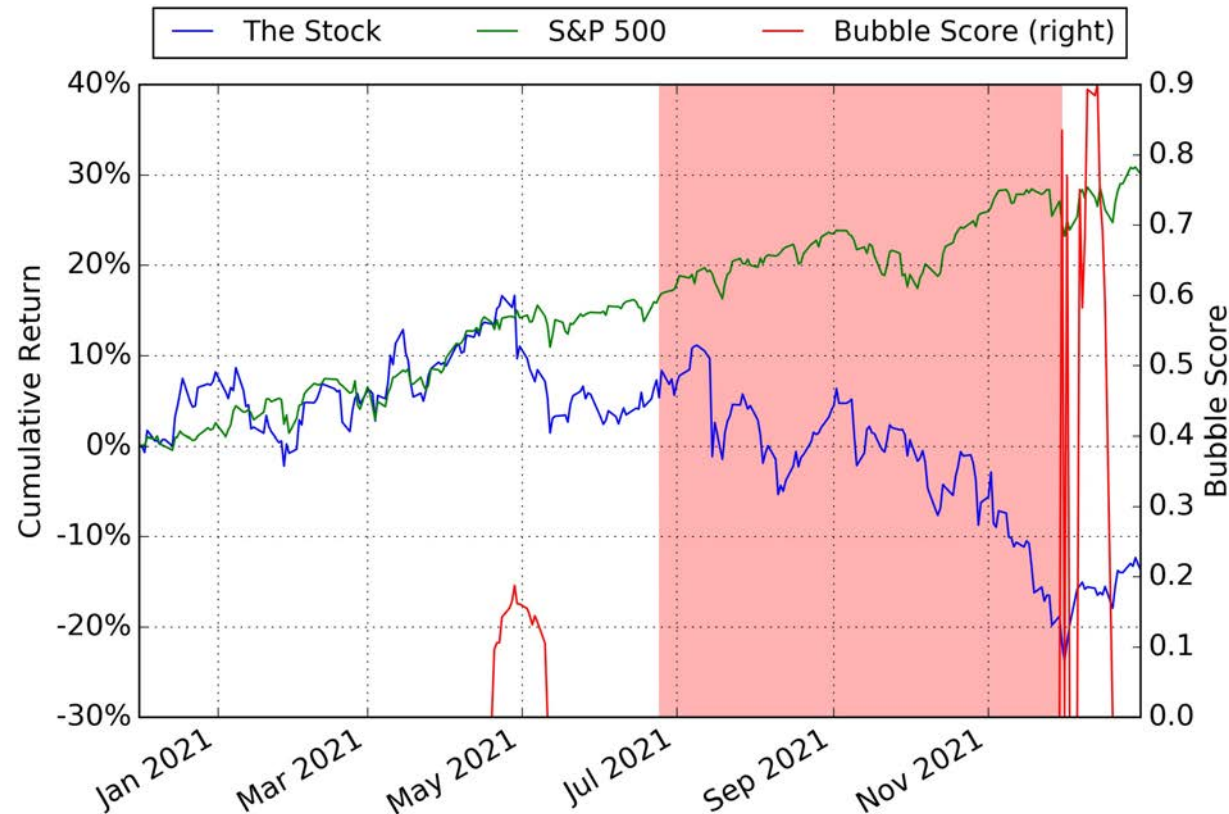
Quadrant 3 Stocks Current Month Example – Ubisoft Entertainment SA.



- The above graph shows the one-year cumulative return of the stock in blue (left hand scale), STOXX 600 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The red shaded period delineates the time interval within which the negative bubble is identified. The Bubble Score of this eight-month bubble has reached 32.7% with a bubble size -25.1%.

# Single Stocks

## Quadrant 3 Stocks Last Month Example – Teleflex Inc.



- ▶ The figure above plots the one-year cumulative return of the stock (blue), S&P 500 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock price has started to rebound in the past month, which is in agreement with our DS LPPLS Bubble Signal. One should remain cautious however, given the weak fundamentals of this stock, which may indicate a continuation of the negative bubble in the future.

