



The FCO Cockpit Global Bubble Status Report October 2021



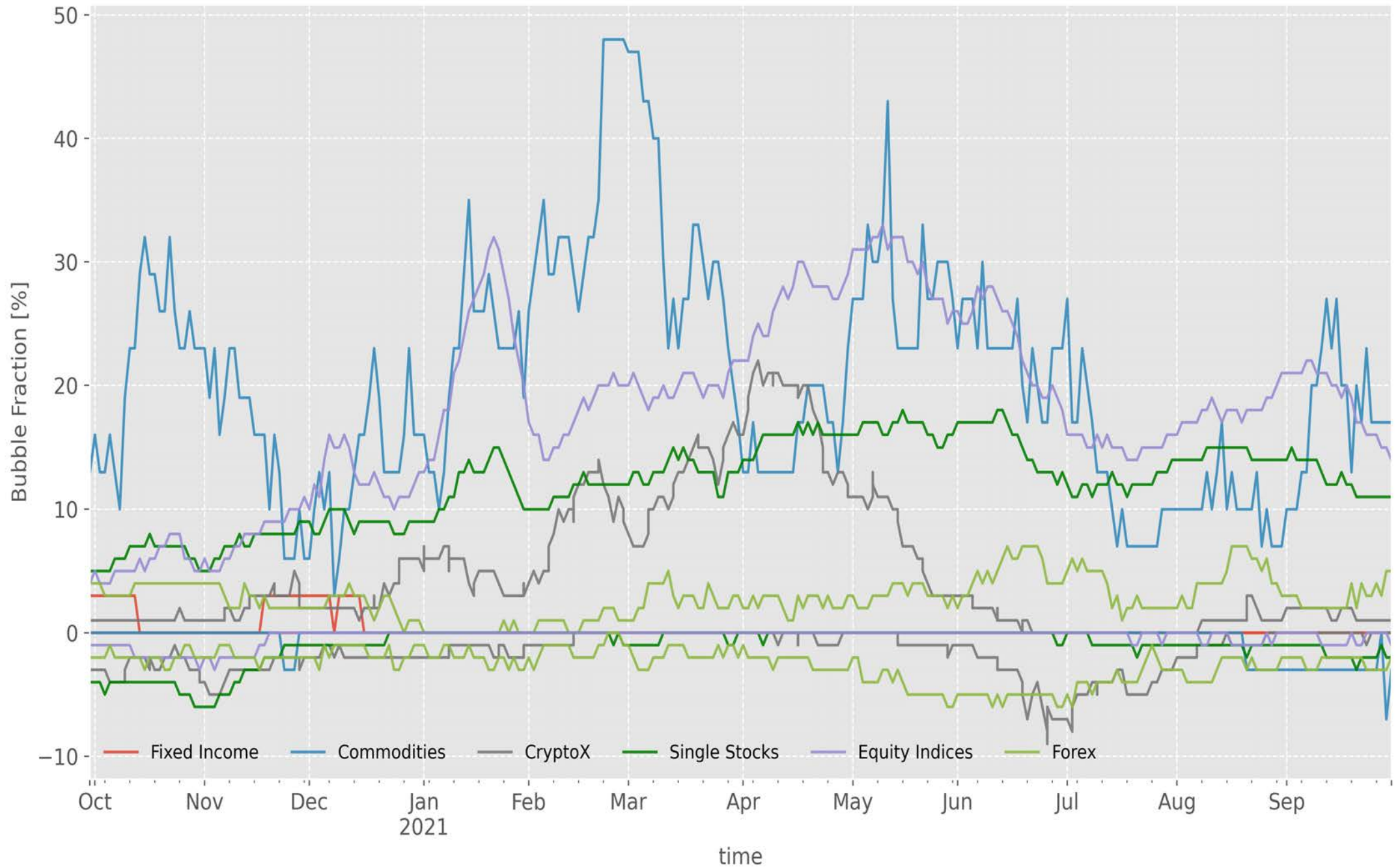
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Purpose and Benefits

- ▶ 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.
- ▶ To new readers, we recommend proceeding to the appendix for more detailed information about the methodology and procedures applied in this report.

