



The FCO Cockpit Global Bubble Status Report December 2021



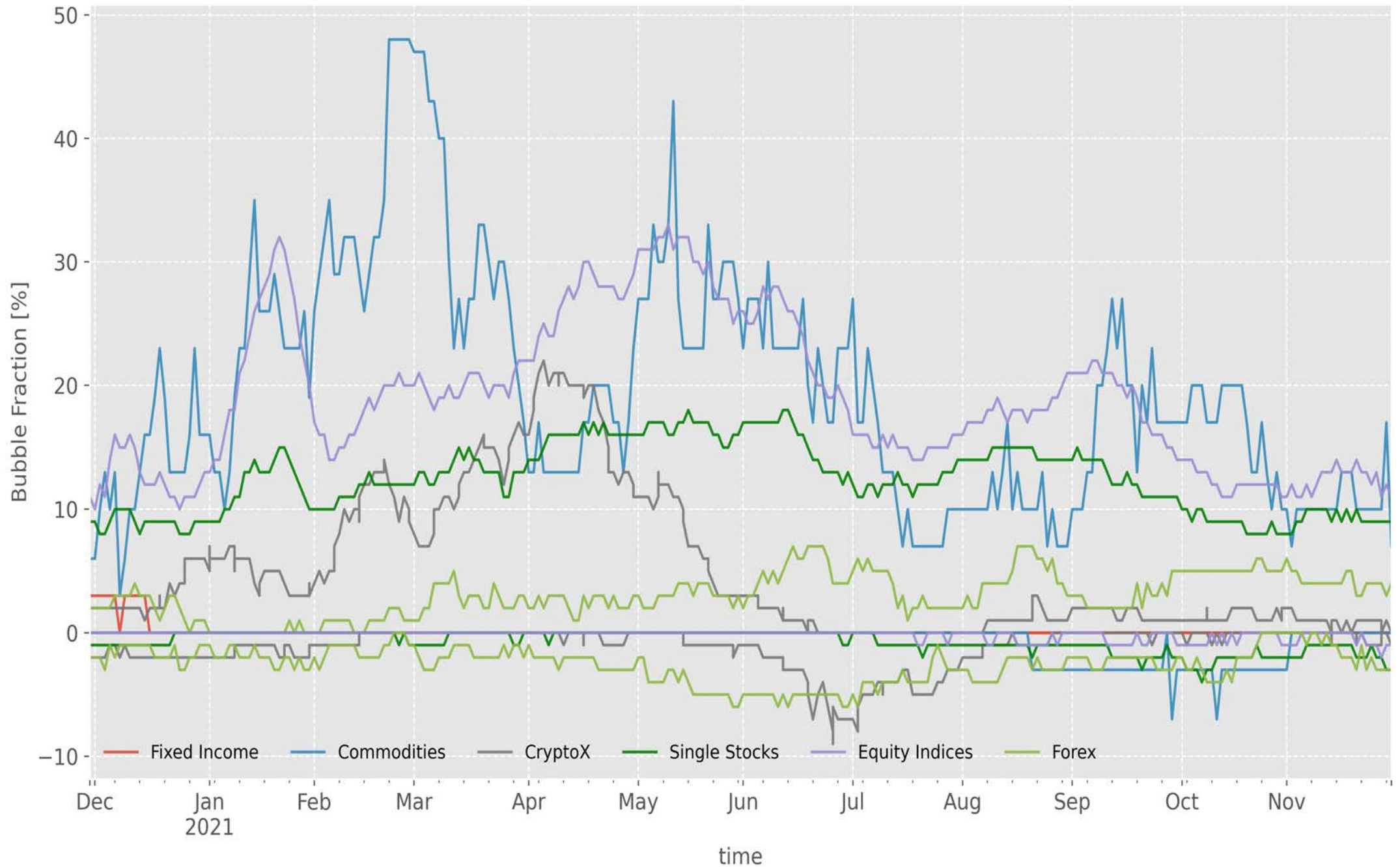
Contents

1. Introduction
2. Results per Asset Class
3. Appendix
4. Contact

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 2021-11-30

	Region	Analyzed Assets	Fraction of Pos. Bubbles [%]	Fraction of Neg. Bubbles [%]
Fixed Income		33	0	0
Commodities		30	7	0
Single Stocks		1616	9	3
	Europe	943	7	3
	United States	660	11	3
Equity Indices		867	11	1
	Europe	57	11	0
	United States	377	12	2
	Global	383	11	1
Forex		99	4	3
CryptoX		468	0	1

- ▶ This month, the fixed income sector continues to show zero bubble signals.
- ▶ In the commodities sector, the negative bubble fraction has dropped to zero from its previous 3% level, and the positive bubble fraction also has fallen by 3 percent to 7%.
- ▶ The positive and negative bubble signals in the single stocks sector has both increased by 1 percent to 9% and 3%, respectively, while they remain unchanged in the equity indices sector, respectively recording 11% and 1%.
- ▶ In the Forex sector, of note is that the negative bubble signal comes to a resurgence at 3%.
- ▶ As with the past few months, bubble signals remain nearly zero in the CryptoX sector.

Fed Fights Inflation

In line with our previous reports, Powell finally retired the use of the word “transitory” to describe inflation, reflecting the final arrival of the bifurcation of the unconventional monetary policy. The surging of the rent cost and the supply-chain disruptions used to be ignored by the Fed for the past half-year, and finally, they realized that “printing money” does not alleviate those risks. Instead, it only amplifies the demand-supply mismatch. Now, the inflation risk is the biggest threat to the global economy, as it hurts the poor and the elder much more than the rich, contributing to an overall increase of social risk. The sudden shift of tune might suggest that the Fed, to some extent, is beginning to worry that inflation might get out of control. So the “taper” might speed up in the next year. At the Financial Crisis Observatory (FCO), we are strong critics of Modern Monetary Theory (MMT), which only delays addressing the current problems while catalysing more extensive instabilities in the financial system and deterring economic recovery. Therefore, we will not be surprised that increased volatilities will appear during the coming “taper” process.

Omicron and Stagflation Risk

In our August FCO report, we mentioned that “there still exists a high chance that a totally “different” variant of COVID that no vaccinations can prevent or cure will come into being.” Now, the identification of a new COVID variant (“Omicron”) in South Africa with a large number of spike protein mutations partially confirms our claim. Although scientists still need time to understand whether the current vaccine is effective enough, more than 30 countries have imposed travel bans (China, Israel, Japan, and Morocco have fully closed the borders, while others announce partial bans or delay reopening). We think it is unlikely that this new variant will send the global economy back to recession. Still, travel bans will threaten to intensify imbalances, slowing recovery and raising supply, which will add more stagflation pressure to the world economy.

Let's discuss some asset classes:

Fix income: Since the identification of the new Covid variant, Omicron, that has shocked oil price and inflation expectations, the 10-year Treasury note yield now faces uncertainty. Although Powell mentioned that the Fed would accelerate the “taper,” institutions are still waiting for more information on the Omicron (Powell also emphasizes that Fed has not considered the impact of the Omicron yet)

U.S. equities: We notice some signs of liquidity tightening, as the MEME stocks mania have gone away: The Gamestop, AMC, and Blackberry are all 60%+ lower than their 52-week high. In addition, the ARKK EFT is below \$100, lower than the average investor buy price (i.e., \$111). We also noticed that Tesla had experienced a significant correction, in line with last month's FCO report.

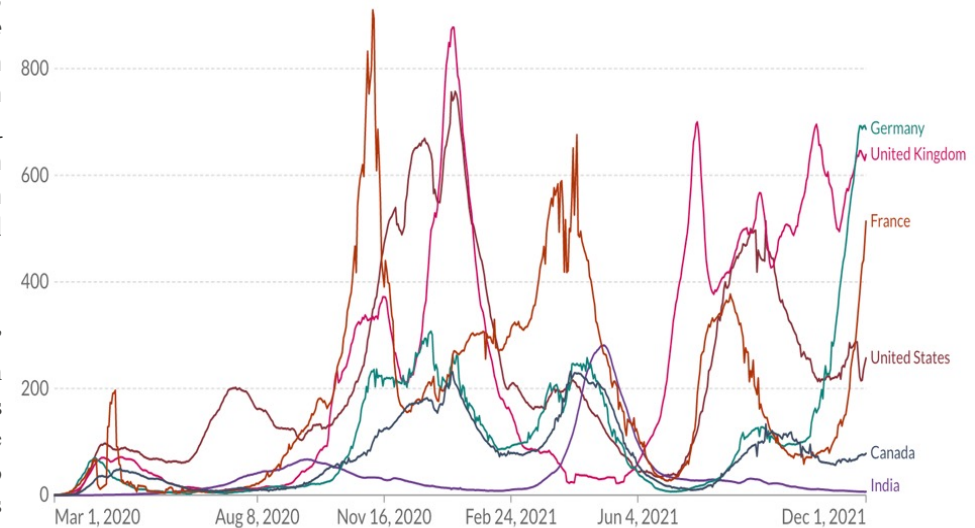
Emerging Market: In our Oct. FCO market outlook, we formulated “Three ‘Nobel-prize’ level questions related to China,” indicating that the Chinese property market is experiencing a severe regime change. We expect the real estate sector to slow down, but we were still shocked when the developers' November revenue data came out. The November apartment selling data (YoY) plummeted significantly (some have 50% drops). Also, in line with our August FCO report, many listed technology giants will have big redundancies by the year-end due to the regulatory interventions in the technology sector. In general, we still reckon that the combination of (i) the slowdown of the property sector, (ii) the regulations of and interventions on the technology sector, (iii) the sporadic outbreaks of the COVID-19 variant, and (iv) the energy crunch will shadow the Chinese Q4 economic outlook. We also expect the Chinese government to implement significant stimulations early next year to support the economy. Otherwise, China will have a high probability for a recession in 2022.

Commodities: The recent drop of the Iron Ore price (50%+ decrease, compared with August high) has hammered the Australian Dollar into a 12 months low. The coal price is now 40% lower than the year high (in Oct.) due to the decisive intervention from China's National Development and Reform Commission (NDRC). The copper price remains at the same price level. Lithium, mainly used in automobile batteries, enjoys an all-time high, as Electric vehicle deliveries in China are expected to double compared with last year's level to around 3 million units. Besides, the prices of food commodities are still increasing, which contributes to inflation.

FCO Market Outlook

Daily new confirmed COVID-19 cases per million people

7-day rolling average. Due to limited testing, the number of confirmed cases is lower than the true number of infections.



Source: Johns Hopkins University CSSE COVID-19 Data

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

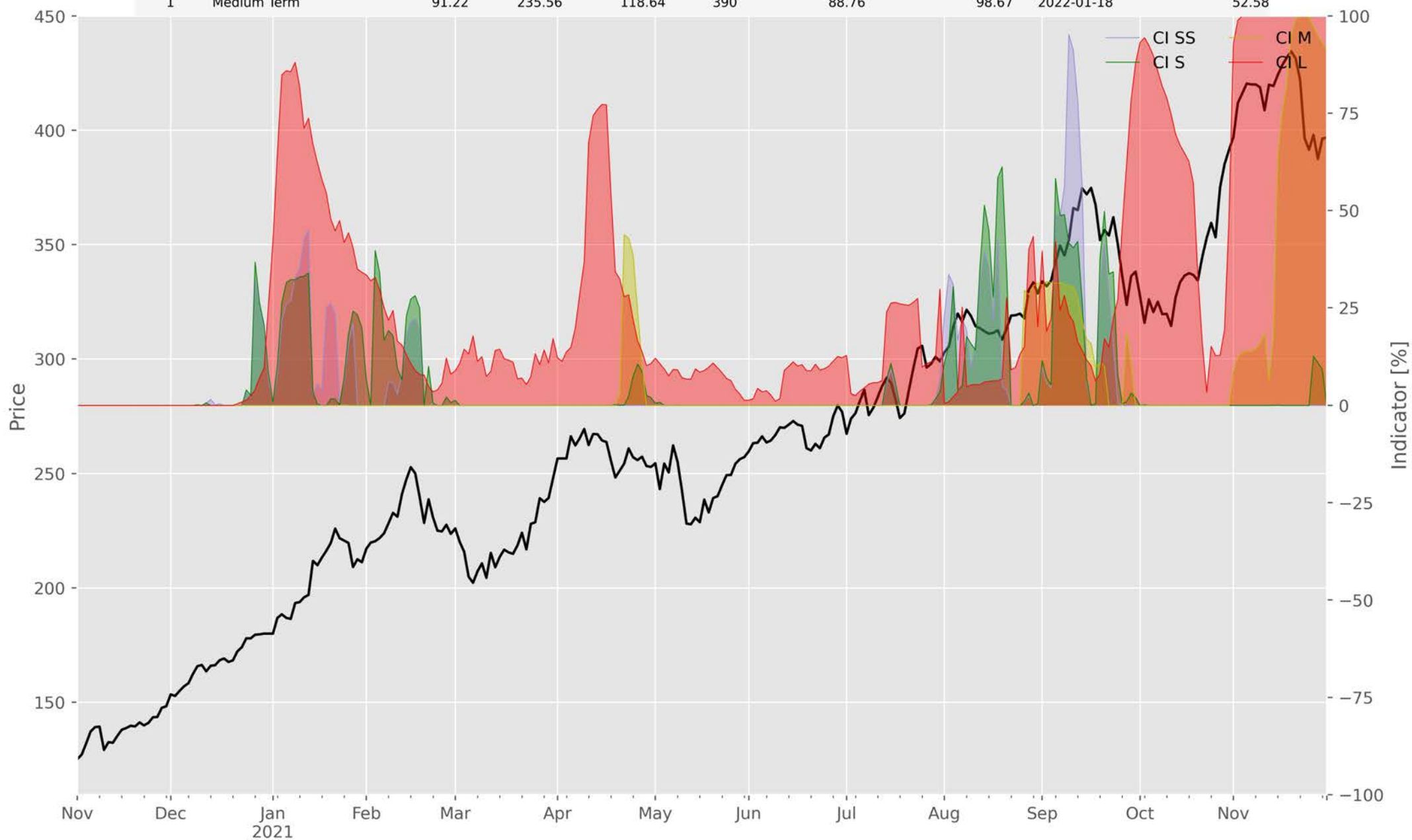
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average (<i>ci</i> , <i>bg</i> , <i>bp</i>)	Critical Time \hat{t}_c	Scenario Probability [%]
1	Medium Term	71.95	34.31	22.32	369	83.66	51.21	2022-02-10	74.07



Single Stocks

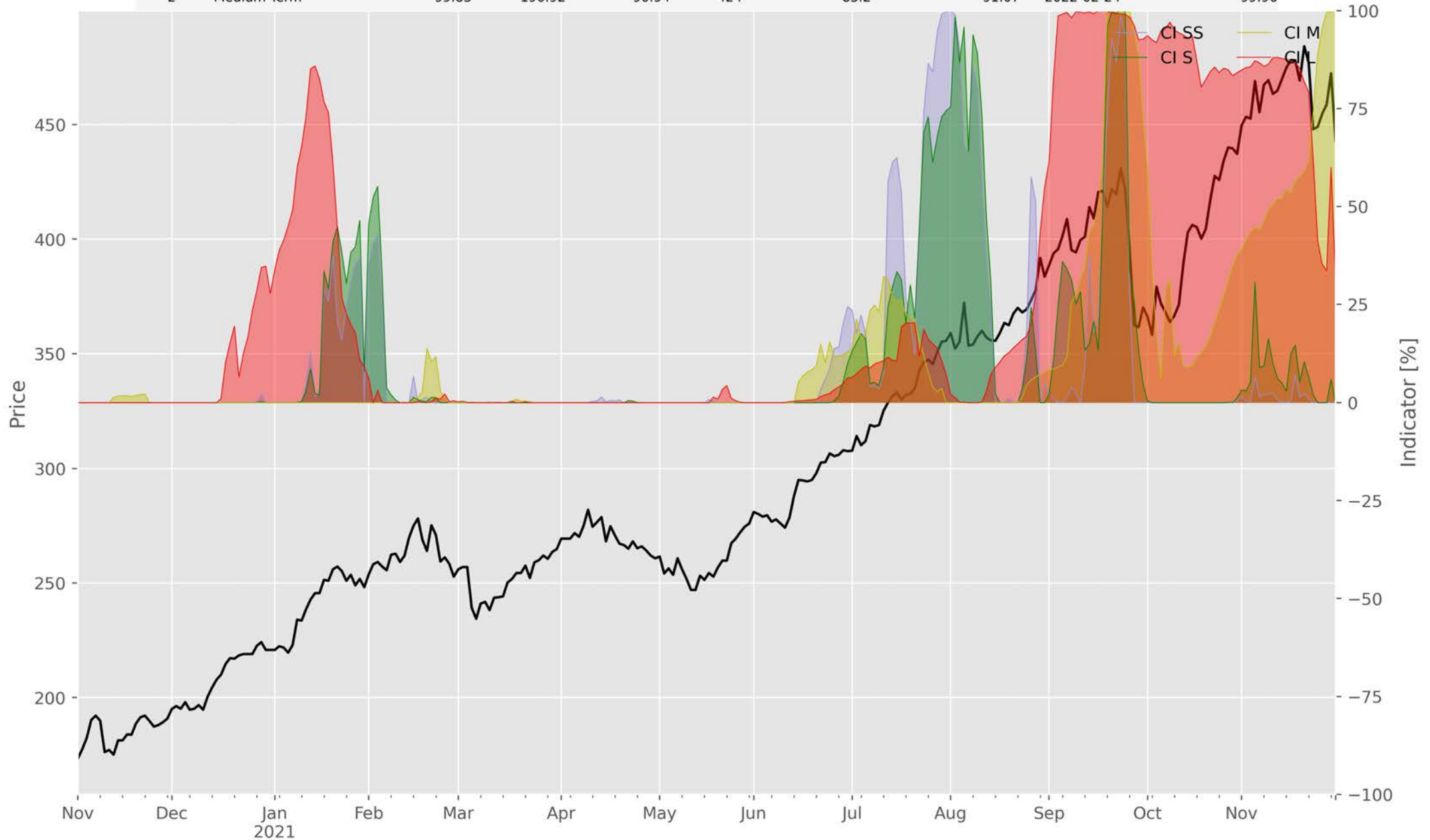
Asm International

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	Medium Term	91.22	235.56	118.64	390	88.76	98.67	2022-01-18	52.58



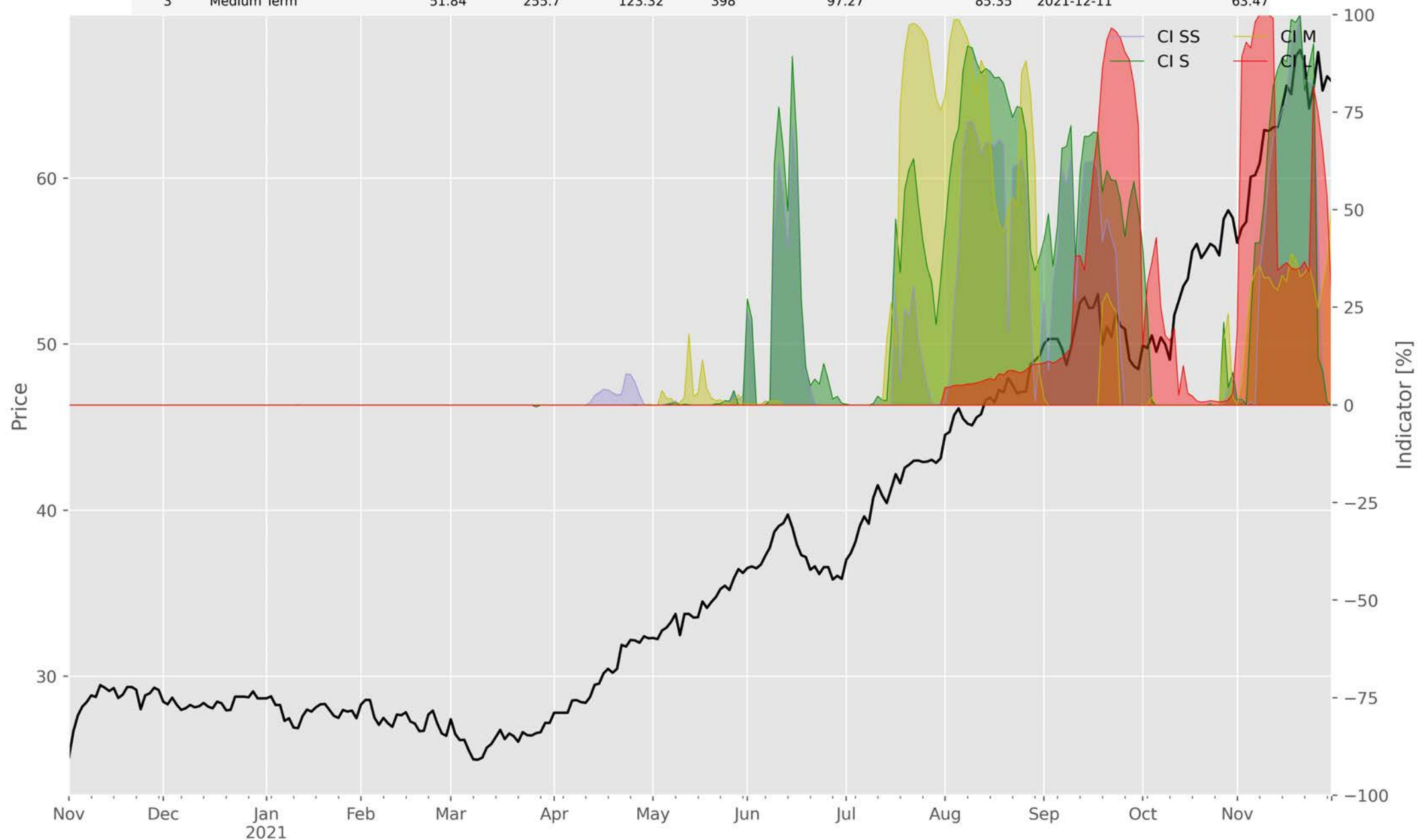
Vat Group

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 [%]
2	Medium Term	99.83	196.92	90.94	424	83.2	91.07	2022-02-24	99.96