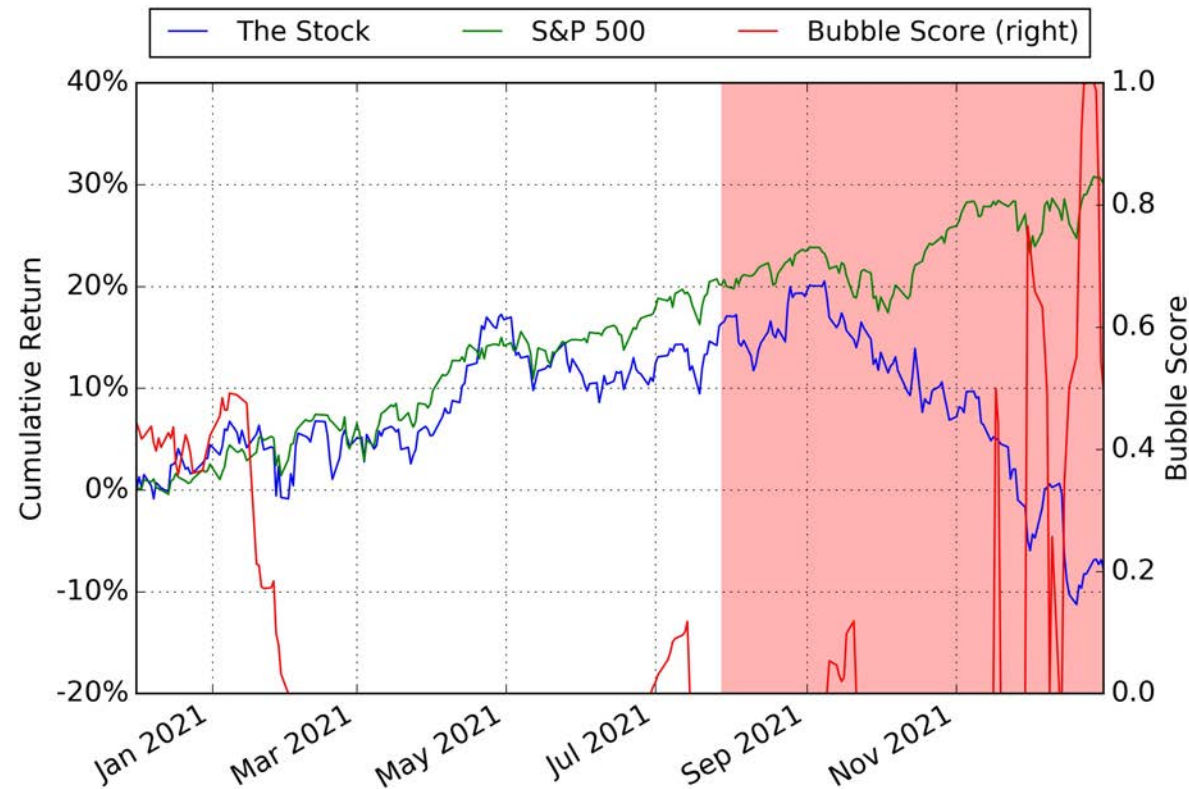
# Single Stocks

Quadrant 4 stocks: strong negative bubble signals with strong fundamentals

Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Qorvo Inc	United States of America	Semiconductors & Semiconductor Equipment	-13.2%	-18.9%	Apr-21	-16.4%	85.9%	23.5%
Zimmer Biomet Holdings Inc	United States of America	Health Care Equipment & Services	-22.0%	-19.9%	Feb-21	-7.1%	82.9%	48.2%
Medtronic PLC	Ireland; Republic of	Health Care Equipment & Services	-12.9%	-20.7%	Jul-21	-49.6%	77.3%	67.7%
Biogen Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	-10.0%	-39.4%	Jun-21	-35.4%	96.7%	25.9%
Skyworks Solutions Inc	United States of America	Semiconductors & Semiconductor Equipment	-1.7%	-17.3%	Apr-21	-21.6%	86.0%	35.1%
Westrock Co	United States of America	Materials	-5.5%	-22.7%	May-21	-23.0%	71.8%	30.0%
Danone SA	France	Food, Beverage & Tobacco	1.7%	-7.7%	Jun-21	-19.7%	67.6%	34.0%
HeidelbergCement AG	Germany	Materials	-11.9%	-20.7%	May-21	-3.1%	84.4%	93.3%
Etablissements Franz Colruyt NV	Belgium	Food & Staples Retailing	-28.0%	-26.9%	May-21	-15.9%	63.4%	10.0%
Thales SA	France	Capital Goods	0.0%	-12.7%	Jun-21	-21.8%	70.4%	21.0%
Hikma Pharmaceuticals PLC	United Kingdom	Pharmaceuticals, Biotechnology & Life Sciences	-13.6%	-10.7%	Aug-21	-20.7%	70.0%	30.4%
ProSiebensat 1 Media SE	Germany	Media & Entertainment	5.3%	-19.5%	Jul-21	-27.4%	73.6%	54.6%
Bucher Industries AG	Switzerland	Capital Goods	3.3%	-7.9%	Apr-21	-29.5%	65.2%	42.9%
Solvay SA	Belgium	Materials	0.3%	-9.3%	May-21	-14.1%	74.6%	9.8%
KGHM Polska Miedz SA	Poland	Materials	-31.4%	-36.7%	May-21	-32.0%	74.7%	98.5%