Fraction of Positive / Negative Bubble Signals for different Asset Classes



General Results as of 2021-09-30

	Region	Analyzed Assets	Fraction of Pos. Bubbles [%]	Fraction of Neg. Bubbles [%]
Fixed Income		33	0	0
Commodities		30	17	3
Single Stocks		1617	11	2
	Europe	943	10	2
	United States	661	12	1
Equity Indices		883	14	1
	Europe	57	14	0
	United States	377	18	1
	Global	383	14	0
Forex		99	5	2
CryptoX		486	1	0

- ▶ This month, the fixed income sector has no bubble signals, as in the previous months.
- ▶ In the commodities sector, the positive bubble fraction has risen significantly from 7% to 17% during this month, while the negative bubble activity remains unchanged at 3%.
- ▶ The positive bubble fraction in single stocks and equity indices sectors has dropped from 14% to 11% and 21% to 14% in this month, respectively.
- ▶ In the Forex sector, the positive and negative bubble signals are still quite low at 5% and 2% by the end of September.
- ▶ In the CryptoX sector, bubble signals remain nearly zero as in the last month.

FCO Market Outlook

Rethink the Energy Trilemma

The energy Trilemma describes a balance between energy security (high reliability), social impact (low cost), and environmental sensitivity (low emissions). However, it is tough to achieve all three elements at the same time. In the Tesla case study of the Feb. 2020 FCO monthly report, we mentioned that the Green Energy and Electrical Automobile tides are coming. We noticed an awakening of the public's green energy awareness in the U.S., U.K., and European countries. Then, the green energy tide has suddenly accelerated with the COVID-19. As a consequence, most of the global big energy producers significantly reduced their Capex in 2020 (also due to COVID-19 uncertainty), which harms the potential producing capacity of fossil fuel energy. Although the investment in solar, wind and hydro energy sources has increased a lot, the world is still far from being able to transitioning its primary energy sources from coal, oil, and natural gas to green energy. Moreover, the green energy sources are not stable enough (i.e., not always enough sunshine, wind, and sufficient rainfall) to guarantee 24/7/365 energy security. Thus, with the combinations of low inventory, the global recovery from the pandemics since late 2021, bad weather (Hurricane Ida in Gulf Coast), and not enough carbon energy production capability as well as the labor shortage, Europe, U.K., and the U.S. are suffering from power shortages, while the developing countries are enduring energy poverty.

Chinese Q4 weak economic outlook

The PMI (purchasing managers' index) figures are one of the most apparent evidence of the weak fundamental of China's economy in Q4, with severe electricity power shortages, a slowdown across its vast property sector since Evergrande's credit event, and sporadic outbreaks of the Covid-19 Delta variant and corresponding lockdowns from time to time. It is hard to imagine what U.S. and European consumers can put into their Christmas shopping cart if China, the "world manufacture" lacks electricity to drive machinery in the next two months. Actually, in some provinces of China, Steel, non-ferrous metals, chemicals, textiles, and other energy-consuming companies will only be allowed to operate for two days a week to keep power consumption under control. China (and Indian) does not have enough coal or natural gas storage for heating while the winter is coming.

Fix income: In line with our past reports, the U.S. begins to admit the fear of inflation, and Fed Chair Powell finally said the central bank might start scaling back asset purchases as soon as November and finish in mid-2022. Meanwhile, the Bank of England Governor Andrew Bailey even mentioned that the interest rate could rise as early as this year to curb the inflation risk. We are happy to see that those central bankers' words align with what we said in our previous FCO monthly reports. We strongly disagree with Ray Dalio's opinion that "Cash is trash," and we do not see there will be "easy" alpha in many asset classes in the next six months. Thus, we recommend that our readers increase cash allocation, reducing risky asset allocation due to the monetary policy change.

U.S. equities: It is interesting to watch that many "long-term" Tesla boosters have sold the Tesla stock in the past few weeks. For instance, ARK investment's \$7000 per share Tesla price target for 2024 can not stop its CEO Cathie Wood from selling \$270 million Tesla stocks at around \$700 per share. Chamath Palihapitiya, another long time Tesla bull, just closed all his Tesla positions. It is amusing to see investors reduce money in contradiction to where their mouths are.