Samhallsbyggnadsbol Aget I Norden B

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	Medium Term	51.84	255.7	123.32	398	97.27	85.35	2021-12-11	63.47



Pz Cussons

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	Short Term	91.49	-25.33	-50.06	106	99.39	76.93	2021-12-01	100



Grifols Ord CI A

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	Super Short	44.58	-27.45	-78.26	53	86.9	67.18	2021-12-08	52.08



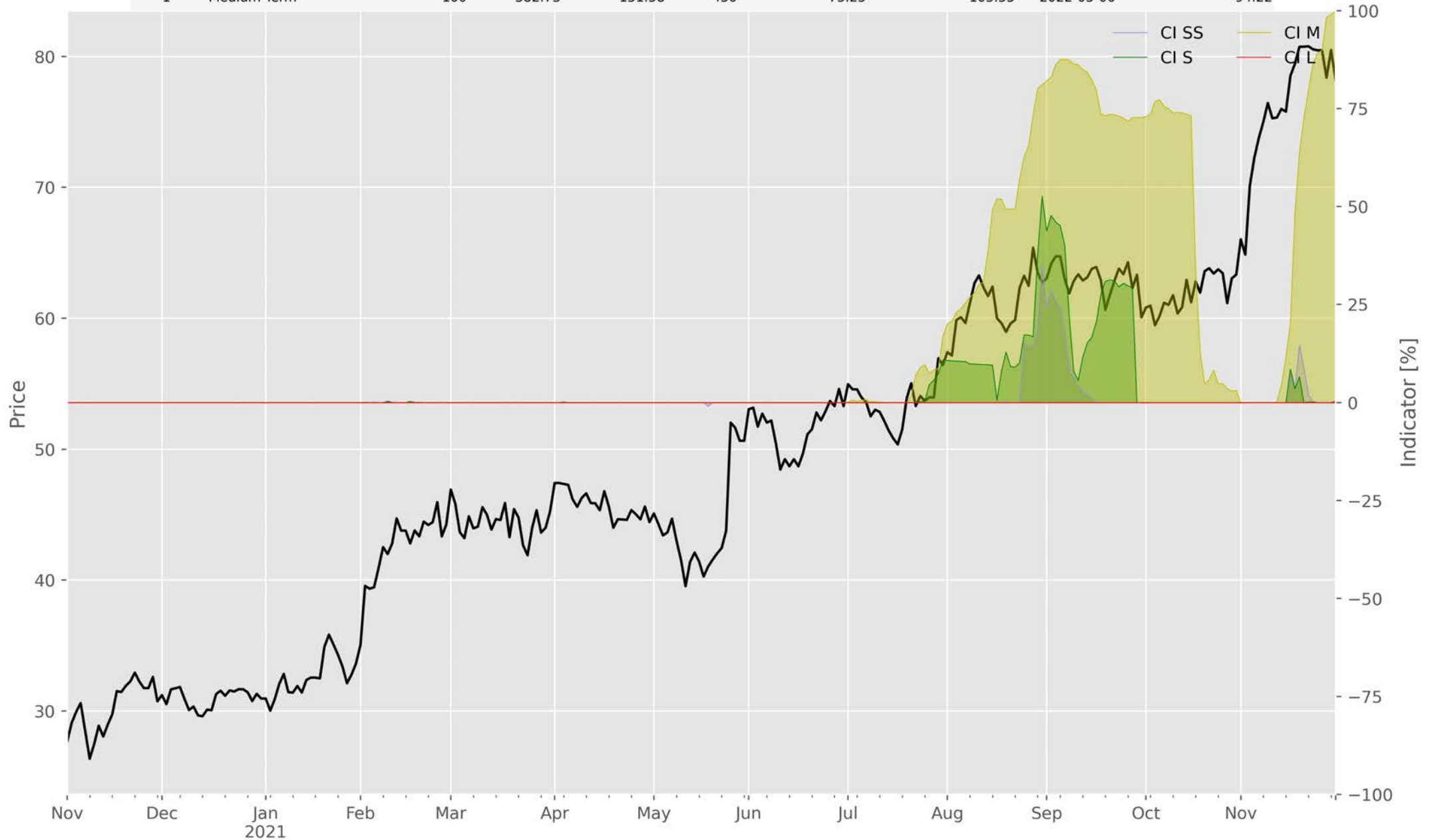
Pharma Mar

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	40.86	-27.04	-71.11	64	76.51	60.57	2021-12-20	99.99



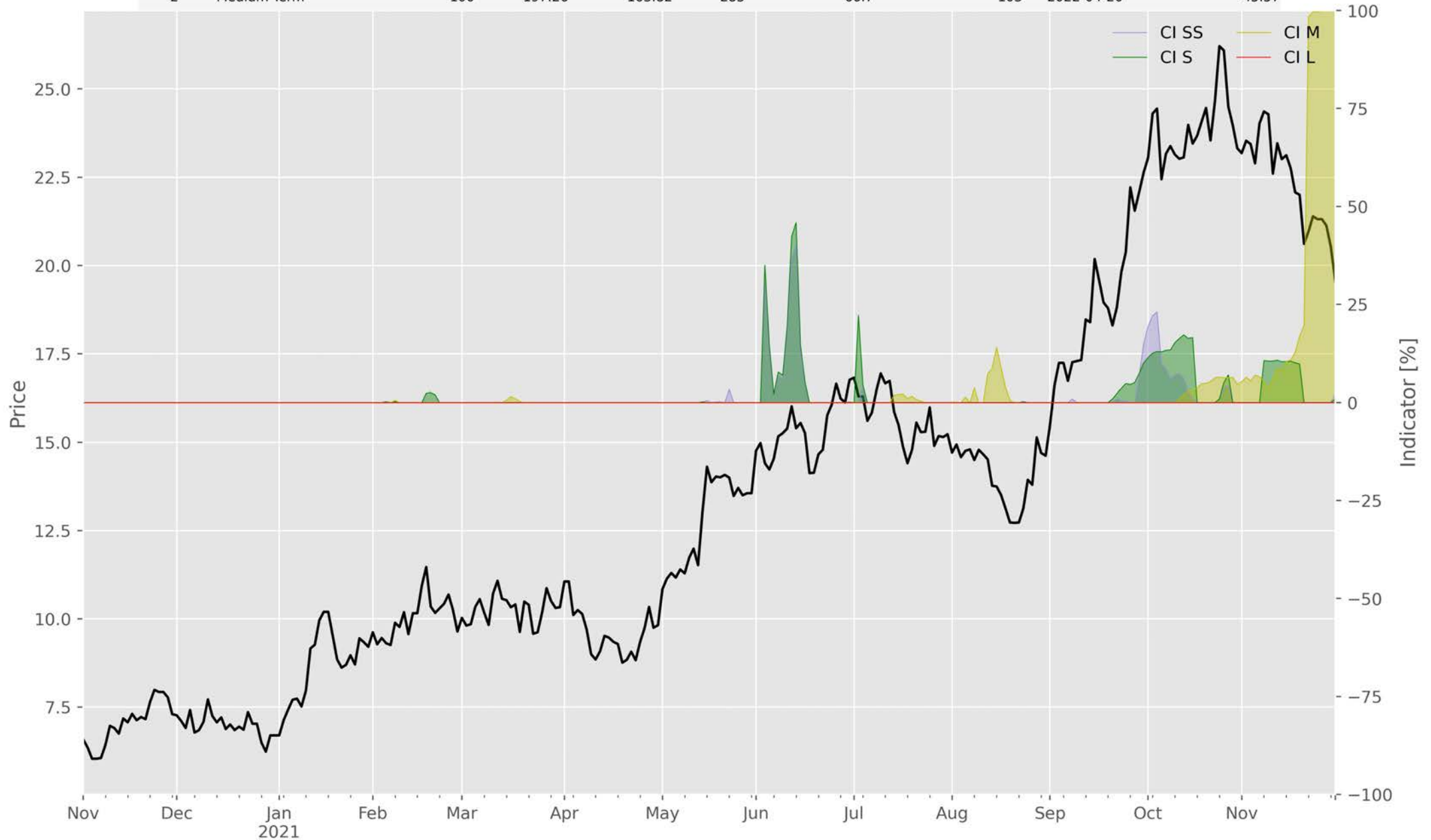
Skyline Champion

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	100	382.73	151.58	430	73.25	103.55	2022-05-06	94.22



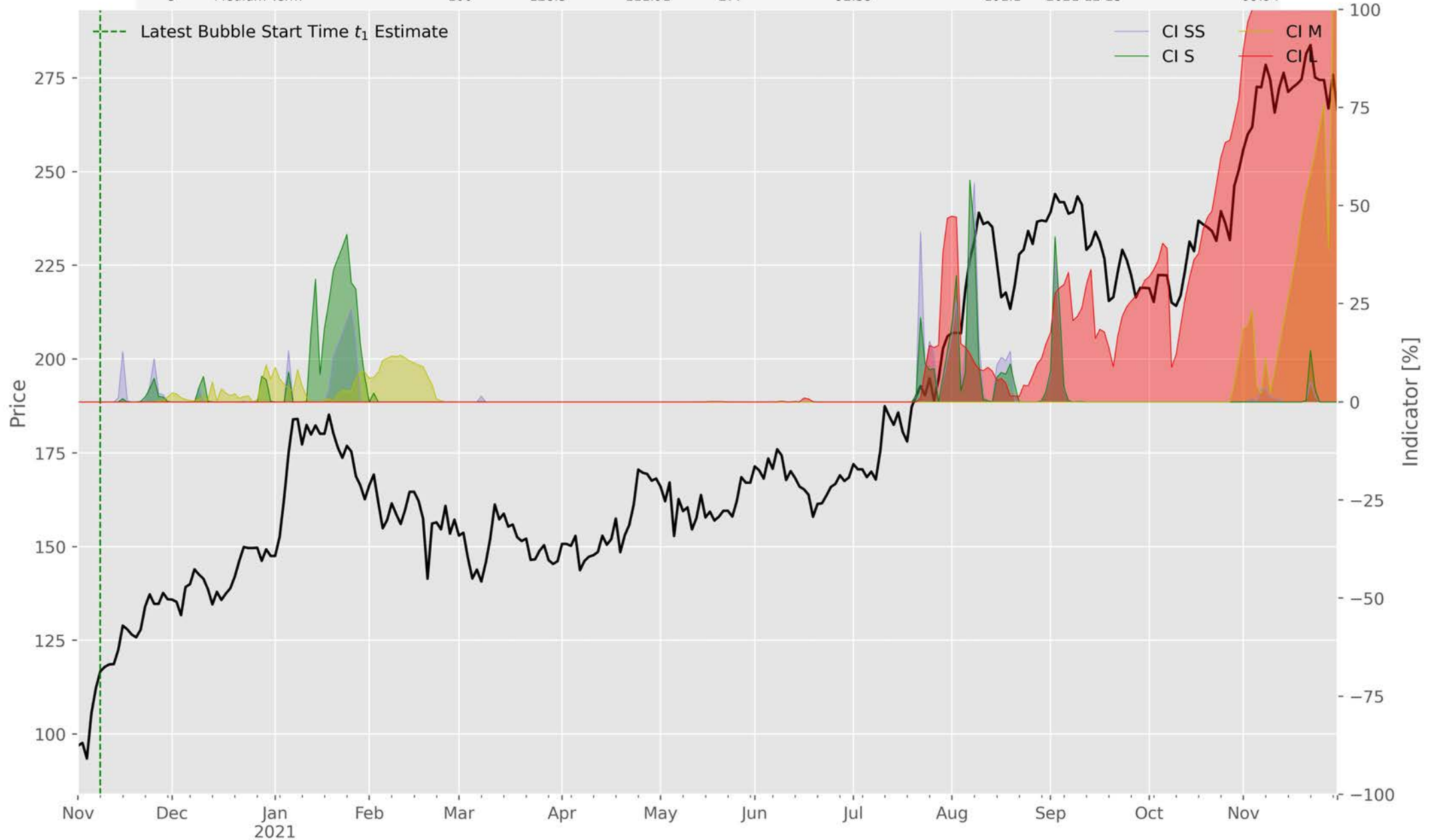
Range Res.

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	197.26	163.82	283	66.7	103	2022-04-20	45.57



Albemarle

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	Medium Term	100	128.3	111.91	277	92.33	101.1	2021-12-23	99.94



Twitter

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	90.79	-32.09	-76.67	67	99.54	88.49	2021-11-30	99.98



International Paper

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	54.05	-20	-57.34	66	94.19	66.34	2021-12-04	99.99



O I Glass

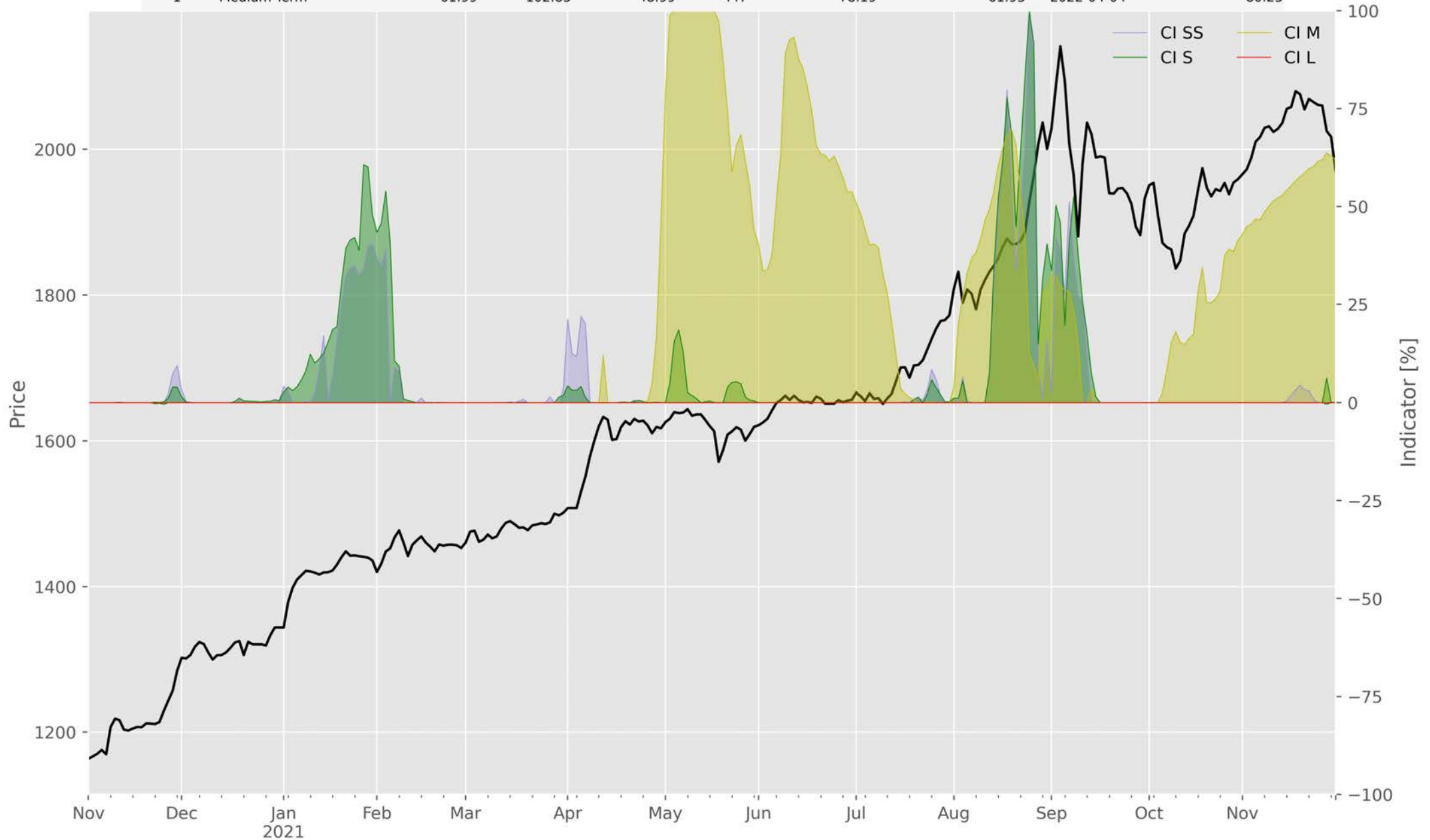
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		ci [%]	bs [%]	bg [%]	[days]	bp [%]	(ci, bg, bp)	\hat{t}_c	[%]
3	Super Short	41.11	-27.93	-71.91	65	98.27	66.23	2021-12-01	99.99



Equity Indices

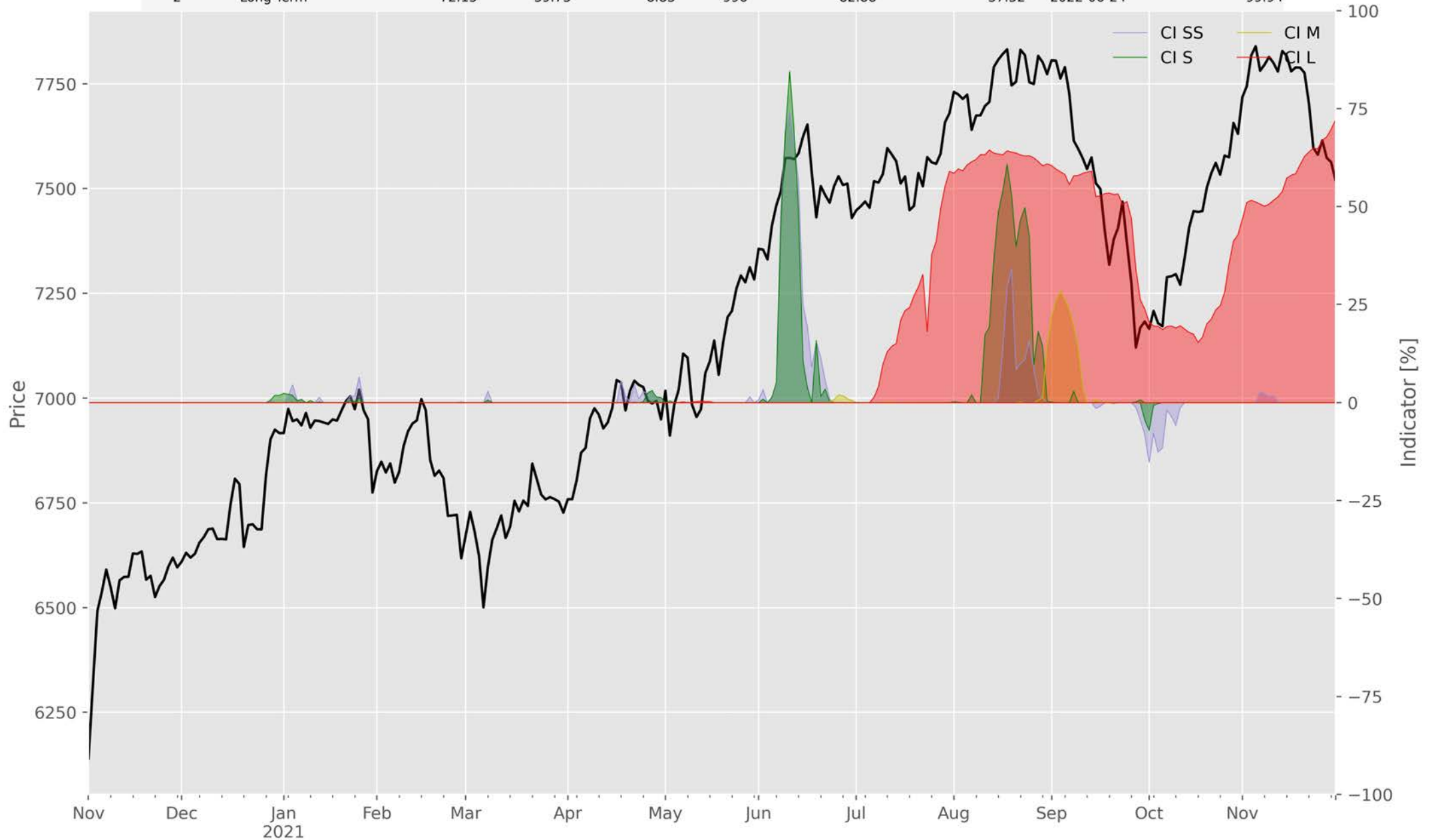
Omx Tallinn (Omxt)

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	61.99	102.85	48.99	447	78.19	61.93	2022-04-04	80.25