# Single Stocks

Quadrant 4 Stocks Current Month Example – Medtronic PLC.

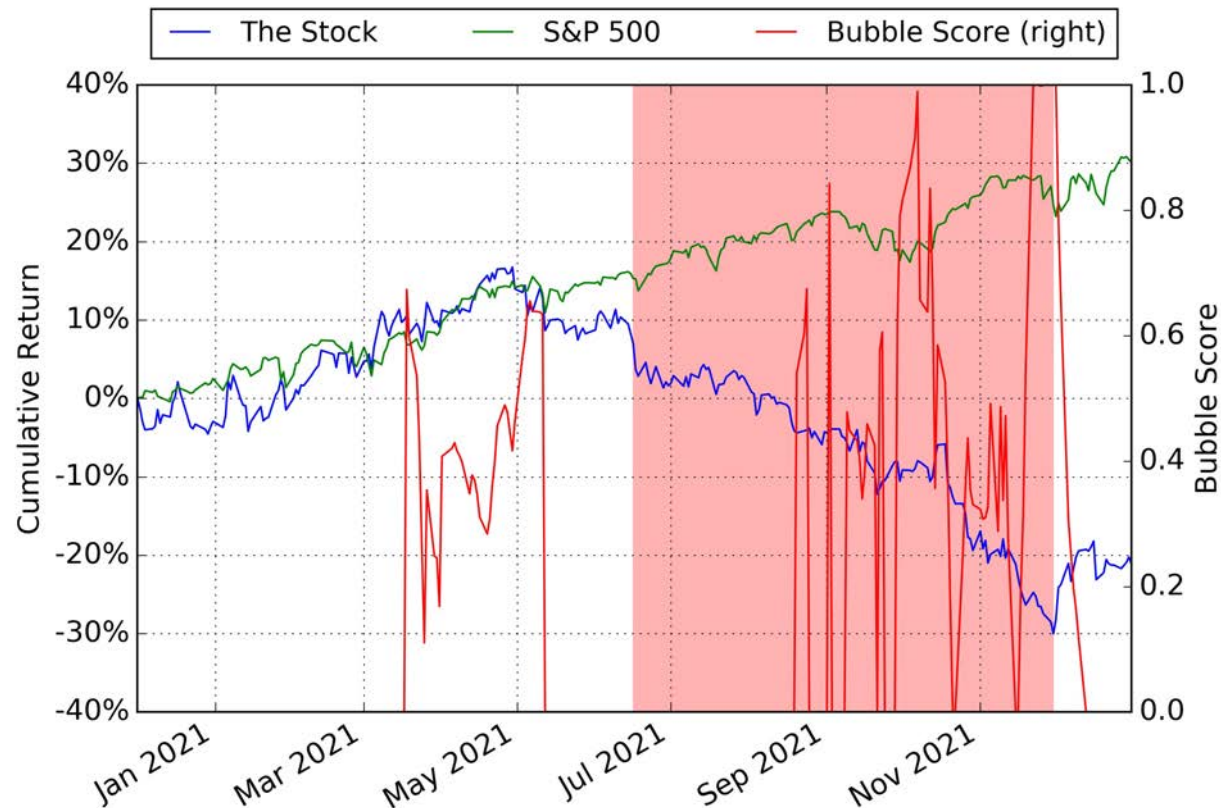


- The above graph shows the one-year cumulative return of the stock in blue (left hand scale), S&P 500 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The red shaded period delineates the time interval within which the strong negative bubble is identified. The Bubble Score of this five-month bubble has reached 49.6% with a negative bubble size -20.7%. We expect a rebound in the future when the negative bubble is mature, given our diagnostic of a negative bubble signal with strong fundamentals, calling for a contrarian buyer position.