China: We see plenty of evidence that U.S. inflation is not temporary, and the Fed has to tighten the interest rate. At the same time, the Chinese economic slowdown is not transient (we discuss this topic in the next slide), and the PBoC has to inject more liquidity. The contradiction of the two countries' monetary policies is likely to continue for some time, which widens the interest rate gap and puts more pressure on the Chinese currency, both of which impact the cross-border capital flow between the two countries.

Commodities: Due to the unusual weather conditions (i.e., flood, hurricane, and drought, etc. in European, North American, and Asian countries), pandemic impacts as well as unconventional monetary policies, most of the agriculture commodities have increased at more than double-digit rates this year, which is not good news for the developing countries. According to the UN World Food Program report, 957 million people across 93 countries do not have enough to eat in 2021. In addition, oil and gas production still lagged behind pre-hurricane levels. The global energy crunch deteriorates the unequal recovery. Thus, we feel very sad that the COVID-19 variants, food crisis, and energy poverty hang over those unfortunate least developed countries. In China, roughly 80% of the basic industrial material factories (i.e., steel, Aluminum, copper factories) have suspended production since Sept., thanks to the forced shutdowns and intense energy shortage. The suspension pushes down the Iron ore demand further (Iron Ore has experienced a 50% price drop until now). We also notice that the Coal price has doubled since the beginning of 2021 for many well-known reasons (lack of mine investment; imports constraints; global shortage in inventories, etc.).

THE ENERGY TRILEMMA



Three “Nobel-prize” level questions related to China

"Somewhere down this road, a generation may believe they have come of age, before they have."
— Lee Kuan Yew on China's rising up

At the global Financial Crisis Observatory (FCO), we are always interested in the topics or phenomena related to real-world economics, and in particular of excesses such as bubbles in all asset classes, and financial crises. This time, we have three "Nobel-prize" level questions related to China for everyone to consider.

After two decades of fast development, China's real estate sector, which contributes around 30% of the country's GDP, finally shows signs of slowing down, indicating that the old economic growth model no longer works. Besides the magnificent skyscrapers, international investors observed that households, developers & related upper-chain companies and different levels of government all become highly indebted while witnessing the astonishing property price soaring in China during the two decades of tremendous urbanization. ***We all know that one person's liability is another person's asset, so our first "Nobel-prize" level question is: If almost all real estate participants are debt-laden, who made money?*** This question is critical since it addresses the origin of the China debt problem.

Evergrande, with the drama of its meltdown, has become one of the most enormous "stranded whales" on the beach at the low tide of credit, sending a strong signal that Beijing no longer accepts the "too big to fail" enterprises to "kidnap" the economy. However, as a result of the Evergrande's spillover effect (Evergrande's debts of June 2021, according to Caixin, is around \$300 billion, or equivalent to 2% of China's GDP), we expect that the Chinese developers' financing situation will deteriorate in both onshore and offshore bond markets. This financial contagion might lead to more critical credit events. Arguably, the current China debt situation is similar to Japan in the 1990s and the U.S. in the late 2000s, as the property sector is becoming a threat to financial, economic, and social stability, and the overcapacity of property-related industries also needs to be solved. ***Thus, our second "Nobel-prize" level question is: How can the Chinese government handle the Evergrande and other coming corporate insolvent cases without triggering a systemic cascade (i.e., banking crisis/financial crisis/economic crisis).***

China has long been the biggest engine of global prosperity. According to IMF, China contributes 28% of GDP growth worldwide from 2013 to 2018. The current global economy's most powerful locomotive overly relies on China's property-driven economic growth model. With the peaking of the working-age population and the coming of aging of the population in China, the old economic model can no longer drive China's economic growth. ***So our third "Nobel-prize" level question is: What can the Chinese economy rely on if real estate is no longer the option.*** The answer to this important question will determine the road of China's future.

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.