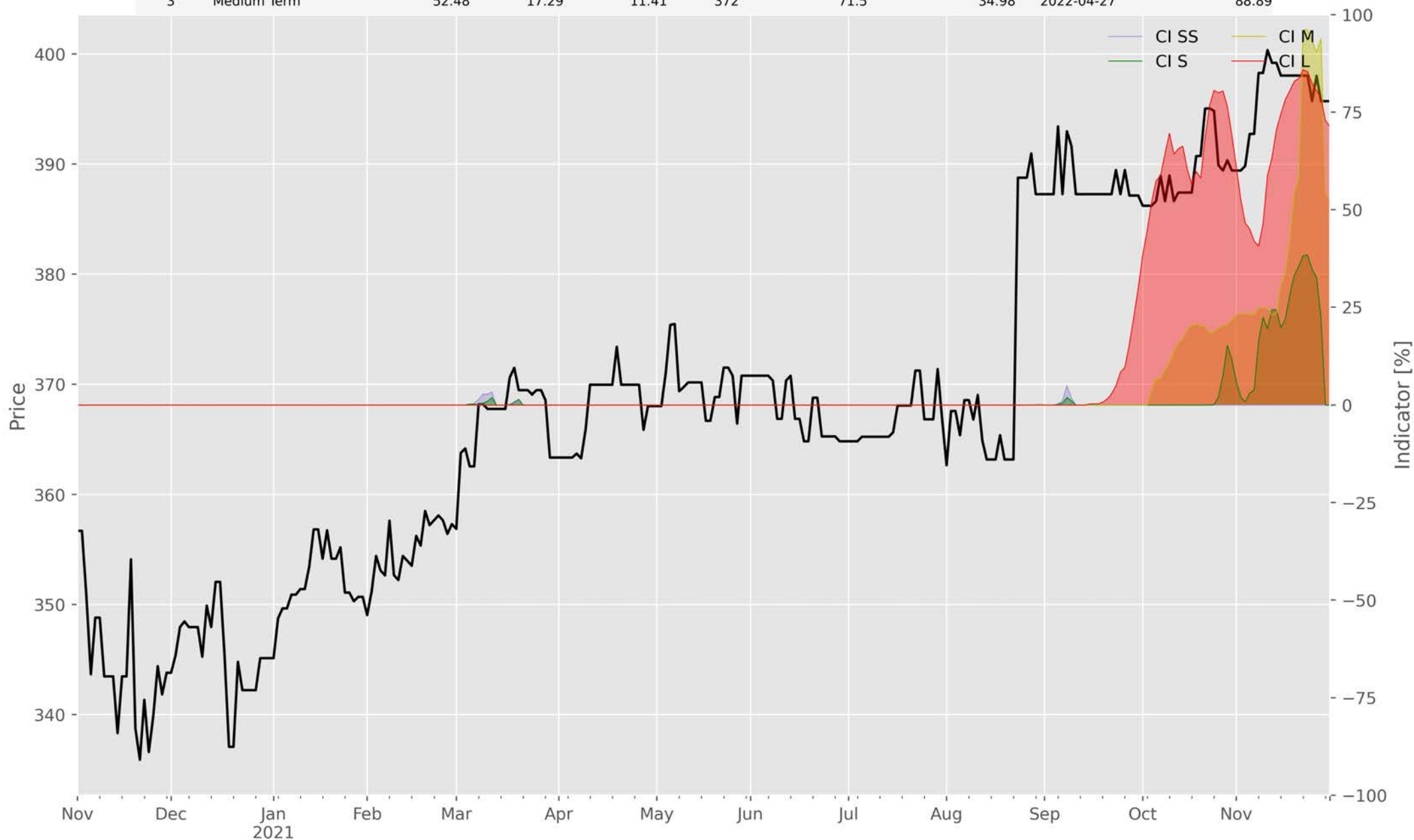
Msci Switzerland U\$

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	72.15	39.73	8.83	996	82.88	37.52	2022-06-24	99.94



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	52.48	17.29	11.41	372	71.5	34.98	2022-04-27	88.89



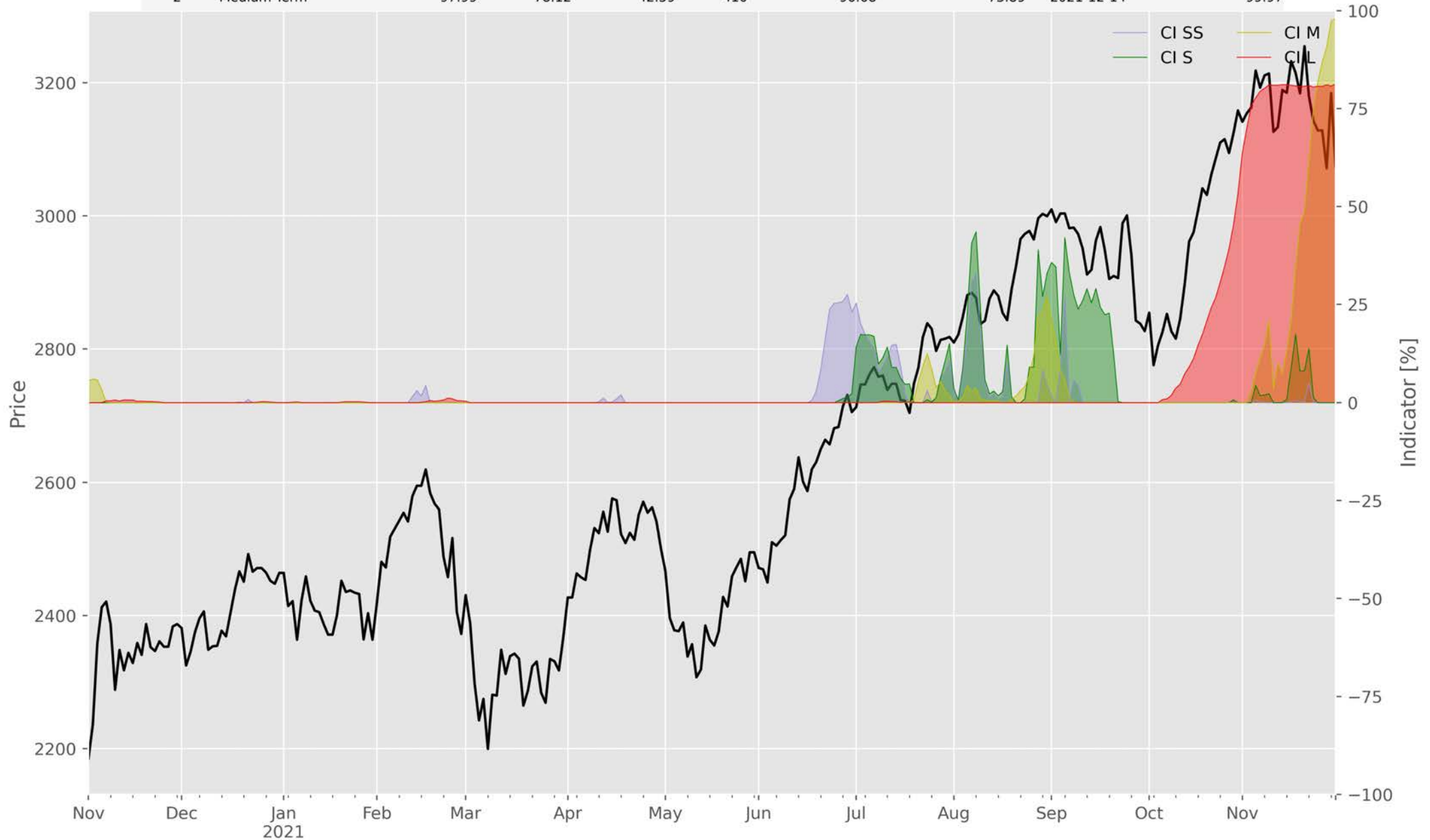
S&P500 Application Software

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	93.31	82.74	44.72	411	96.9	73.95	2021-12-13	99.97



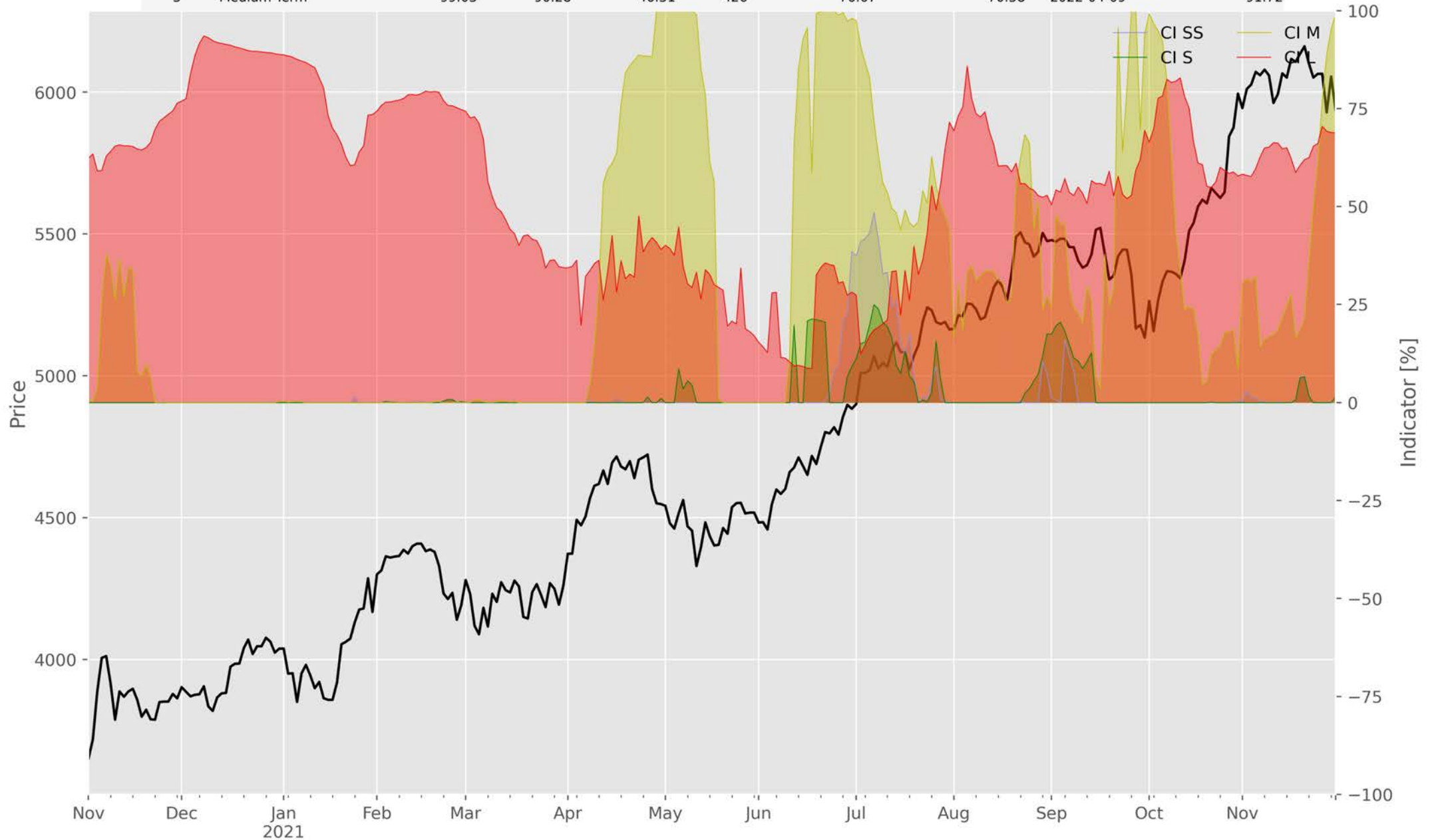
S&P1500 Application Software

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	97.99	78.12	42.59	410	96.68	73.89	2021-12-14	99.97



S&P500 Systems Software

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	Medium Term	99.03	90.28	46.31	426	76.67	70.58	2022-04-09	91.72



S&P1500 Telecom Serv

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	22.86	-13.71	-40.75	71	99.9	45.32	2021-11-30	99.99



S&P1500 Diversified Telecom Serv

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	21.52	-12.63	-36.46	75	99.36	42.72	2021-11-30	55.72



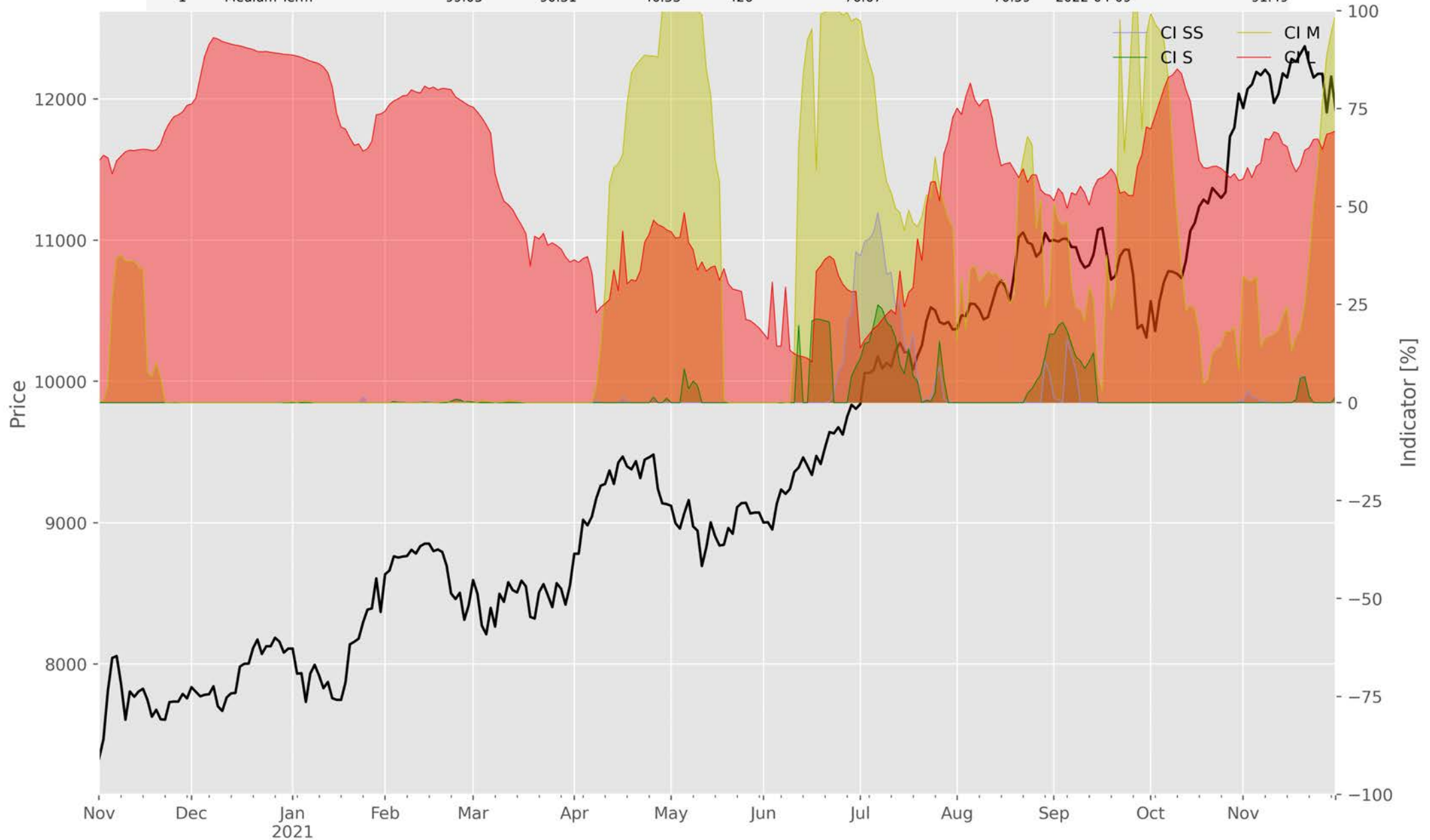
S&P500 Integrated Telecom Serv

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	40.91	-19.18	-17.85	273	97.9	41.5	2021-12-06	100



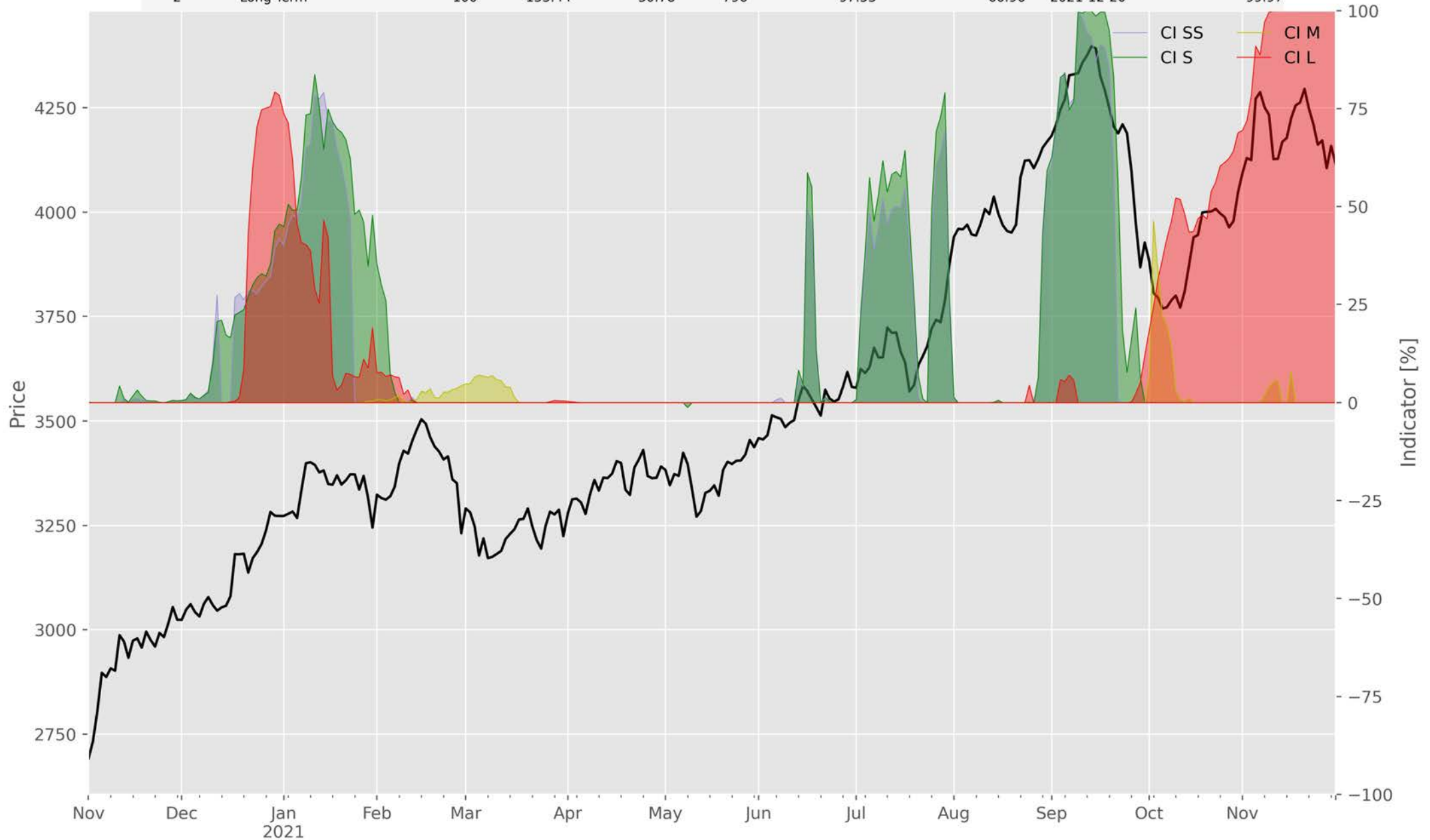
S&P Global 1200 Systems Software

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	99.03	90.31	46.33	426	76.67	70.59	2022-04-09	91.49