# Single Stocks

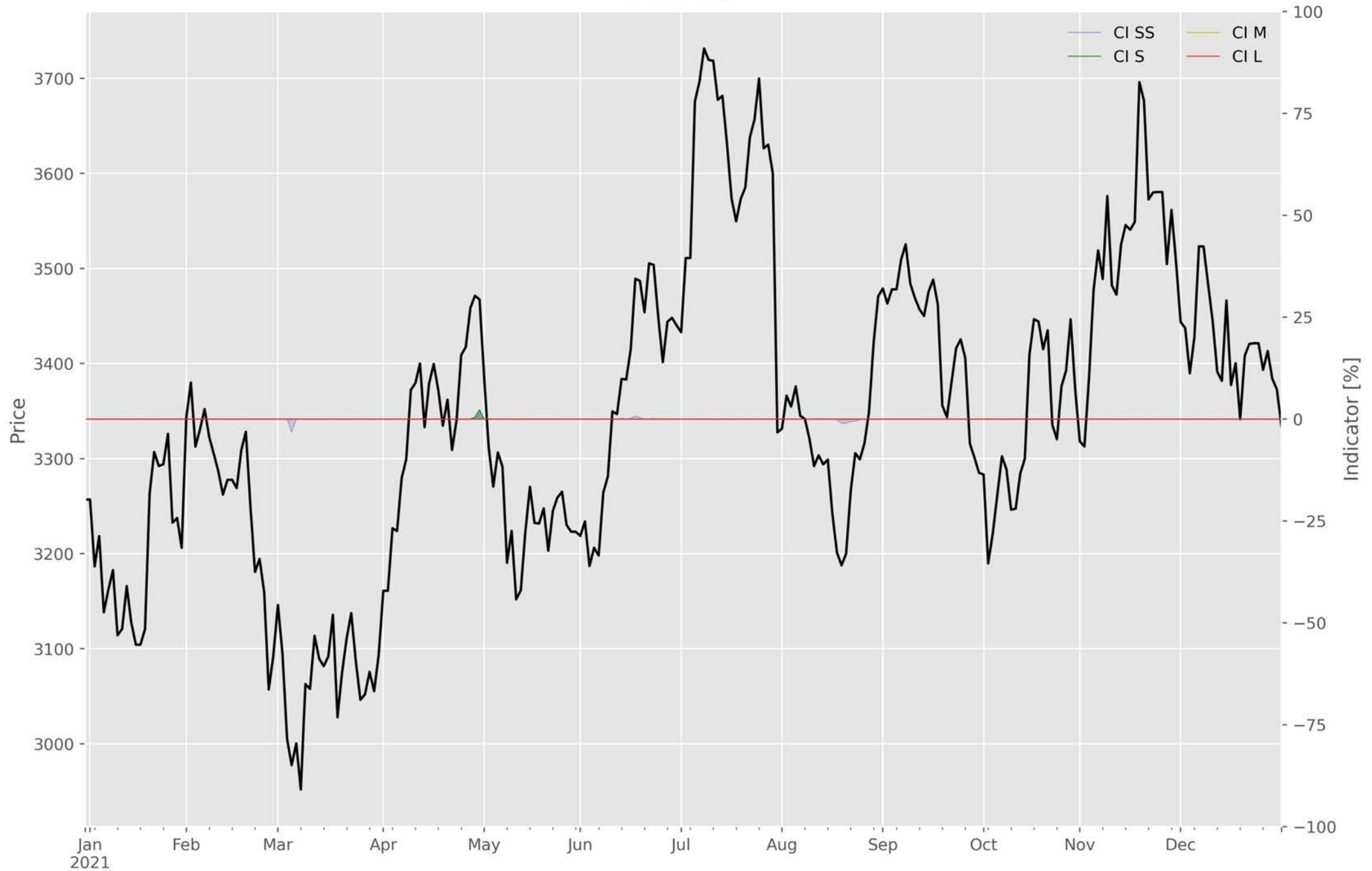
Quadrant 4 Stocks Last Month Example – Western Union Co.