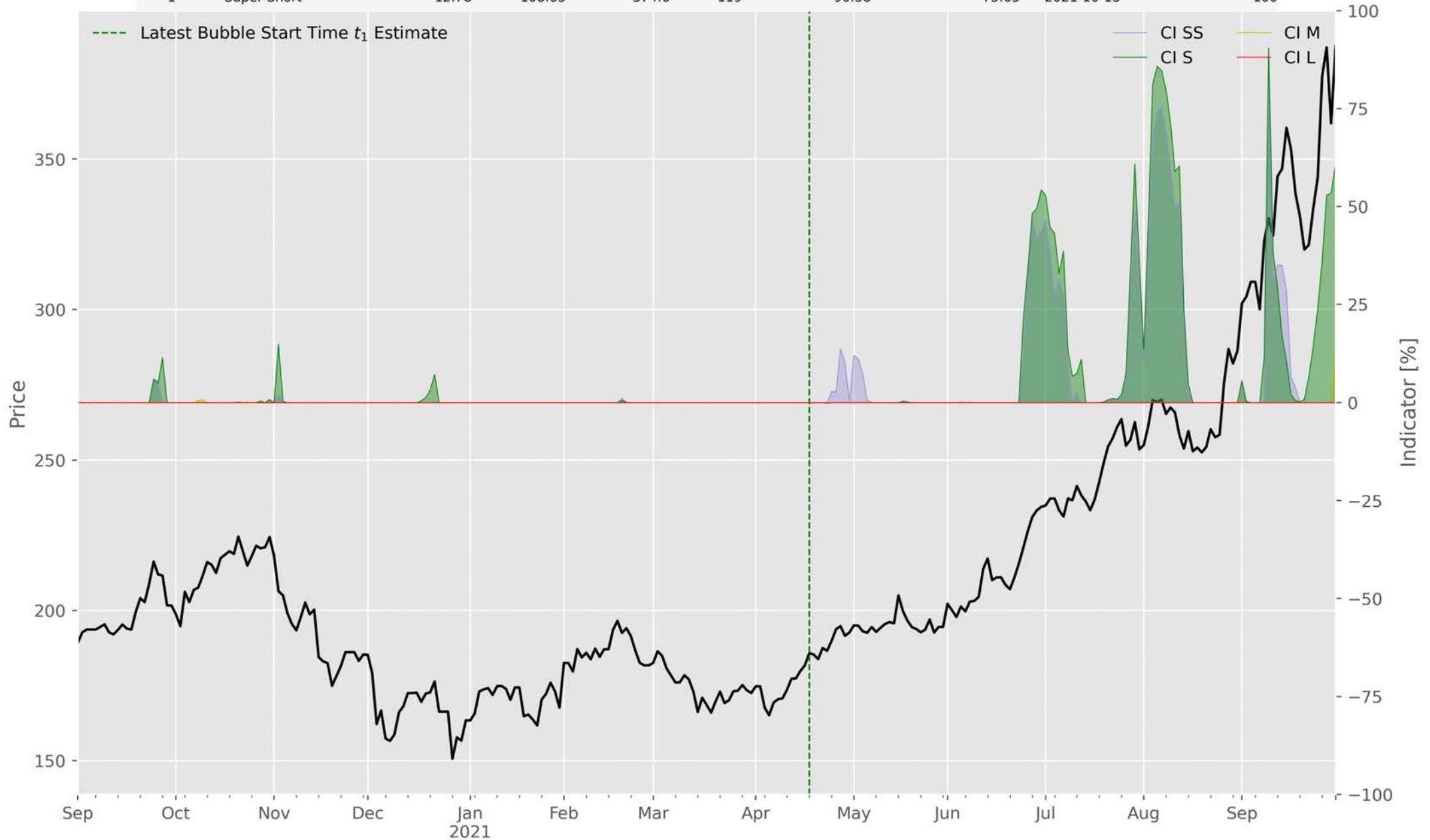
Fixed Income

No bubbles to report

Commodities

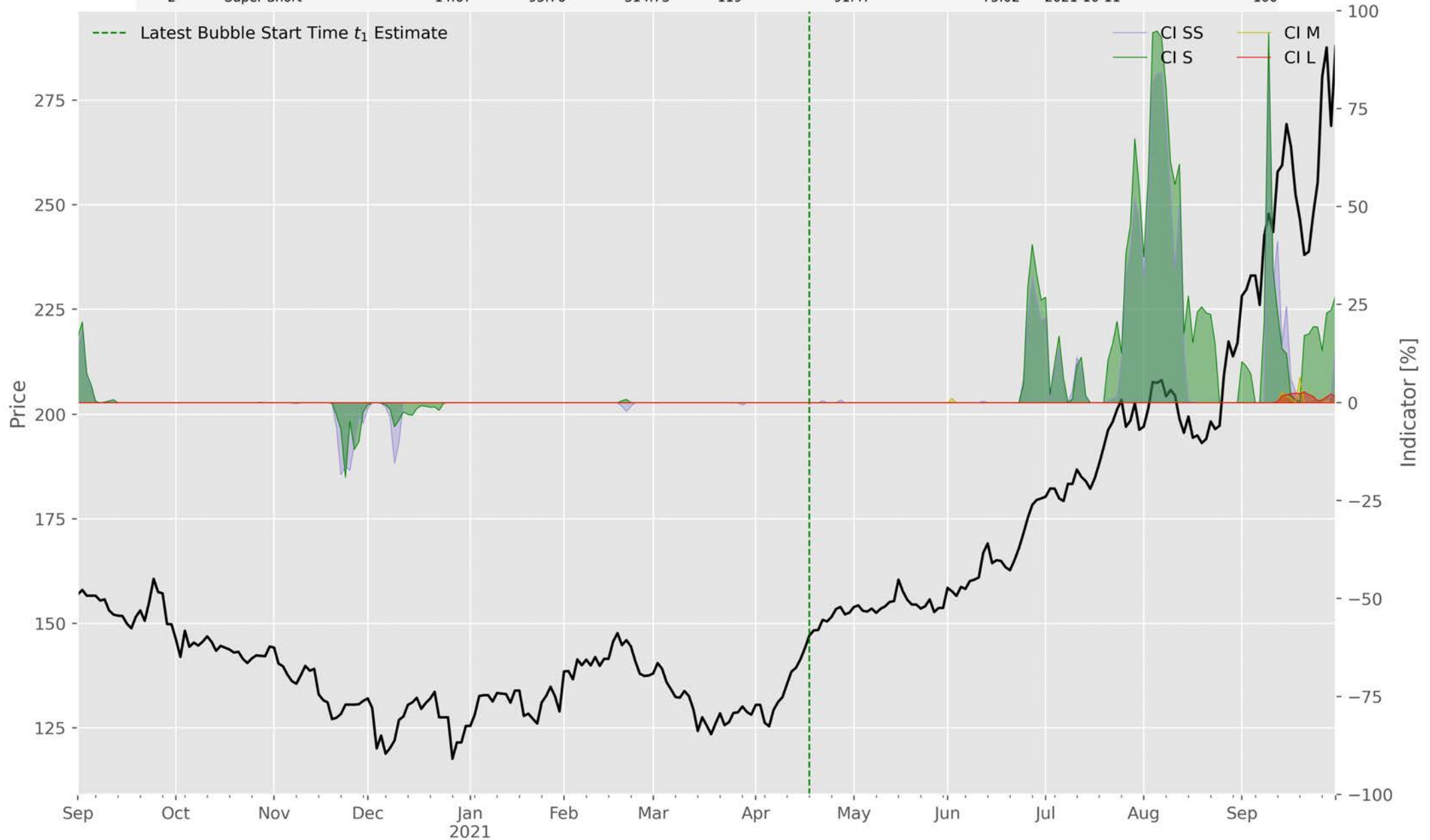
Micx Natural Gas Spot Index

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	Super Short	12.78	108.63	374.6	119	90.38	75.63	2021-10-13	100