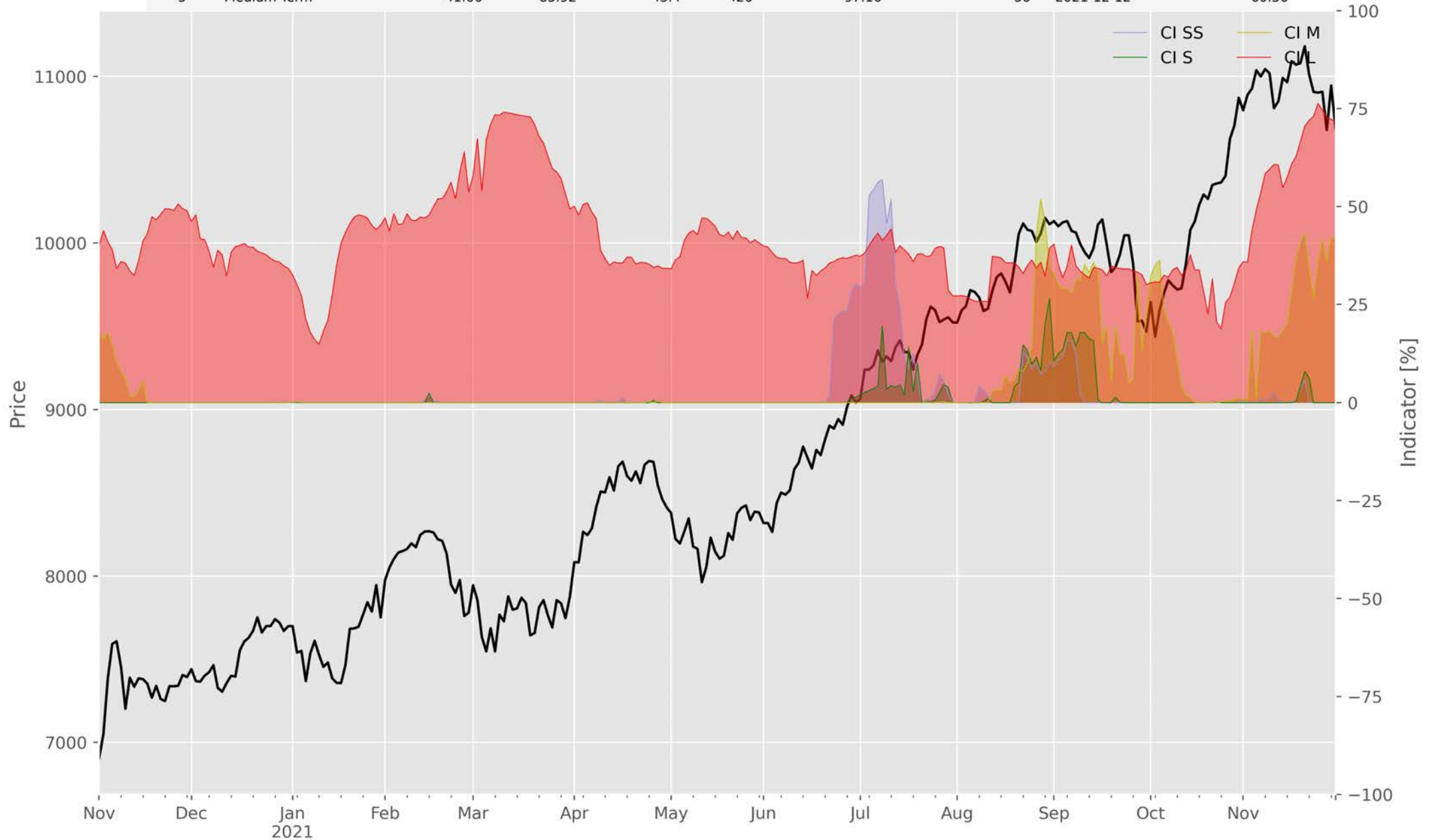
S&P Global 1200 Elec Eq Mfg

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	100	133.44	30.78	796	97.53	66.96	2021-12-20	99.97



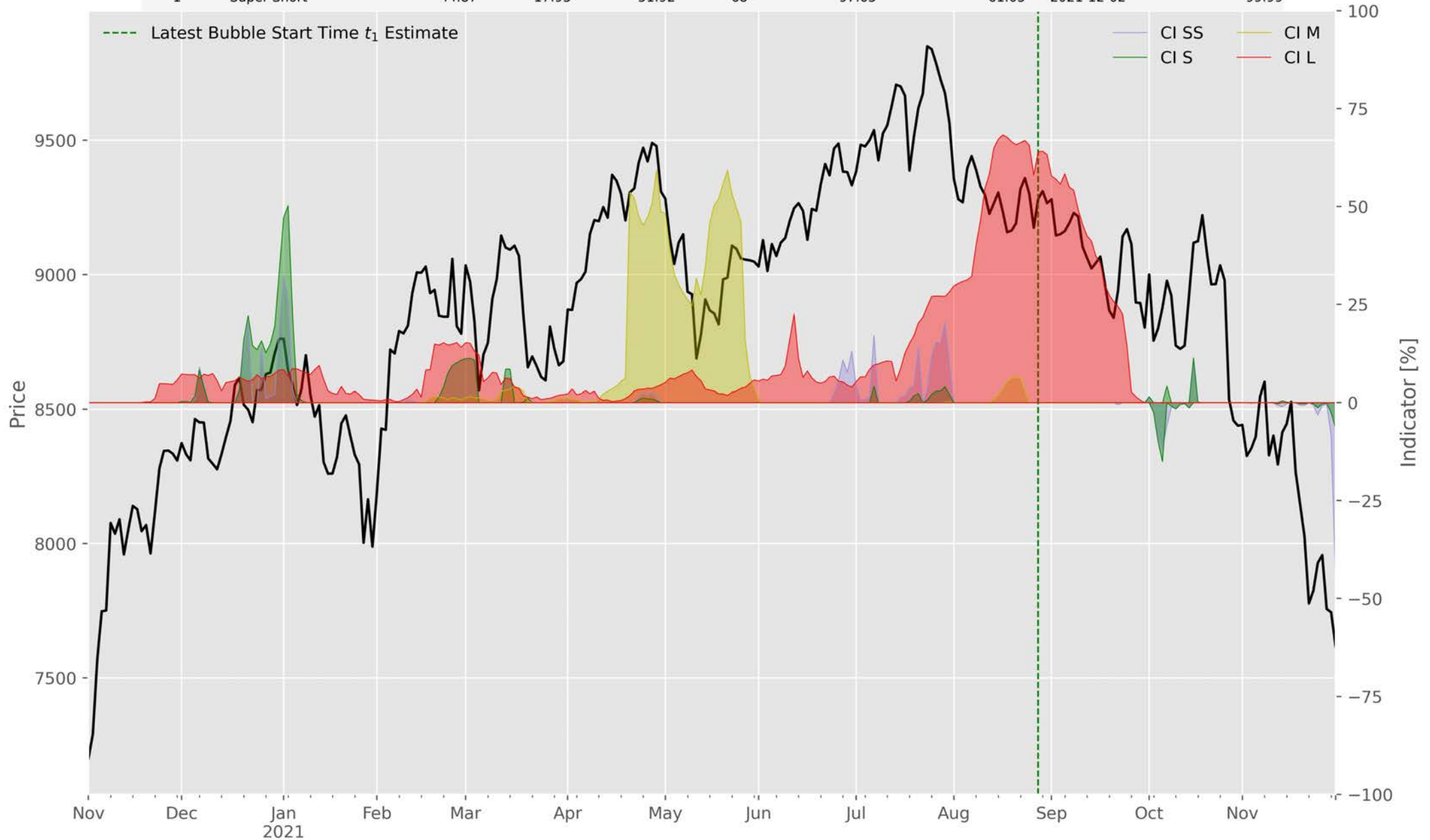
S&P Global 1200 Software

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	Medium Term	41.66	83.92	43.4	426	97.16	56	2021-12-12	60.36



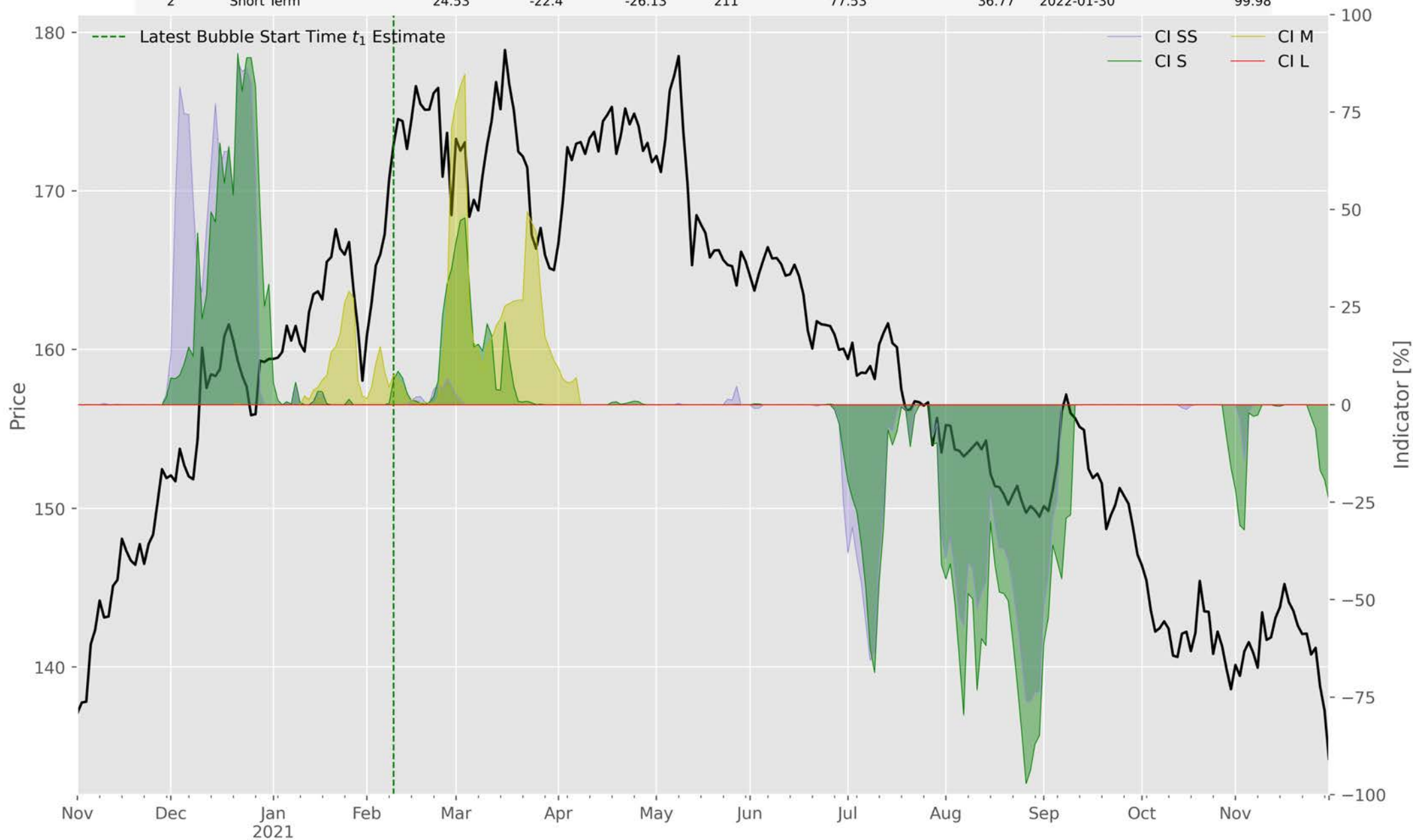
S&P Global 1200 Data Pro&Out Svs

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	Super Short	44.87	-17.93	-51.92	68	97.65	61.05	2021-12-02	99.99



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	24.53	-22.4	-26.13	211	77.53	36.77	2022-01-30	99.98



S&P Global 1200 W/L Telecom Svs

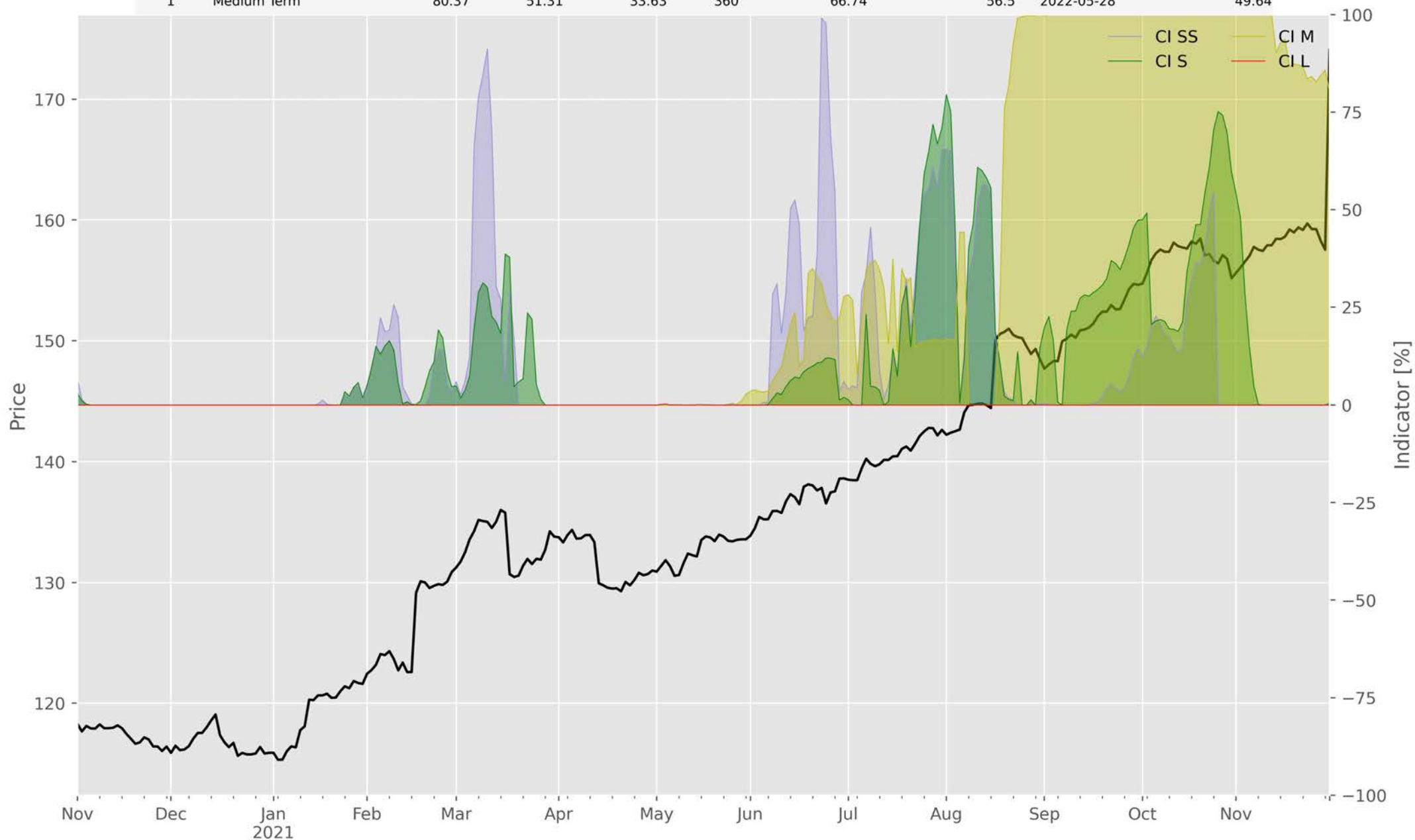
Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time \hat{t}_c	Scenario Probability [%]
3	Short Term	23.35	-21.6	-25.12	212	78.45	35.84	2022-01-27	99.98



Forex

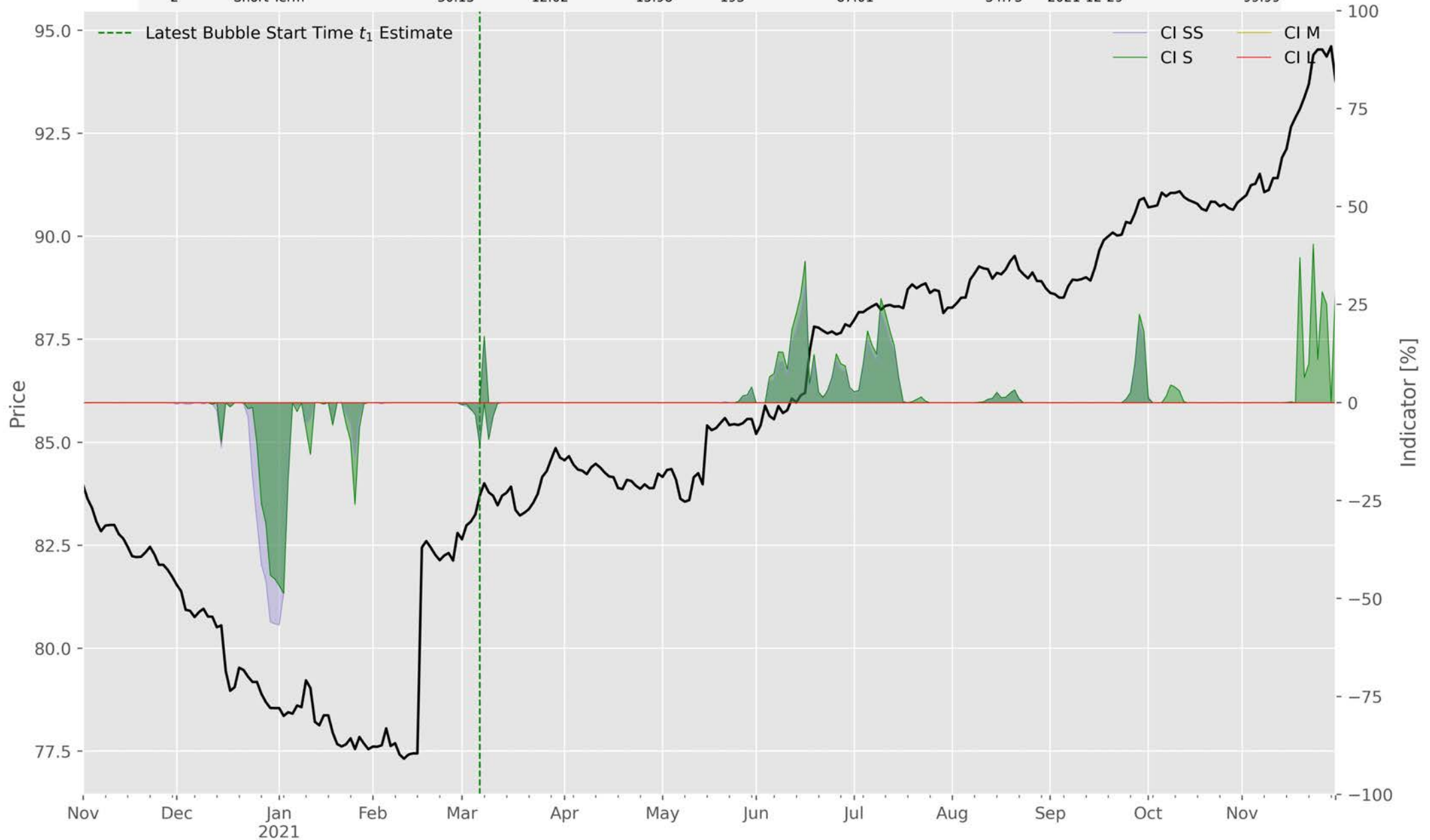
Jpm Ukraine Reer Ppi (2010=100)

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	[%]
1	Medium Term	80.37	51.31	33.63	360	66.74	56.5	2022-05-28	49.64



Jpm Egypt 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	Short Term	30.13	12.02	15.98	193	87.01	34.73	2021-12-29	99.99



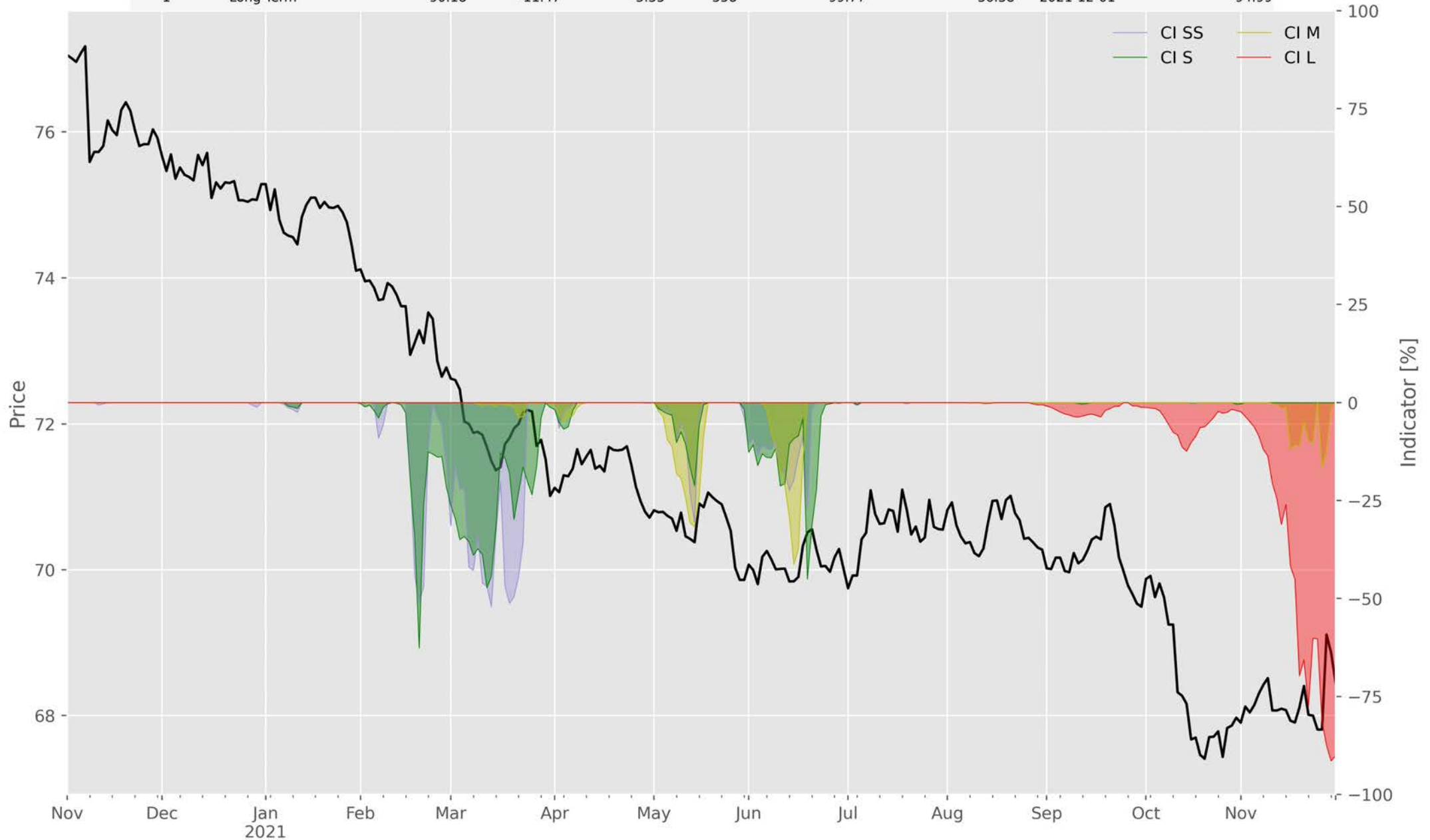
Jpm Argentina Reer Cpi (2010=100)