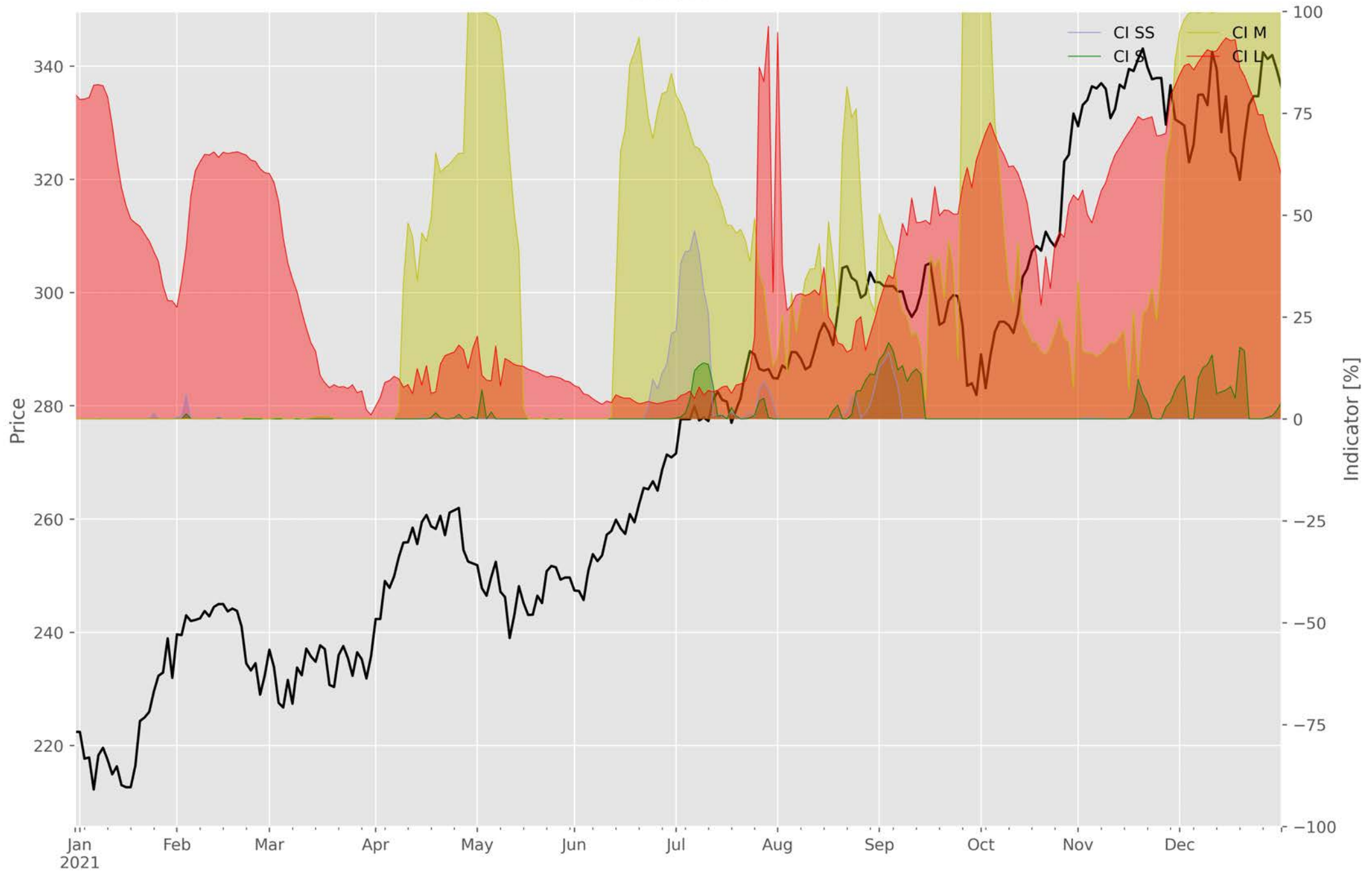
- The figure above plots the one-year cumulative return of the stock (blue), S&P 500 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock price has started a rebound in the past month with the disappearance of the bubble signal, marking the end of the previous negative bubble regime.