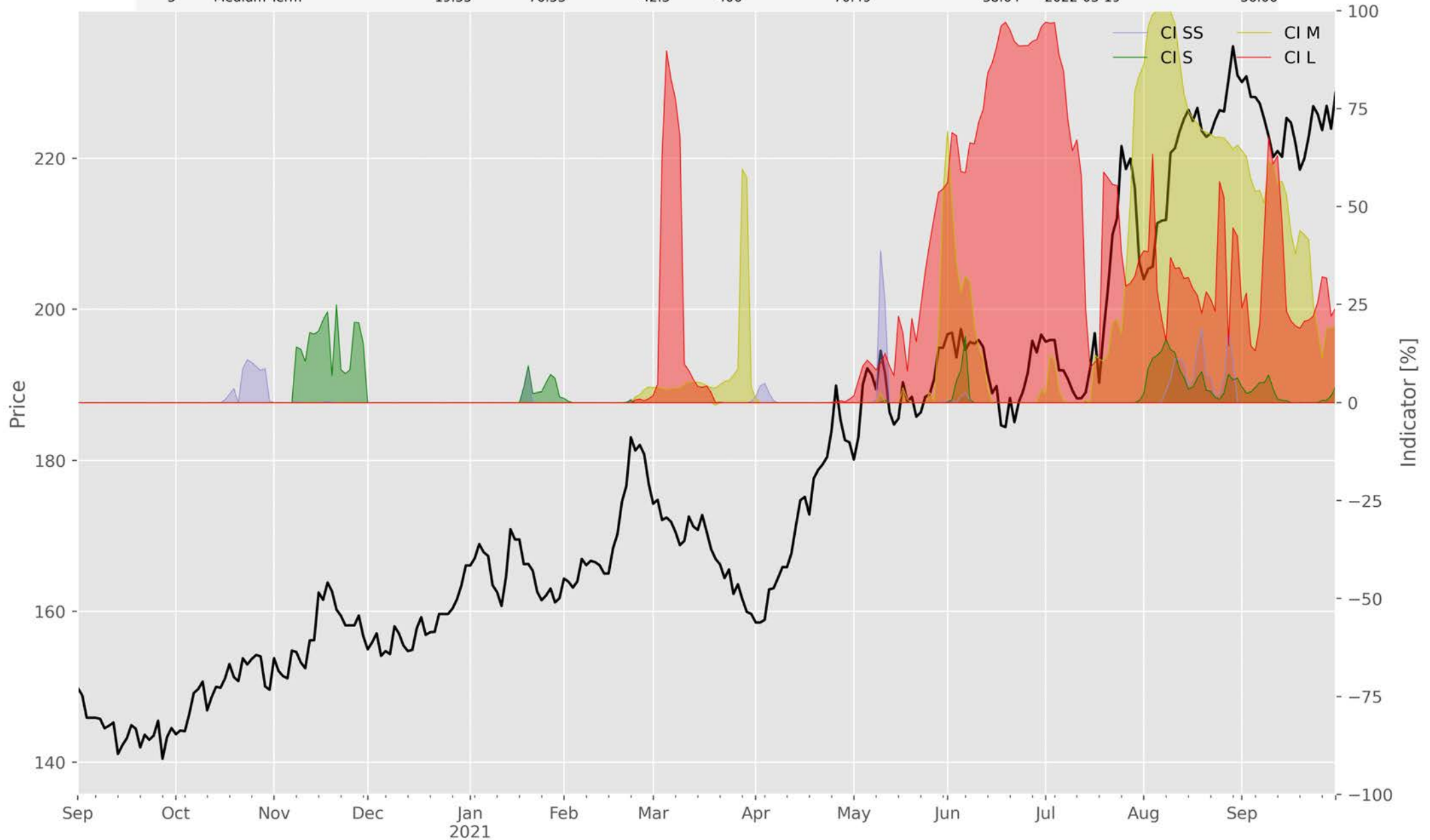
MLcx Unseasonal Nat. Gas Spot Index

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	Super Short	14.67	95.76	314.73	119	91.47	75.02	2021-10-11	100



Mlxx Softs Spot Index

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	19.35	76.53	42.3	406	70.49	38.64	2022-03-19	56.06