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, bg, bp</i>)	Critical Time \hat{t}_c	Scenario Probability [%]
3	Super Short	17.32	15.34	33.04	126	67.01	33.72	2022-01-31	100



Jpm Japan Reer Cpi (2010=100)

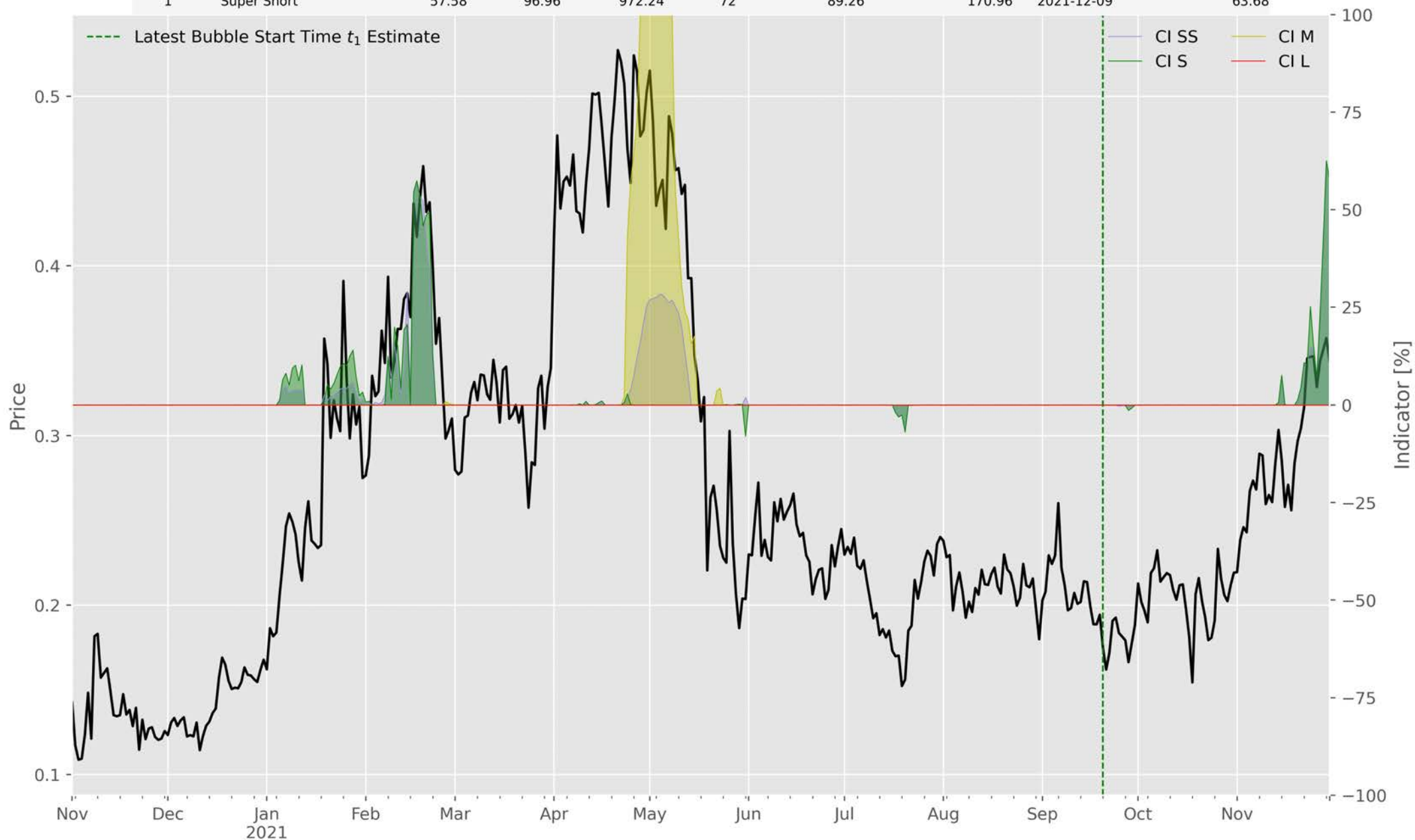
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average (<i>ci</i> , <i>bg</i> , <i>bp</i>)	Critical Time \hat{t}_c	Scenario Probability [%]
1	Long Term	90.18	-11.47	-5.35	558	99.77	36.38	2021-12-01	94.99



CryptoX

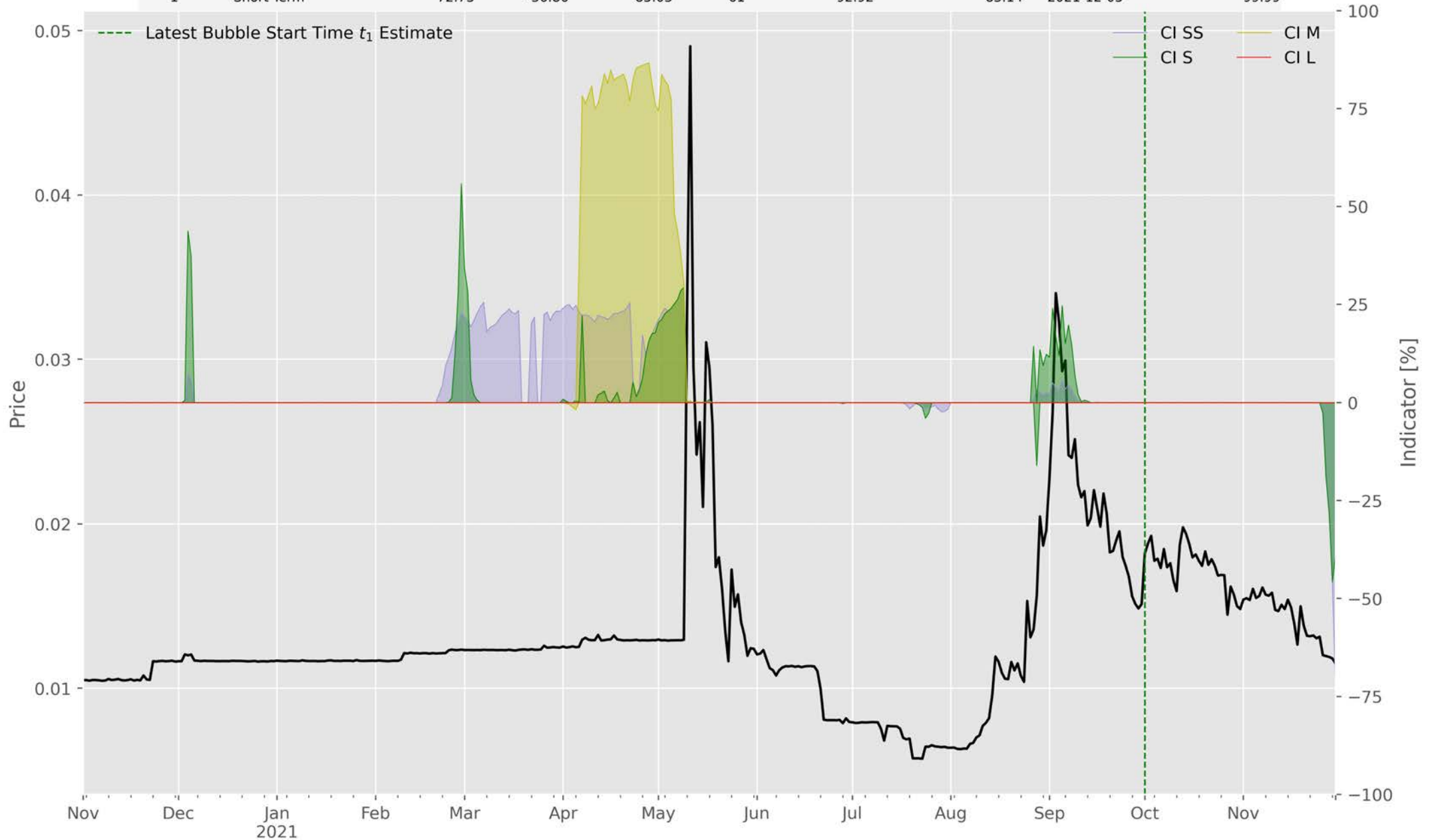
Quantum Resistant Ledger/USD

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	57.58	96.96	972.24	72	89.26	170.96	2021-12-09	63.68



Revain/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 \tilde{t}_c	Scenario Probability [%]
1	Short Term	72.73	-36.86	-85.03	61	92.92	83.14	2021-12-05	99.99

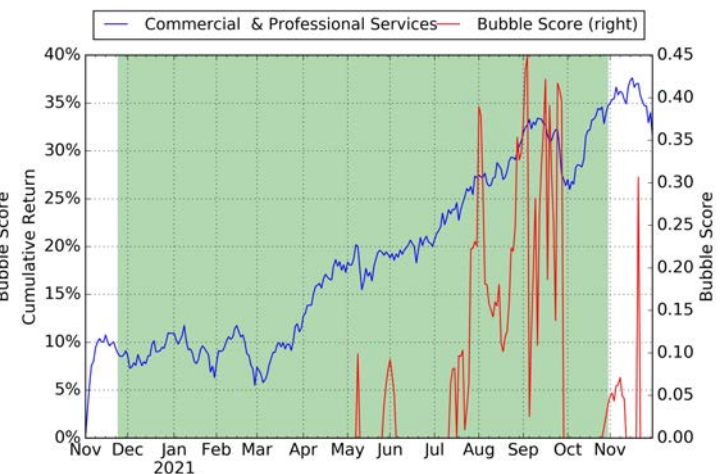
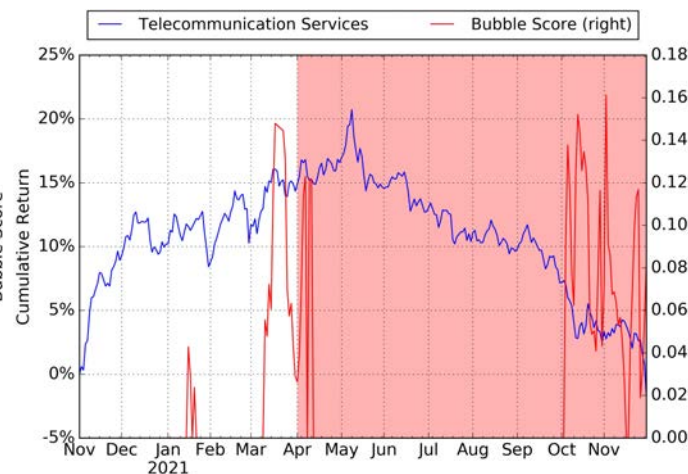
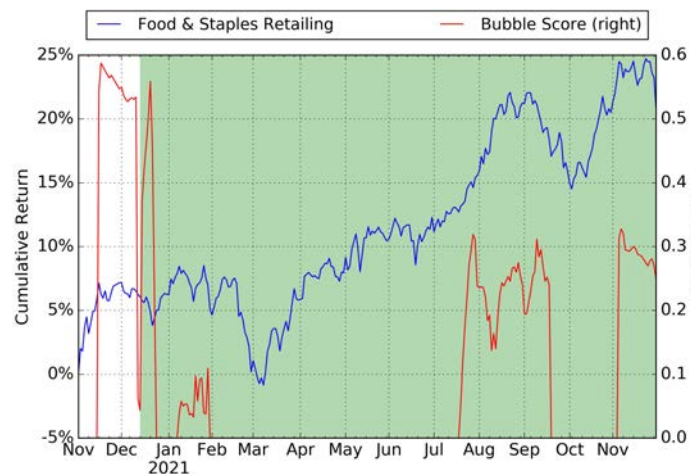


Sectors

GICS Industry Group Name	Yearly Return		Bubble Size		Bubble Score		Value Score		Growth Score	
	Dec 1st	Nov 1st	Dec 1st	Nov 1st	Dec 1st	Nov 1st	Dec 1st	Nov 1st	Dec 1st	Nov 1st
Pharmaceuticals, Biotechnology & Life Sciences	11.6%	15.9%	0.0%	0.0%	0.0%	0.0%	62.2%	62.3%	56.8%	56.8%
Consumer Services	3.5%	18.2%	0.0%	0.0%	0.0%	0.0%	25.6%	26.0%	59.0%	59.6%
Retailing	16.7%	17.4%	0.0%	0.0%	0.0%	0.0%	18.7%	17.9%	46.8%	45.5%
Transportation	9.2%	18.4%	0.0%	0.0%	0.0%	0.0%	44.1%	43.3%	55.7%	55.4%
Consumer Durables & Apparel	18.8%	27.0%	0.0%	0.0%	0.0%	0.0%	33.0%	33.5%	49.3%	48.6%
Semiconductors & Semiconductor Equipment	53.7%	48.5%	0.0%	0.0%	0.0%	0.0%	57.5%	56.2%	43.4%	42.3%
Technology Hardware & Equipment	31.9%	27.6%	0.0%	0.0%	0.0%	0.0%	78.1%	77.3%	56.4%	55.7%
Automobiles & Components	43.7%	75.2%	0.0%	0.0%	0.0%	0.0%	49.2%	52.8%	45.1%	42.3%
Telecommunication Services	-12.1%	-3.9%	-14.6%	-10.7%	-17.8%	-4.7%	60.2%	60.4%	42.7%	43.0%
Energy	26.6%	61.1%	0.0%	0.0%	0.0%	0.0%	50.4%	50.0%	69.8%	70.1%
Software & Services	23.3%	33.1%	0.0%	0.0%	0.0%	0.0%	37.1%	38.2%	51.1%	50.8%
Materials	8.9%	18.4%	0.0%	0.0%	0.0%	0.0%	49.7%	49.1%	50.8%	51.2%
Health Care Equipment & Services	14.3%	19.9%	0.0%	0.0%	0.0%	0.0%	49.3%	48.4%	51.6%	52.7%
Capital Goods	9.7%	20.4%	0.0%	0.0%	0.0%	0.0%	48.4%	48.7%	49.6%	49.4%
Media & Entertainment	20.6%	34.7%	0.0%	0.0%	0.0%	0.0%	27.5%	27.6%	33.7%	32.2%
Commercial & Professional Services	22.0%	22.4%	0.0%	23.7%	0.0%	3.9%	31.2%	30.1%	53.1%	52.7%
Food & Staples Retailing	13.9%	14.8%	13.9%	0.0%	24.9%	0.0%	38.9%	37.7%	61.1%	60.8%
Household & Personal Products	-1.2%	-3.6%	0.0%	0.0%	0.0%	0.0%	29.3%	27.9%	54.2%	53.6%
Food, Beverage & Tobacco	2.7%	9.4%	0.0%	0.0%	0.0%	0.0%	49.2%	49.1%	56.7%	56.9%
Utilities	1.7%	1.4%	0.0%	0.0%	0.0%	0.0%	44.2%	44.5%	53.4%	53.6%
Insurance	12.4%	25.3%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Real Estate	19.4%	23.2%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Diversified Financials	30.9%	45.3%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Banks	25.6%	49.1%	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: *Food & Staples Retailing* (positive bubble) and *Telecommunication Services* (negative bubble). This means that the bubbles are not yet matured and there is a scenario in which they continue to develop.
- ▶ The industry group *Commercial & Professional Services* that was identified with a small negative bubble signal last month has experienced a correction after reaching a new high, with the disappearance of the bubble signals. This means that the index has ended its previous market regime.



Portfolio Construction & Performance

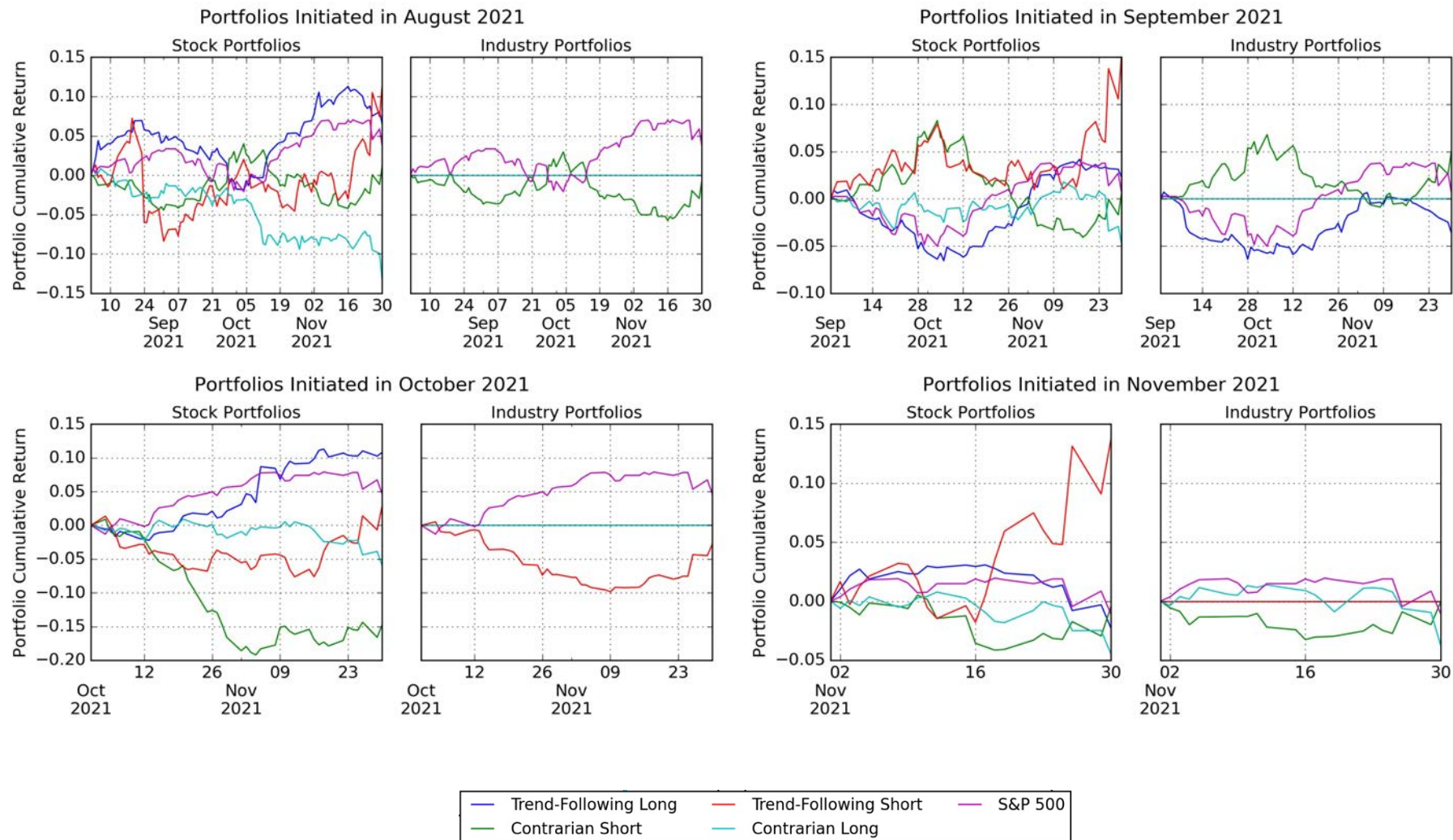
- ▶ Here we illustrate the methodology of the portfolio construction process based on the results of our previous analyses.
- ▶ For individual stocks that we identified in the 4 quadrants, we constructed 4 portfolios based on the 4 quadrants defined in the last report. Each portfolio consists of all 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.