# Appendix

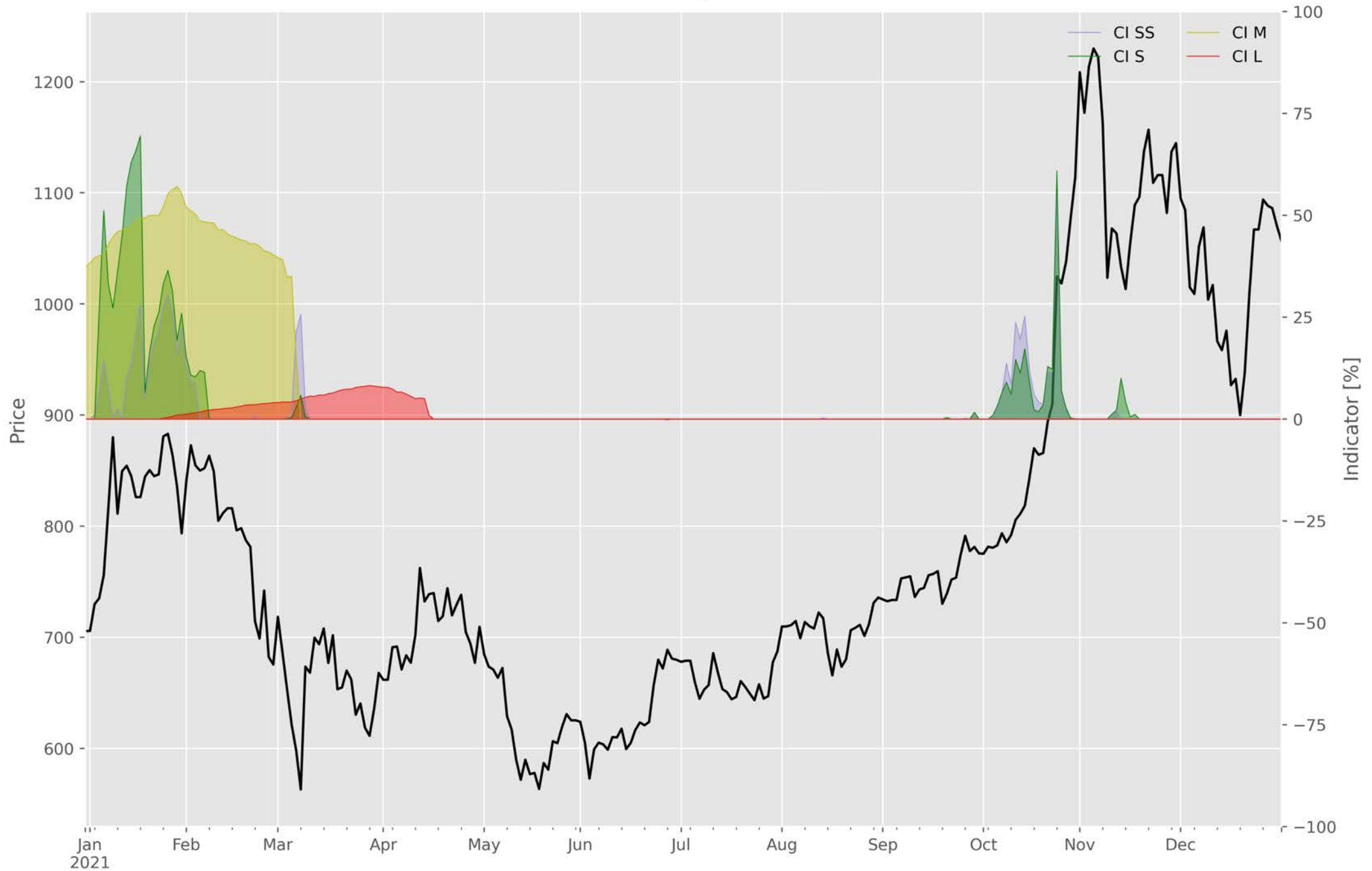
# Amazon.Com



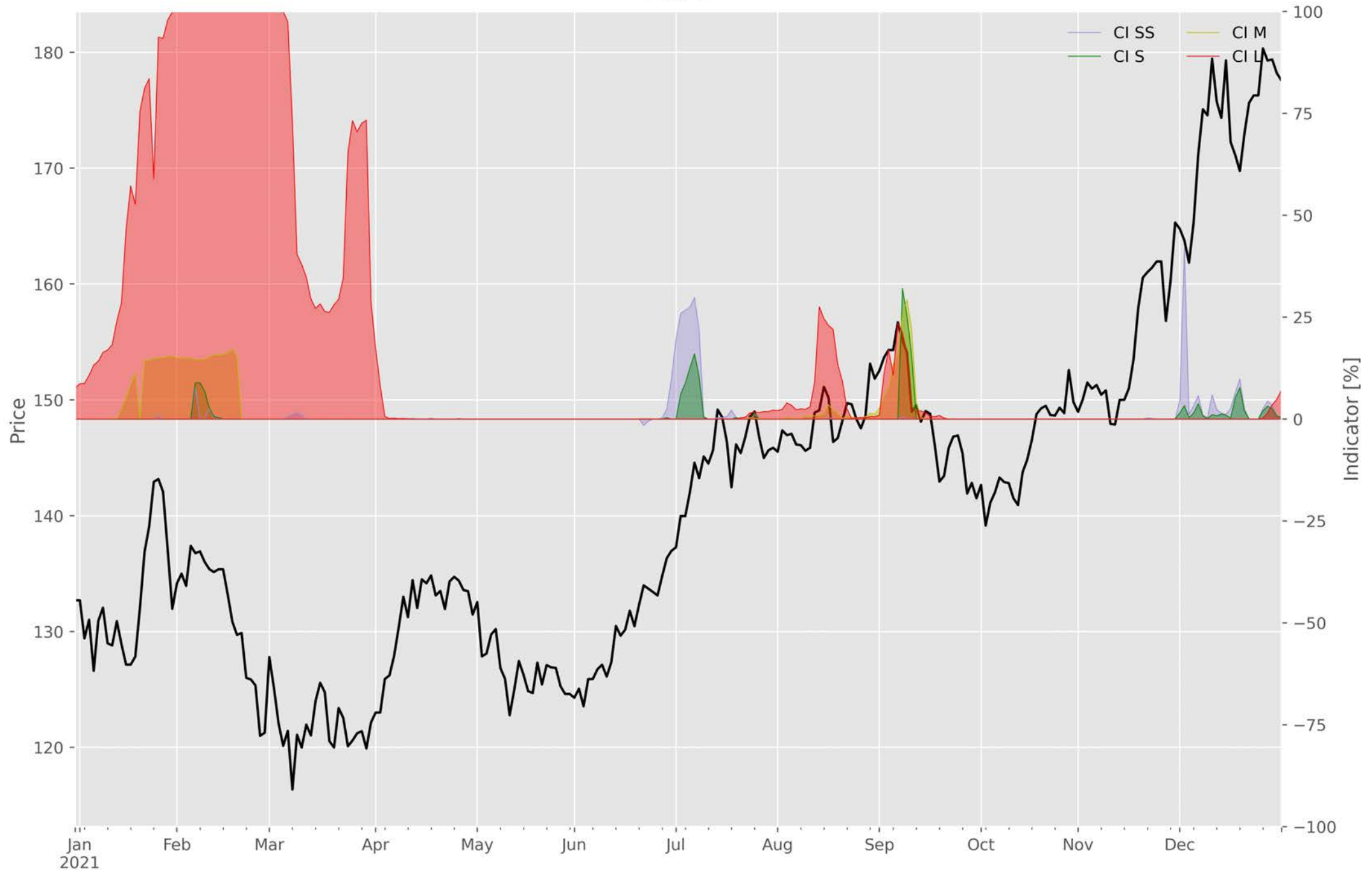
# Microsoft



# Tesla

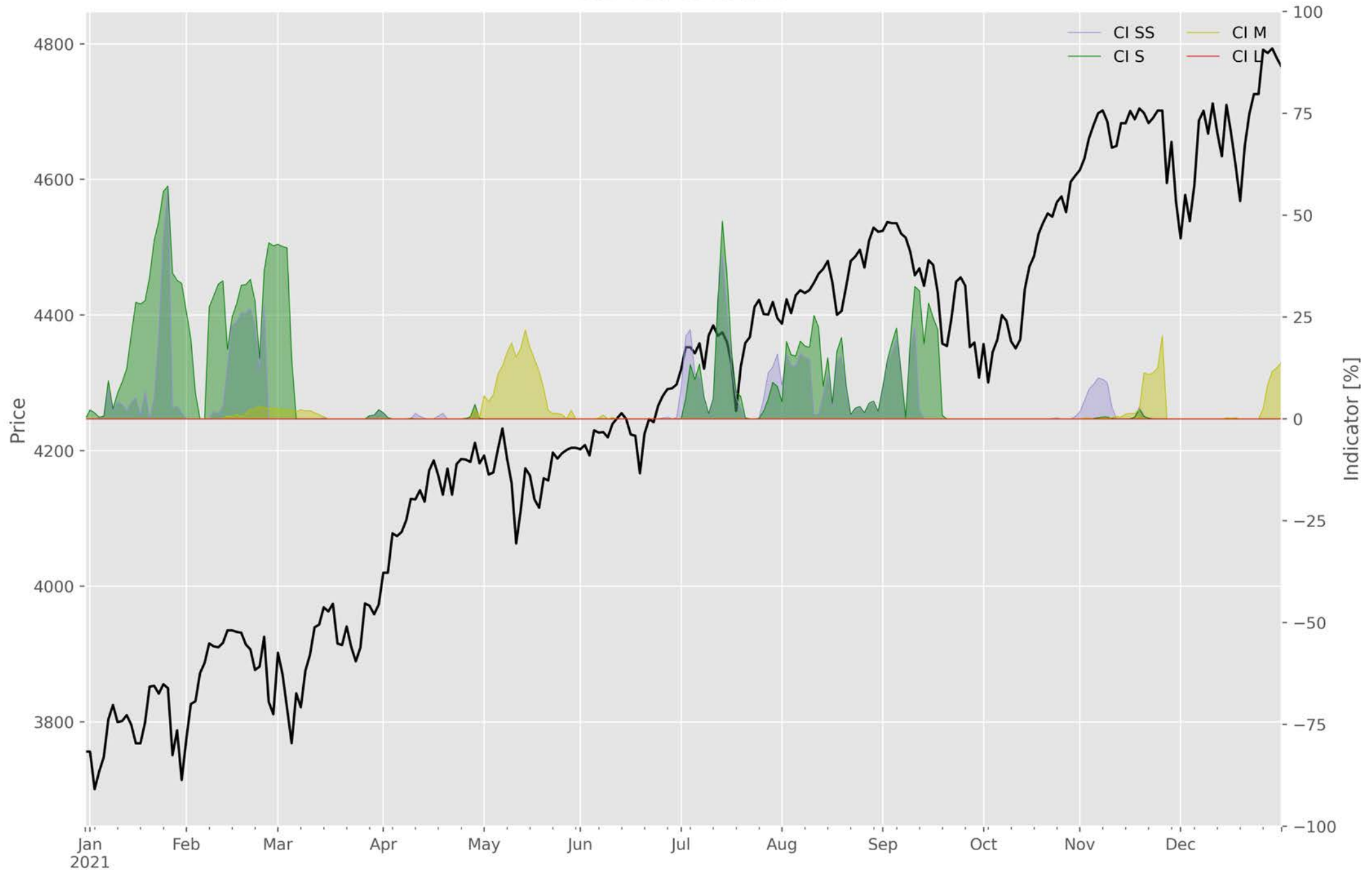


# Apple





## S&P 500 Composite



## Bitcoin/USD



# More Information

- ▶ Visit the **Financial Crisis Observatory** for more information

<http://www.er.ethz.ch/financial-crisis-observatory.html>

- ▶ **Contacts ETH Zurich**

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