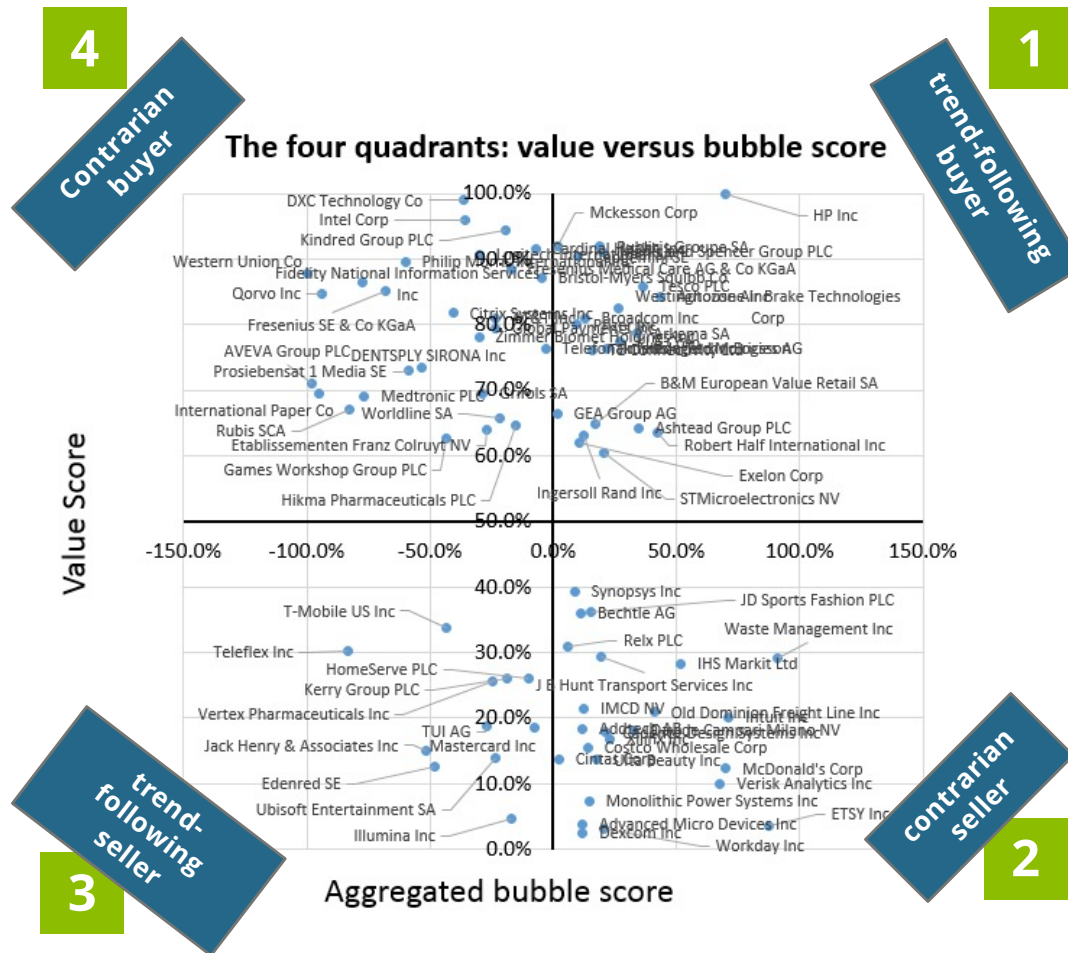
Portfolio Construction & Performance

- ▶ The market has been flat with recent drawdowns due to the new wave of COVID-19 in the US and Europe, while our portfolios seem to have difficulties in outperforming the market. 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.



Single Stocks

We can divide the stocks into four quadrants¹⁾



- **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. HP 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. JD Sports Fashion PLC
- **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. T-Mobile US Inc
- **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. Intel Corp

¹⁾ 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.

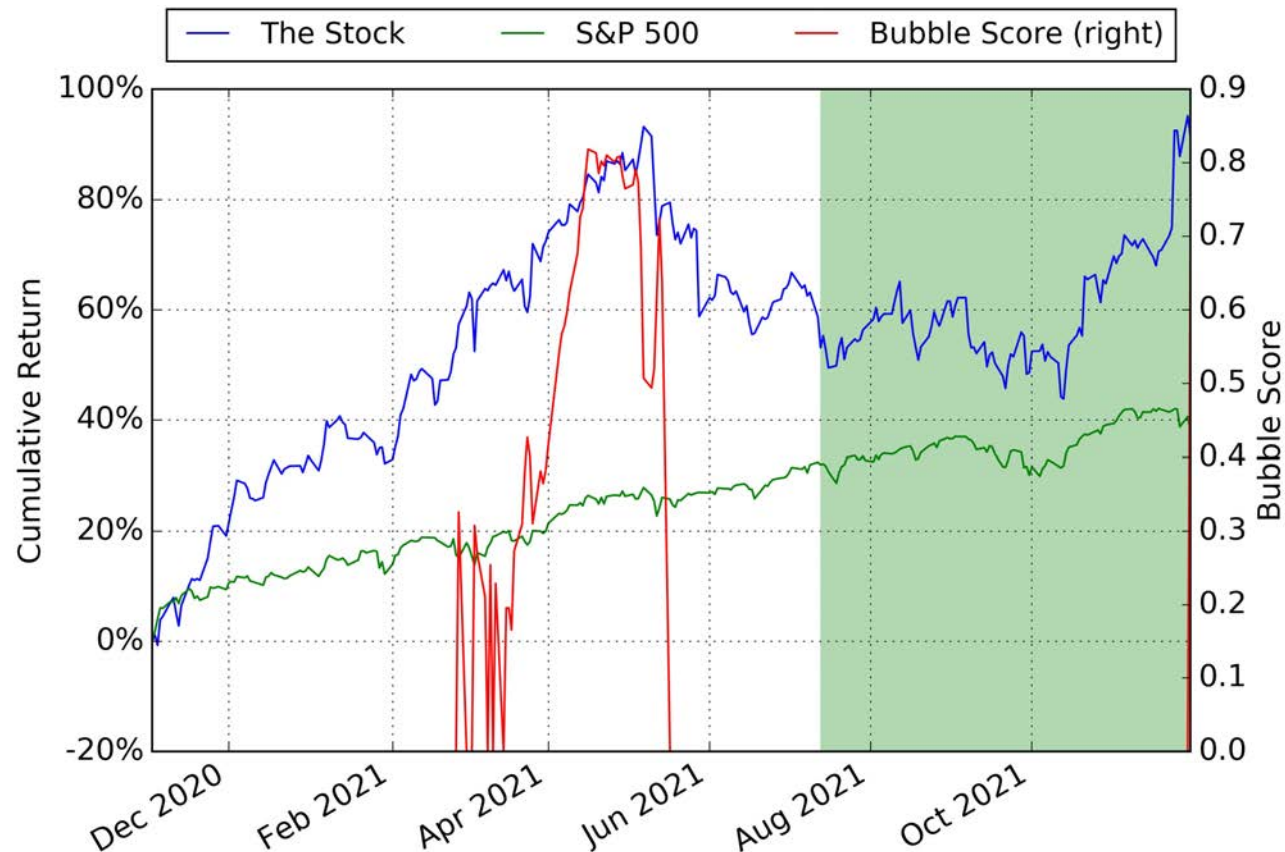
Single Stocks

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
HP Inc	United States of America	Technology Hardware & Equipment	52.1%	25.2%	Jul-21	69.8%	99.9%	23.6%
Ingersoll Rand Inc	United States of America	Capital Goods	29.7%	17.9%	Mar-21	12.4%	63.1%	26.7%
Westinghouse Air Brake Technologies Corp	United States of America	Capital Goods	16.0%	23.2%	Feb-21	26.5%	82.6%	79.1%
Exelon Corp	United States of America	Utilities	28.3%	17.0%	Apr-21	10.7%	61.9%	29.1%
Autozone Inc	United States of America	Retailing	59.9%	57.9%	Feb-21	43.6%	84.2%	14.2%
TE Connectivity Ltd	Switzerland	Technology Hardware & Equipment	29.5%	29.5%	Dec-20	15.7%	76.0%	39.6%
KLA Corp	United States of America	Semiconductors & Semiconductor Equipment	59.1%	33.9%	Feb-21	27.0%	77.3%	38.8%
Robert Half International Inc	United States of America	Commercial & Professional Services	72.1%	43.2%	Mar-21	42.5%	63.6%	41.2%
Broadcom Inc	United States of America	Semiconductors & Semiconductor Equipment	33.0%	30.3%	Dec-20	12.8%	81.0%	60.3%
Mckesson Corp	United States of America	Health Care Equipment & Services	21.3%	18.1%	Mar-21	1.8%	92.0%	61.5%
Pfizer Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	28.4%	38.8%	Dec-20	9.4%	80.0%	95.0%
Ashtead Group PLC	United Kingdom	Capital Goods	85.1%	21.2%	May-21	34.6%	64.2%	47.9%
B&M European Value Retail SA	Luxembourg	Retailing	34.3%	13.1%	Jul-21	17.1%	64.8%	16.1%
Capgemini SE	France	Software & Services	72.7%	72.7%	Dec-20	9.8%	90.3%	15.3%
Tesco PLC	United Kingdom	Food & Staples Retailing	22.4%	24.4%	Apr-21	36.5%	85.8%	77.6%
Publicis Groupe SA	France	Media & Entertainment	42.3%	5.1%	Apr-21	19.0%	91.9%	9.7%
Infineon Technologies AG	Germany	Semiconductors & Semiconductor Equipment	34.4%	27.3%	May-21	21.4%	76.4%	34.8%
Arkema SA	France	Materials	20.8%	16.7%	Mar-21	33.8%	78.6%	18.7%
GEA Group AG	Germany	Capital Goods	56.9%	31.7%	Mar-21	1.6%	66.5%	83.2%
Marks and Spencer Group PLC	United Kingdom	Retailing	65.2%	69.7%	Feb-21	20.1%	91.2%	88.8%
STMicroelectronics NV	Switzerland	Semiconductors & Semiconductor Equipment	43.9%	43.9%	Dec-20	20.5%	60.5%	30.4%

Single Stocks

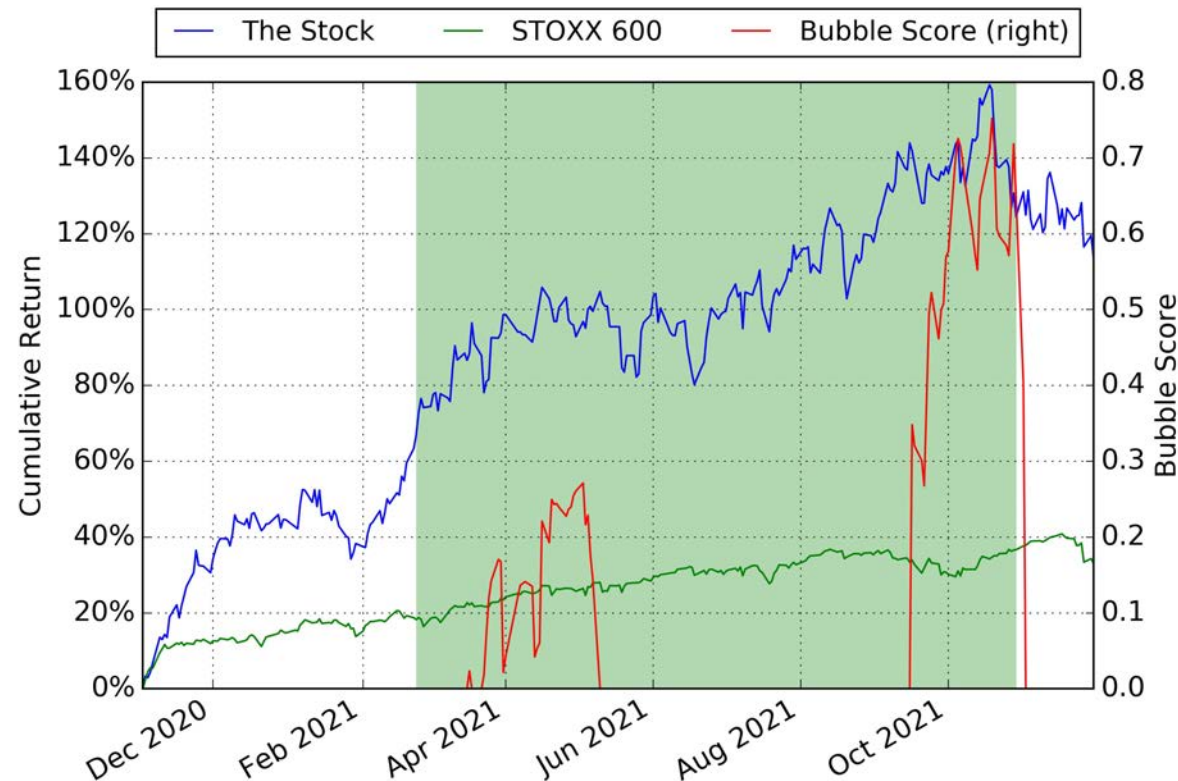
Quadrant 1 Stocks Current Month Example – HP Inc.



- 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 69.8% with a bubble size 25.2%. This signal is barely visible close to the vertical axis on the right, which means that it has just appeared.

Single Stocks

Quadrant 1 Stocks Last Month Example – Norsk Hydro ASA.



- The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (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 has entered a 25% drawdown after peaking in mid-October, which in agreement with our DS LPPLS bubble signal identified last month.

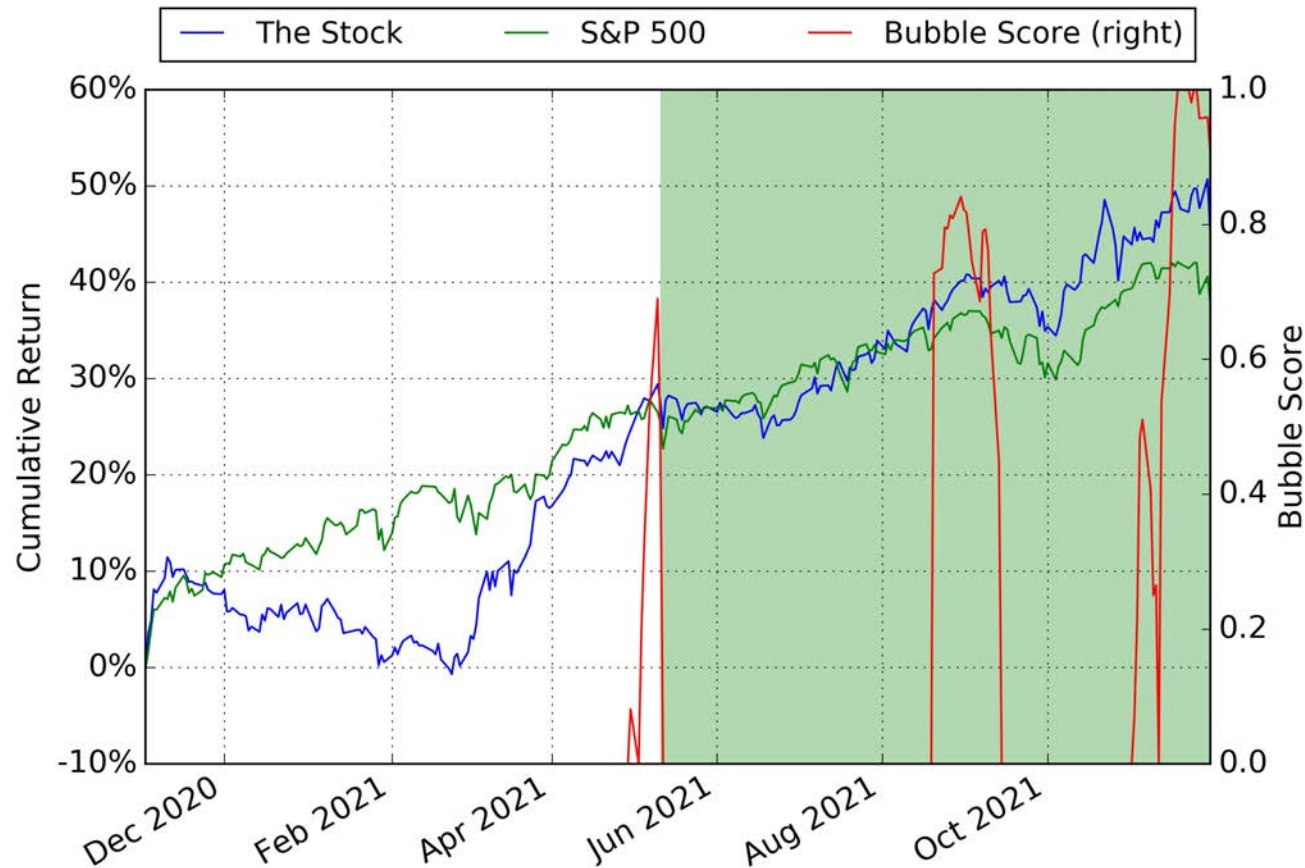
Single Stocks

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
Waste Management Inc	United States of America	Commercial & Professional Services	37.8%	13.6%	May-21	90.8%	29.1%	61.2%
McDonald's Corp	United States of America	Consumer Services	17.2%	9.1%	Mar-21	70.0%	12.3%	74.6%
Costco Wholesale Corp	United States of America	Food & Staples Retailing	44.1%	64.2%	Mar-21	14.0%	15.4%	48.6%
Advanced Micro Devices Inc	United States of America	Semiconductors & Semiconductor Equipment	76.3%	72.7%	Dec-20	11.9%	3.8%	60.4%
IHS Markit Ltd	United Kingdom	Commercial & Professional Services	41.6%	12.7%	Jun-21	51.8%	28.3%	53.3%
J B Hunt Transport Services Inc	United States of America	Transportation	37.0%	10.2%	May-21	19.3%	29.4%	52.1%
Monolithic Power Systems Inc	United States of America	Semiconductors & Semiconductor Equipment	79.3%	62.1%	Dec-20	14.6%	7.4%	67.1%
Cadence Design Systems Inc	United States of America	Software & Services	53.7%	41.5%	Dec-20	21.3%	17.8%	53.6%
Dexcom Inc	United States of America	Health Care Equipment & Services	68.7%	68.7%	Dec-20	12.0%	2.4%	51.7%
Xilinx Inc	United States of America	Semiconductors & Semiconductor Equipment	61.6%	81.8%	Feb-21	23.1%	16.8%	64.8%
Ulta Beauty Inc	United States of America	Retailing	39.3%	38.0%	Dec-20	17.6%	13.6%	23.0%
Cintas Corp	United States of America	Commercial & Professional Services	19.2%	29.1%	Jan-21	2.4%	13.7%	50.7%
Old Dominion Freight Line Inc	United States of America	Transportation	75.2%	51.9%	Mar-21	41.0%	20.9%	63.4%
Intuit Inc	United States of America	Software & Services	79.1%	39.3%	Jun-21	71.2%	20.0%	42.8%
ETSY Inc	United States of America	Retailing	72.4%	74.1%	May-21	87.3%	3.6%	26.8%
Verisk Analytics Inc	United States of America	Commercial & Professional Services	16.2%	34.2%	Feb-21	67.7%	9.9%	74.1%
Synopsys Inc	United States of America	Software & Services	46.5%	37.4%	Dec-20	8.7%	39.3%	69.7%
Workday Inc	United States of America	Software & Services	24.9%	19.9%	May-21	20.8%	3.1%	44.5%
Addtech AB	Sweden	Capital Goods	100.0%	68.9%	Feb-21	11.9%	18.3%	85.8%
Bechtle AG	Germany	Software & Services	8.8%	20.2%	Feb-21	11.3%	36.0%	77.3%
Relx PLC	United Kingdom	Commercial & Professional Services	29.5%	29.5%	Dec-20	6.2%	30.9%	46.7%
JD Sports Fashion PLC	United Kingdom	Retailing	37.9%	22.0%	Apr-21	15.5%	36.3%	51.1%
Davide Campari Milano NV	Italy	Food, Beverage & Tobacco	38.0%	32.4%	Mar-21	32.8%	18.1%	81.6%
IMCD NV	Netherlands	Capital Goods	89.5%	60.7%	Apr-21	12.5%	21.5%	32.9%
Nibe Industrier AB	Sweden	Capital Goods	98.9%	98.9%	Dec-20	13.1%	17.2%	42.2%

Single Stocks

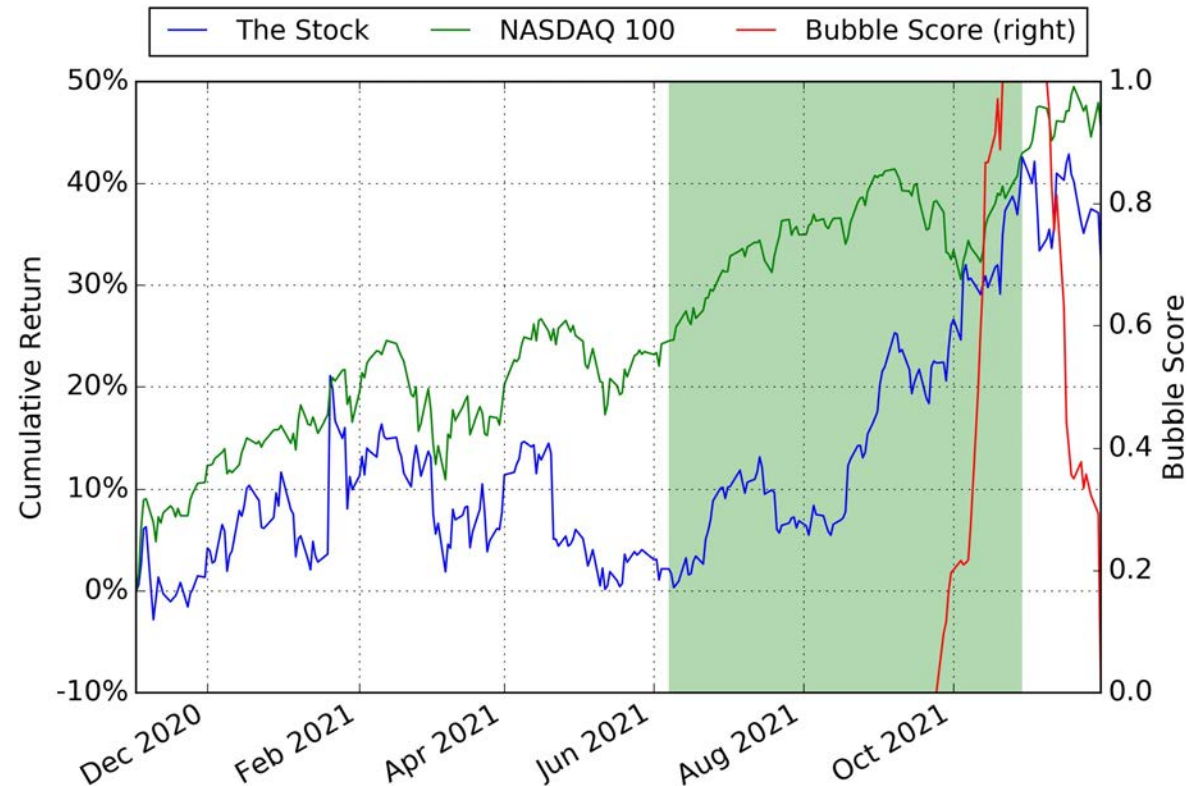
Quadrant 2 Stocks Current Month Example – Waste Management Inc.



- 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 seven-month bubble has reached 90.8% with a bubble size 13.6%. 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 – Netflix Inc.



The figure above plots the one-year cumulative return of the stock (blue), NASDAQ 100 (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 undergone a change of regime, which is in agreement with the LPPLS signal. The weak fundamentals suggests that the correction may continue, as we can see from the weak performance of the stock even under the backdrop of the rebound of the NASDAQ 100 index.

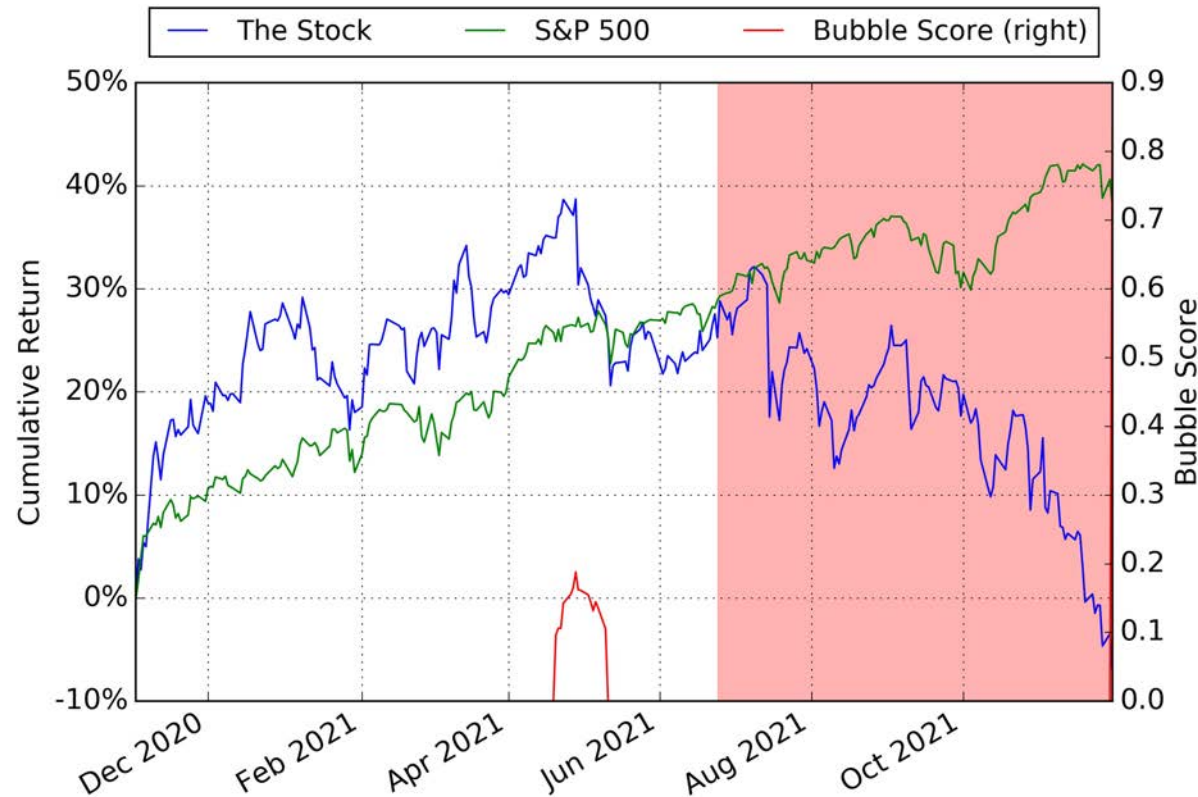
Single Stocks

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
T-Mobile US Inc	United States of America	Telecommunication Services	-17.0%	-23.0%	May-21	-43.3%	33.7%	72.1%
Vertex Pharmaceuticals Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	-16.7%	-14.0%	Feb-21	-24.9%	25.5%	36.5%
Illumina Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	8.2%	-15.1%	Jun-21	-17.2%	4.7%	59.7%
Jack Henry & Associates Inc	United States of America	Software & Services	-3.4%	-9.1%	Jul-21	-51.9%	14.9%	48.8%
Teleflex Inc	United States of America	Health Care Equipment & Services	-22.0%	-27.8%	Jun-21	-83.5%	30.3%	53.1%
Mastercard Inc	United States of America	Software & Services	-6.5%	-15.2%	Mar-21	-7.7%	18.6%	58.4%
Kerry Group PLC	Ireland; Republic of	Food, Beverage & Tobacco	-9.0%	-8.4%	Jul-21	-18.6%	26.0%	64.6%
Ubisoft Entertainment SA	France	Media & Entertainment	-42.2%	-21.3%	May-21	-23.3%	13.8%	90.0%
TUI AG	Germany	Consumer Services	-11.1%	-34.8%	Jan-21	-27.1%	18.7%	99.9%
Edenred SE	France	Software & Services	-14.8%	-19.2%	Jul-21	-48.3%	12.5%	91.1%
HomeServe PLC	United Kingdom	Commercial & Professional Services	-17.9%	-17.9%	Dec-20	-9.7%	26.1%	57.2%
voestalpine AG	Austria	Materials	6.1%	-14.0%	Mar-21	-17.3%	35.9%	5.3%

Single Stocks

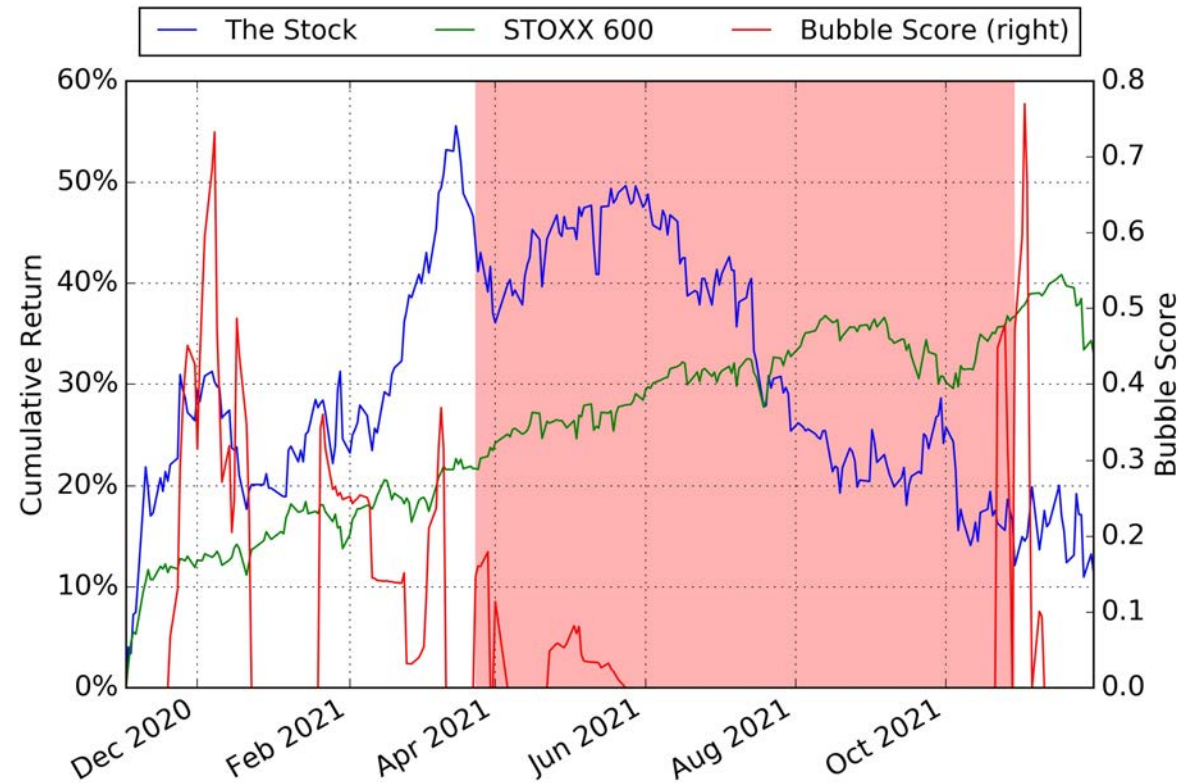
Quadrant 3 Stocks Current Month Example – Teleflex Inc.



- 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 negative bubble is identified. The Bubble Score of this five-month bubble has reached 83.5% with a bubble size -27.8%. This signal is barely visible close to the vertical axis on the right, which means that it has just appeared.

Single Stocks

Quadrant 3 Stocks Last Month Example – H & M Hennes & Mauritz AB.



- The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (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 lost its downward momentum in the past month. One should remain cautious given the weak fundamentals of this stock, which may indicate a continuation of the negative bubble in the future.

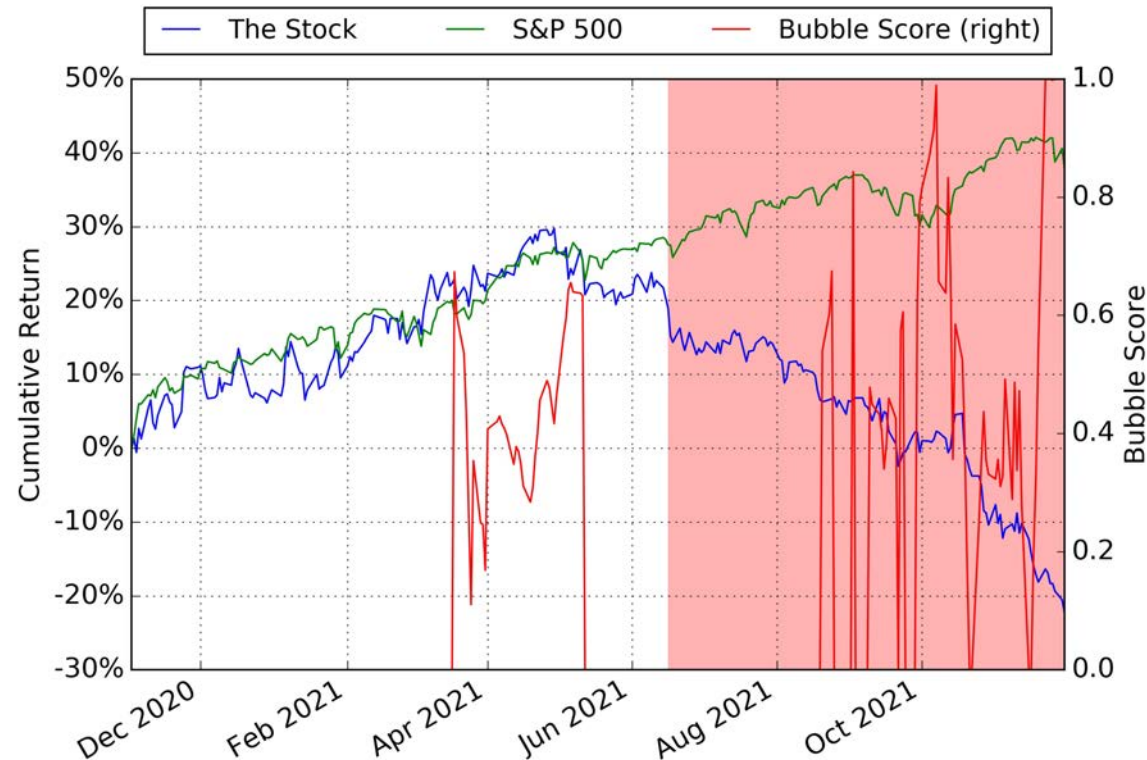
Single Stocks

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	-8.8%	-21.9%	Jun-21	-94.0%	84.7%	23.7%
Philip Morris International Inc	United States of America	Food, Beverage & Tobacco	1.6%	-11.9%	Jun-21	-60.0%	89.5%	55.5%
Cardinal Health Inc	United States of America	Health Care Equipment & Services	-17.7%	-23.4%	Mar-21	-7.3%	91.5%	14.9%
AT&T Inc	United States of America	Telecommunication Services	-27.4%	-23.9%	Mar-21	-23.5%	80.9%	33.2%
Zimmer Biomet Holdings Inc	United States of America	Health Care Equipment & Services	-18.8%	-29.4%	Apr-21	-30.1%	78.0%	48.1%
Western Union Co	United States of America	Software & Services	-29.0%	-32.5%	Jun-21	-100%	87.8%	68.1%
Global Payments Inc	United States of America	Software & Services	-39.2%	-44.1%	Apr-21	-23.5%	79.4%	57.0%
DENTSPLY SIRONA Inc	United States of America	Health Care Equipment & Services	-10.6%	-21.5%	Mar-21	-53.6%	73.4%	17.7%
International Paper Co	United States of America	Materials	-3.0%	-22.6%	May-21	-95.3%	69.6%	66.6%
Medtronic PLC	Ireland; Republic of	Health Care Equipment & Services	-5.5%	-15.4%	Jul-21	-76.6%	69.0%	67.4%
Bristol-Myers Squibb Co	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	-12.0%	-14.3%	Dec-20	-4.7%	87.1%	14.3%
Intel Corp	United States of America	Semiconductors & Semiconductor Equipment	-1.7%	-15.1%	Apr-21	-35.9%	95.9%	5.7%
Fidelity National Information Services Inc	United States of America	Software & Services	-29.3%	-30.3%	Apr-21	-77.2%	86.5%	45.1%
Citrix Systems Inc	United States of America	Software & Services	-39.0%	-31.1%	May-21	-40.6%	81.7%	37.0%
DXC Technology Co	United States of America	Software & Services	20.7%	-24.6%	Jun-21	-36.6%	98.9%	11.3%
Worldline SA	France	Software & Services	-36.6%	-42.5%	Jun-21	-22.0%	65.8%	74.3%
Rubis SCA	France	Utilities	-36.1%	-38.0%	Jun-21	-82.5%	66.9%	87.6%
Etablissements Franz Colruyt NV	Belgium	Food & Staples Retailing	-16.6%	-20.1%	Jan-21	-27.1%	64.0%	11.6%
Logitech International SA	Switzerland	Technology Hardware & Equipment	-8.8%	-37.5%	Jun-21	-30.0%	90.7%	6.6%
Fresenius SE & Co KGaA	Germany	Health Care Equipment & Services	-11.8%	-25.5%	May-21	-68.1%	85.1%	13.6%
Fresenius Medical Care AG & Co KGaA	Germany	Health Care Equipment & Services	-22.8%	-17.8%	Apr-21	-17.3%	88.4%	9.2%
Games Workshop Group PLC	United Kingdom	Consumer Durables & Apparel	-5.6%	-19.6%	Jul-21	-43.4%	62.5%	62.3%
Kindred Group PLC	Malta	Consumer Services	35.7%	-31.3%	Jul-21	-19.3%	94.4%	11.5%
Telefonaktiebolaget LM Ericsson	Sweden	Technology Hardware & Equipment	-13.6%	-19.5%	Mar-21	-3.1%	76.3%	11.0%
AVEVA Group PLC	United Kingdom	Software & Services	-2.3%	-15.8%	Jul-21	-98.0%	71.0%	80.8%
Hikma Pharmaceuticals PLC	United Kingdom	Pharmaceuticals, Biotechnology & Life Sciences	-10.6%	-12.9%	Jul-21	-15.3%	64.6%	30.9%
Grifols SA	Spain	Pharmaceuticals, Biotechnology & Life Sciences	-33.8%	-27.3%	Mar-21	-28.6%	69.5%	20.5%
Prosiebensat 1 Media SE	Germany	Media & Entertainment	-1.6%	-26.2%	Feb-21	-58.5%	73.0%	54.3%
Johnson Matthey PLC	United Kingdom	Materials	-13.0%	-32.0%	Jun-21	-19.8%	72.3%	12.1%
Countryside Properties PLC	United Kingdom	Consumer Durables & Apparel	-4.2%	-23.7%	Apr-21	-41.6%	75.1%	27.9%
Orpea SA	France	Health Care Equipment & Services	-21.2%	-20.3%	Apr-21	-60.7%	86.8%	87.8%
KGHM Polska Miedz SA	Poland	Materials	-23.8%	-24.2%	Jun-21	-67.4%	80.8%	98.4%

Single Stocks

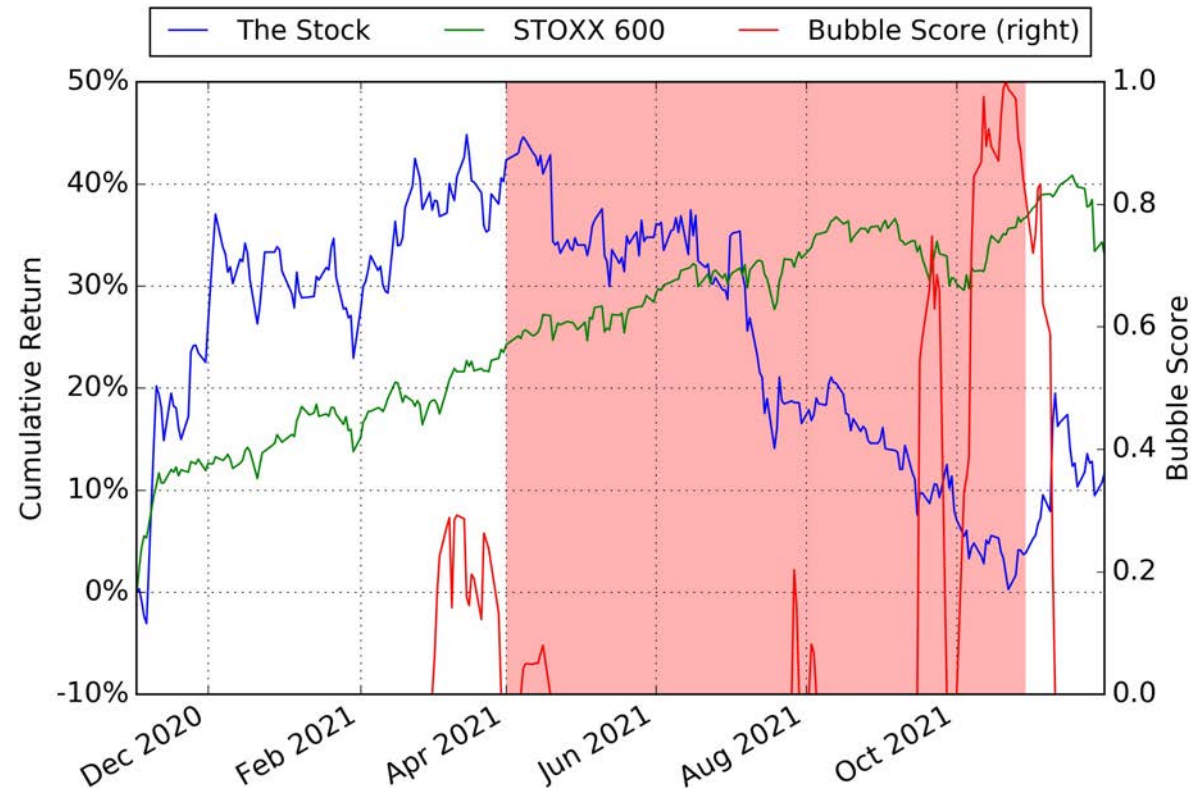
Quadrant 4 Stocks Current Month Example – Western Union Co.



- 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 six-month bubble has reached 100% with a negative bubble size -32.5%. 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

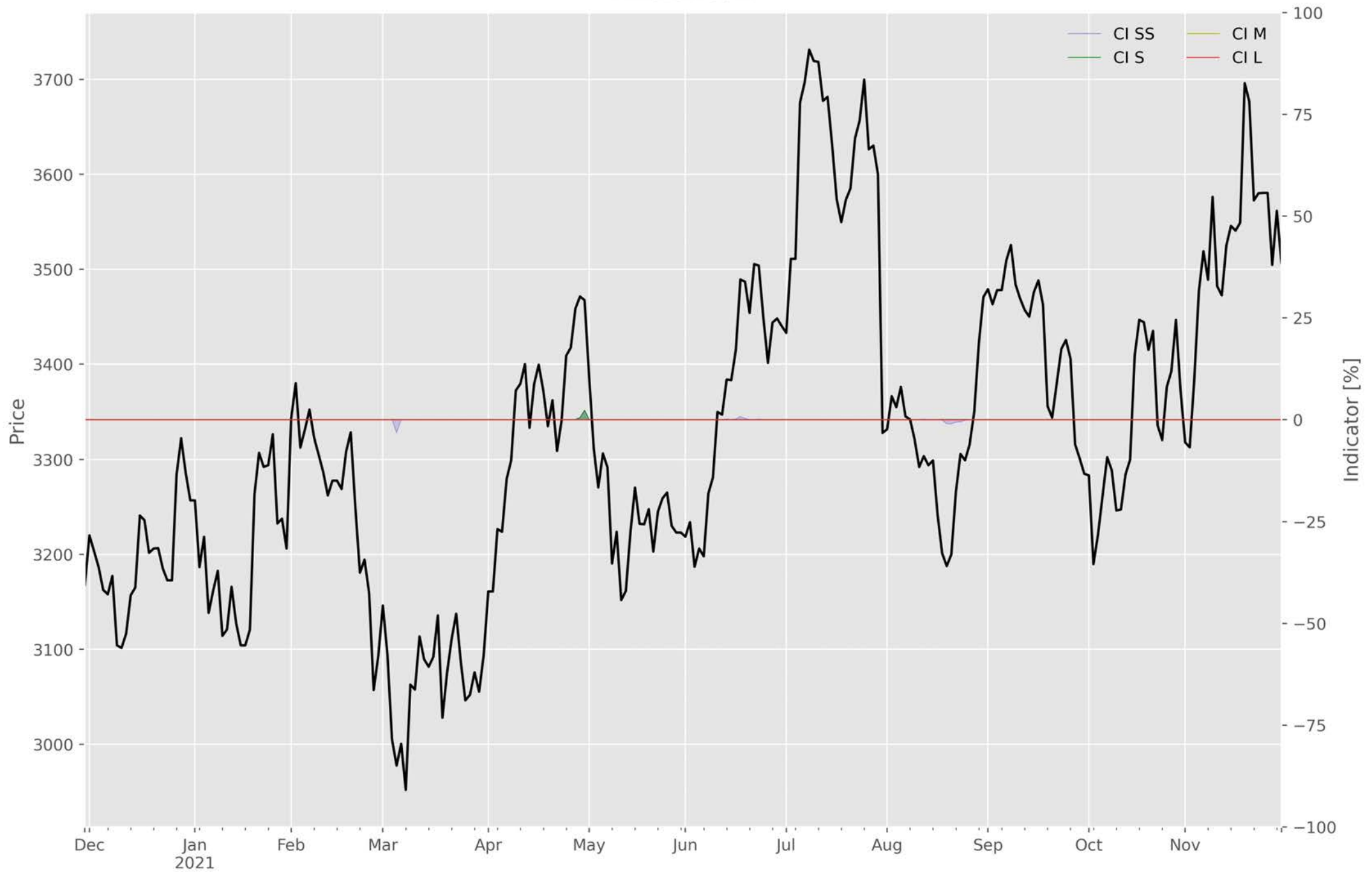
Quadrant 4 Stocks Last Month Example – Associated British Foods PLC.



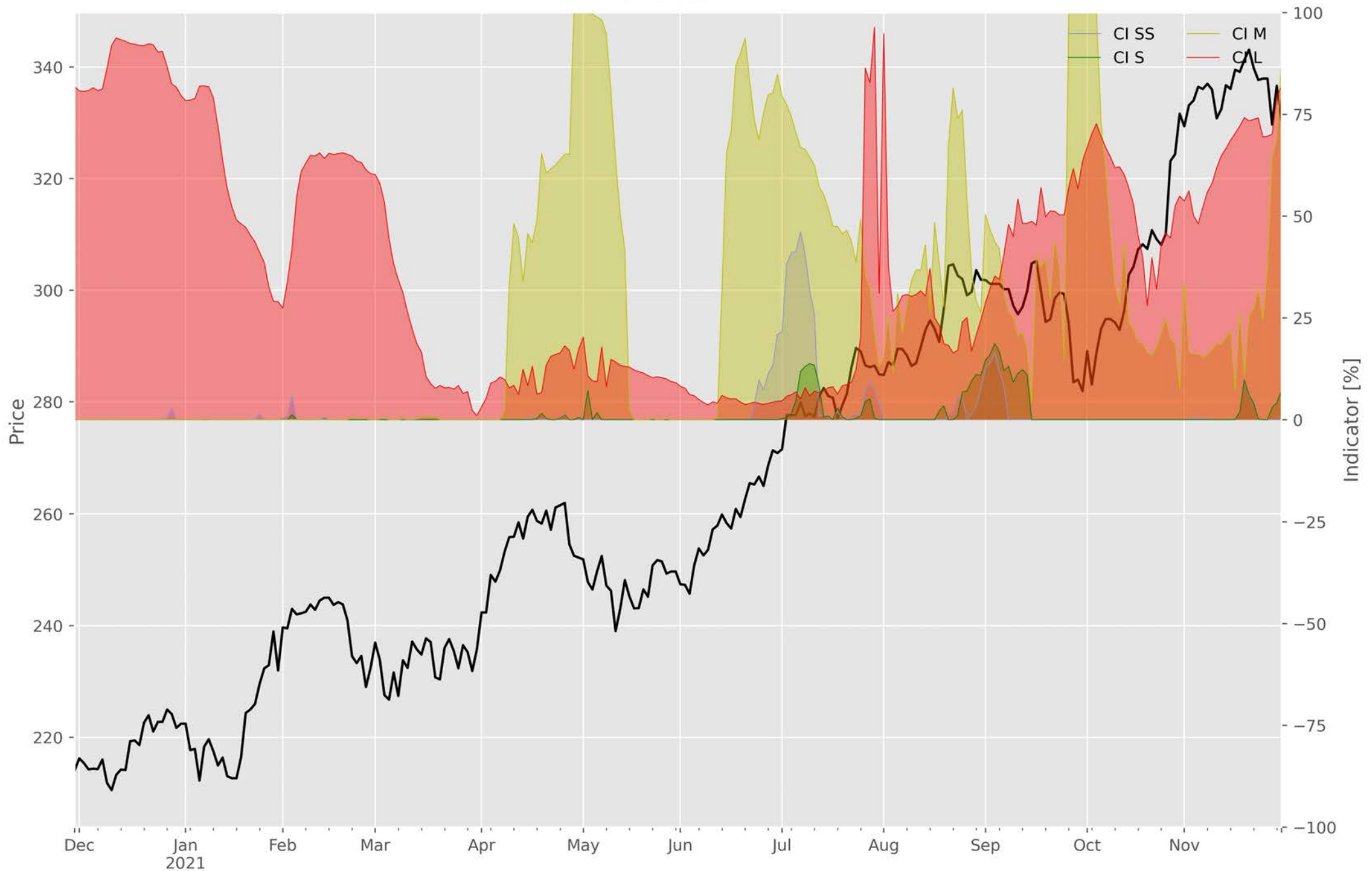
- The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock price rebounded strongly in the last month, marking the end of the previous negative bubble regime.

Appendix

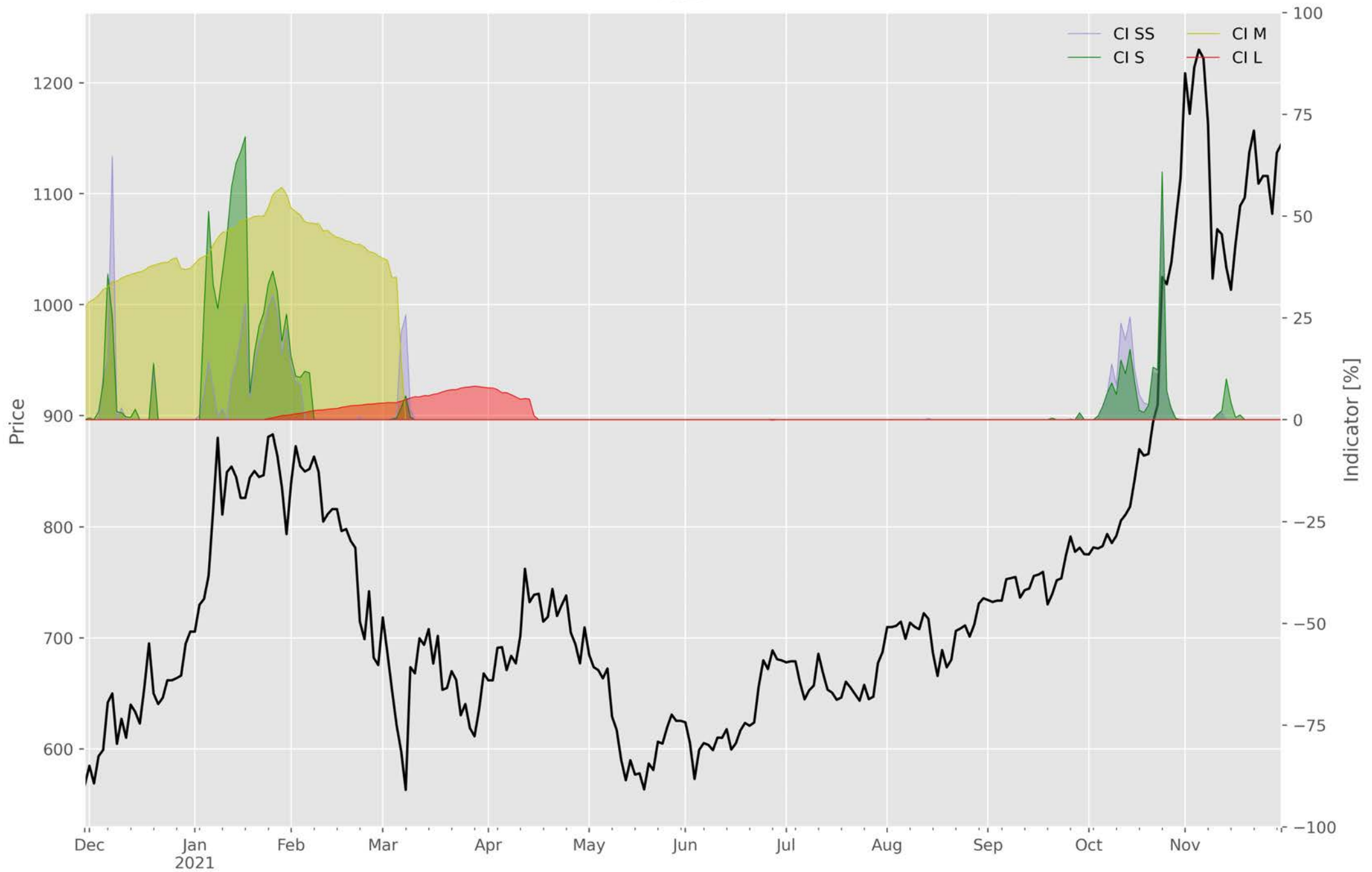
Amazon.Com



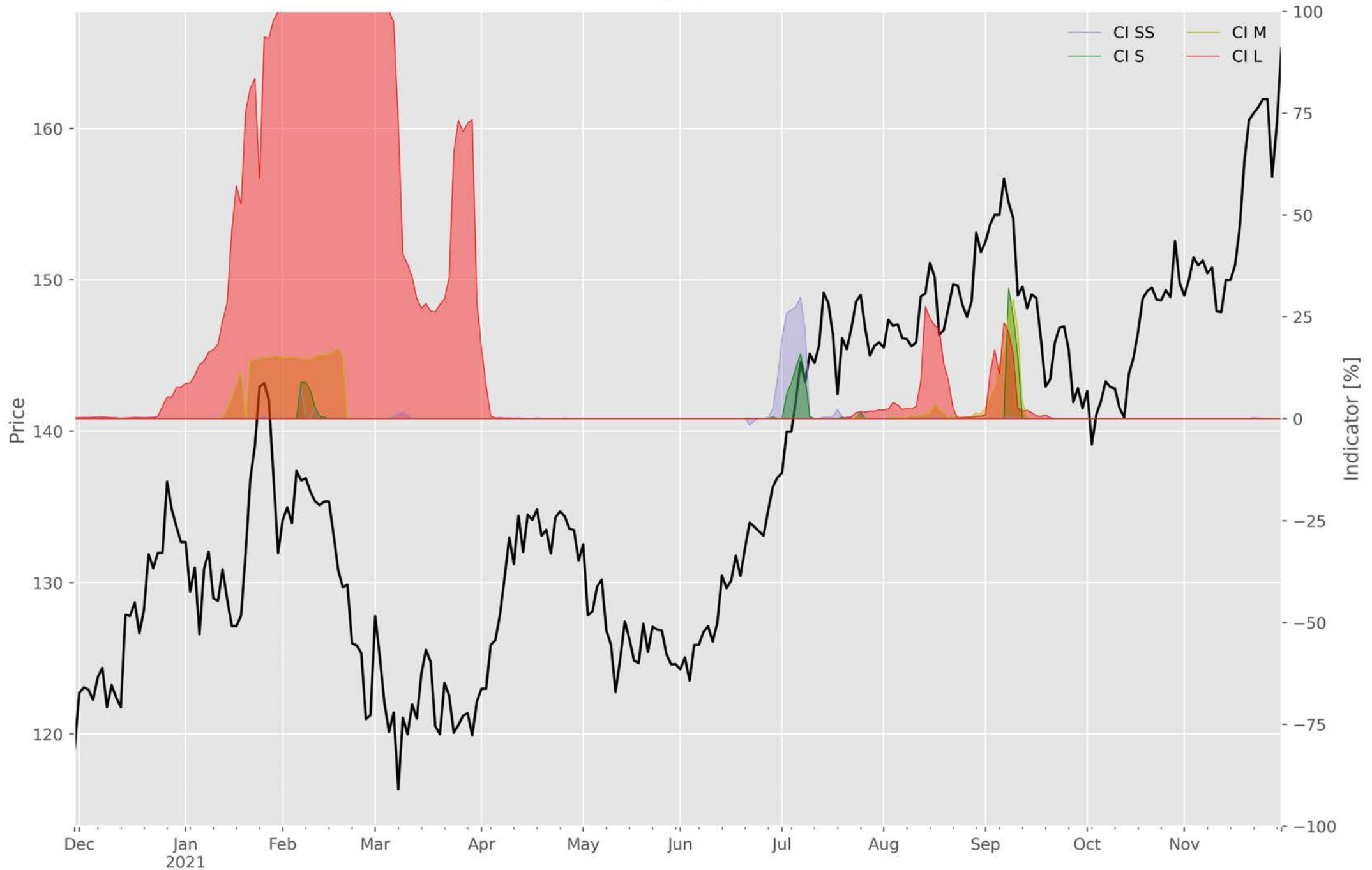
Microsoft



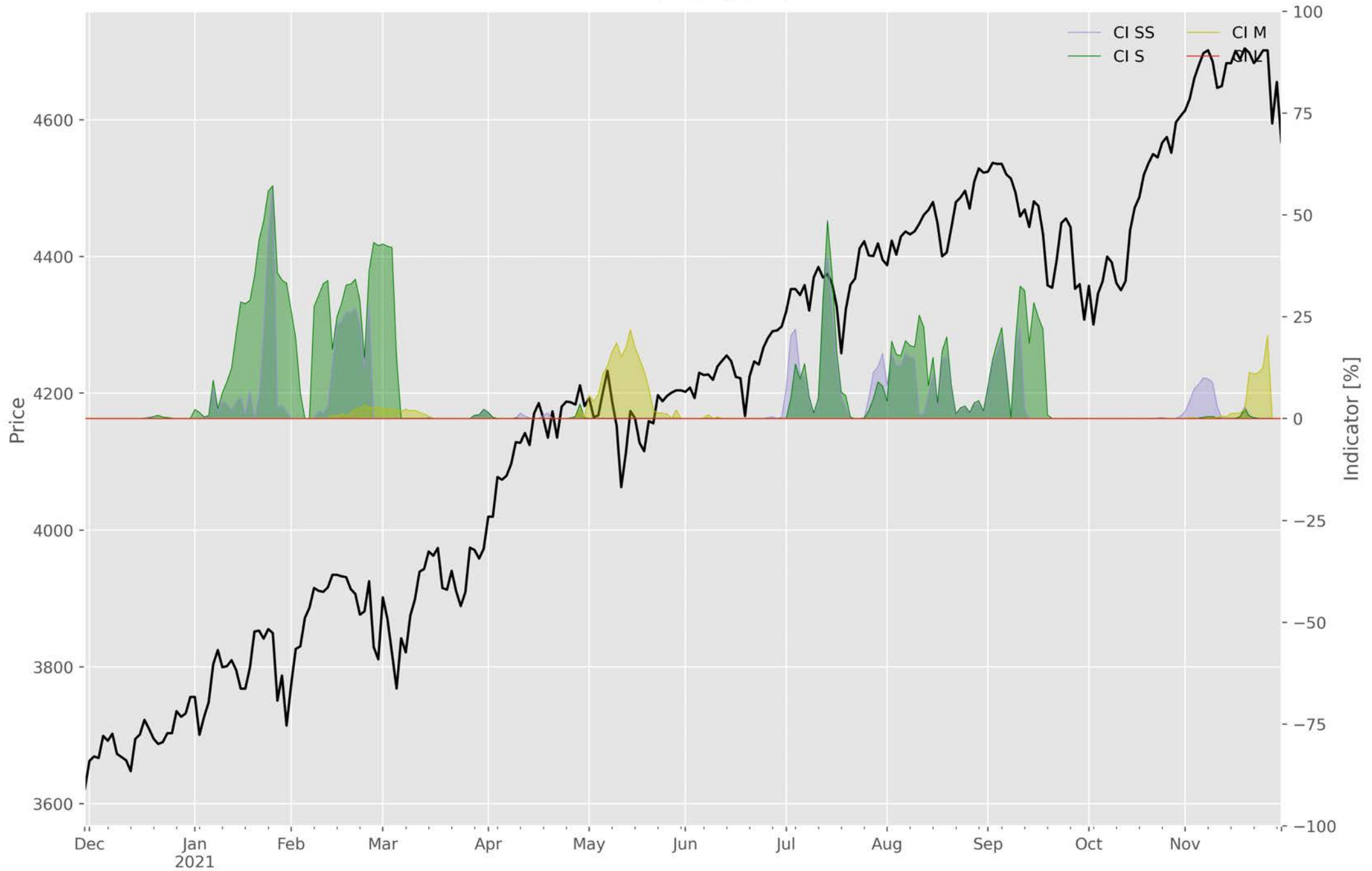
Tesla



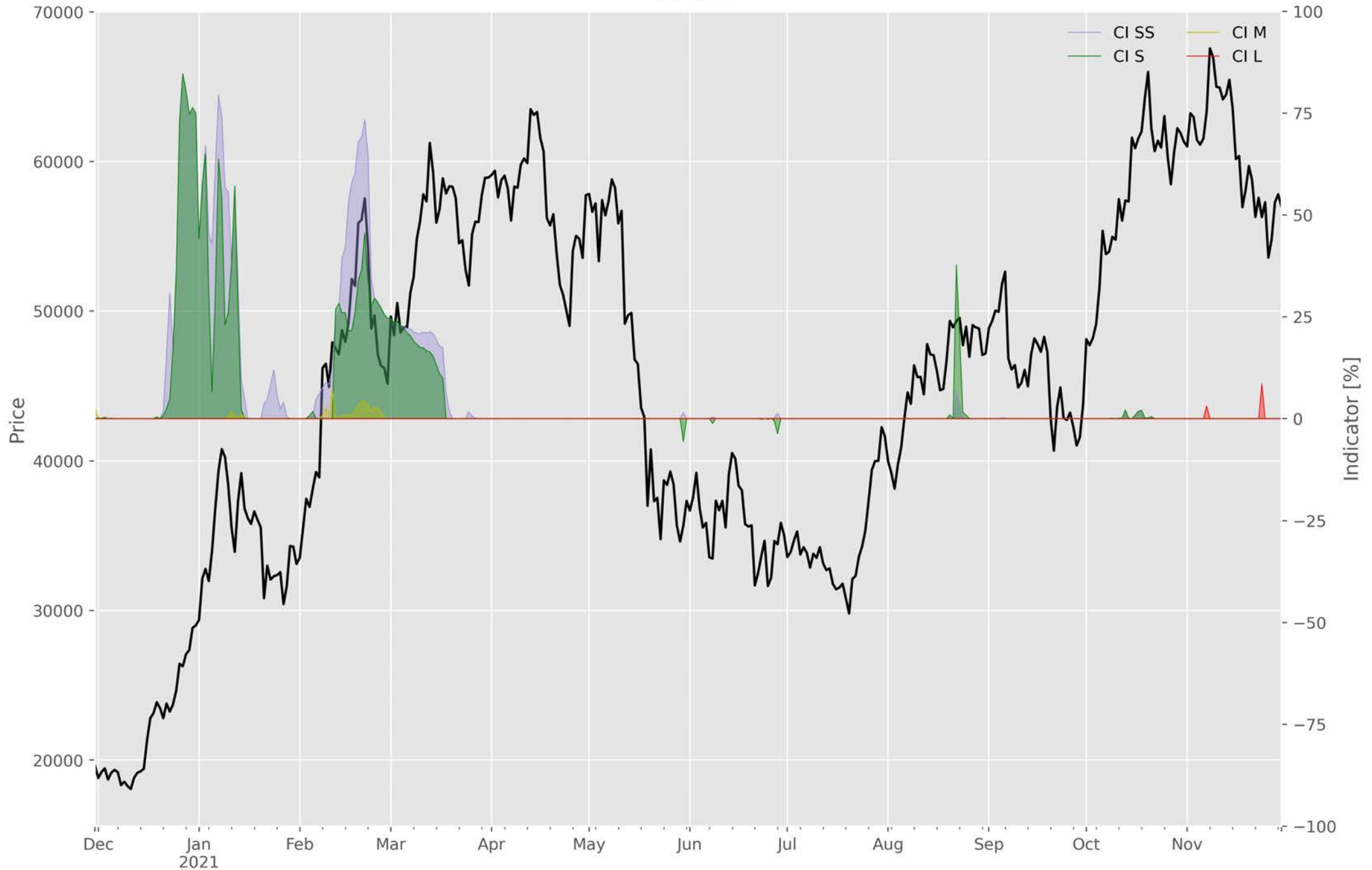
Apple



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**

Didier Sornette, Ke Wu, Dongshuai Zhao & Yu Feng

Chair of Entrepreneurial Risks

Department of Management, Technology and Economics

ETH Zurich

Scheuchzerstrasse 7

8092 Zurich, Switzerland