Single Stocks

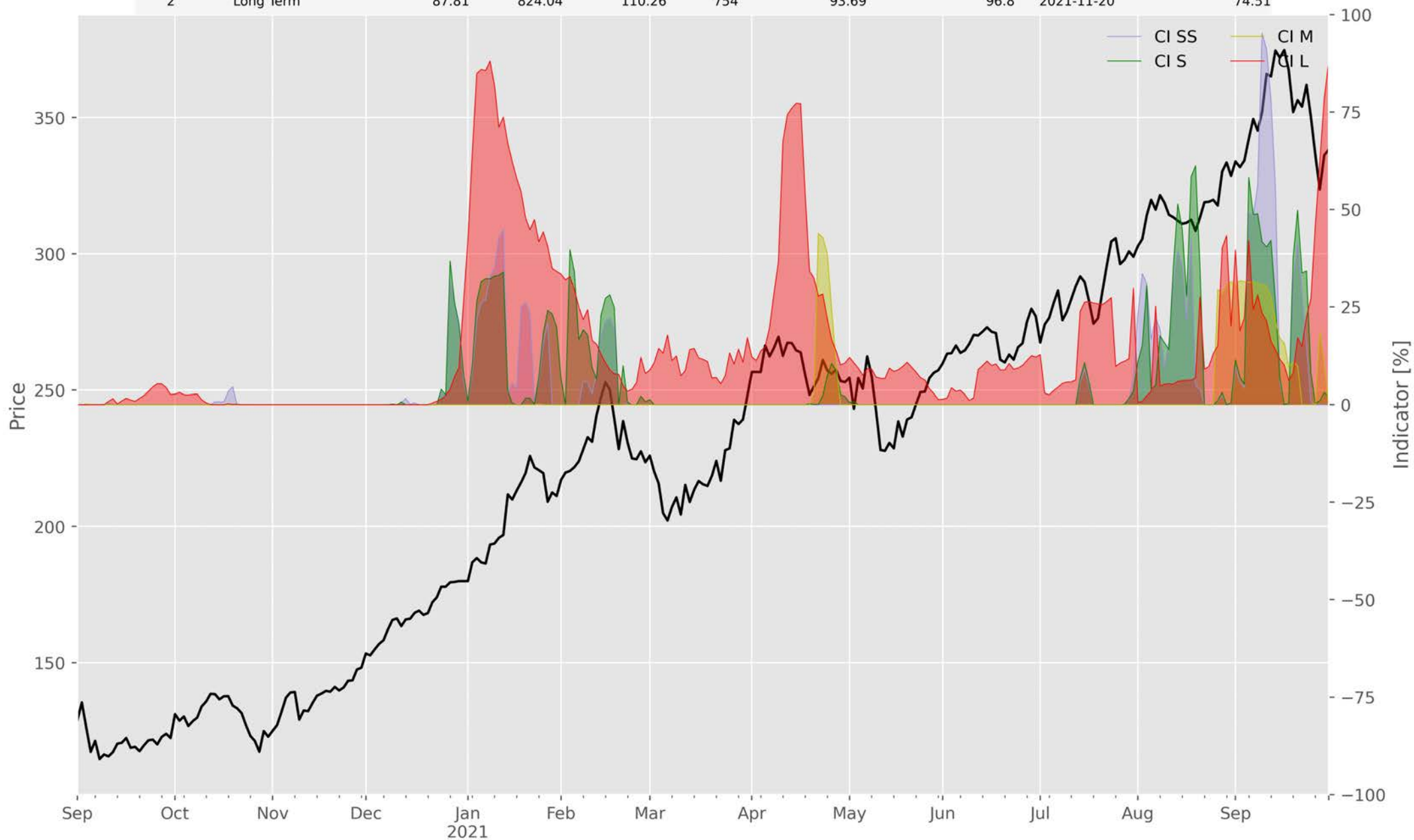
Playtech

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	49.13	26.26	209.62	52	94.54	99.12	2021-10-03	99.99



Asm International

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	87.81	824.04	110.26	754	93.69	96.8	2021-11-20	74.51



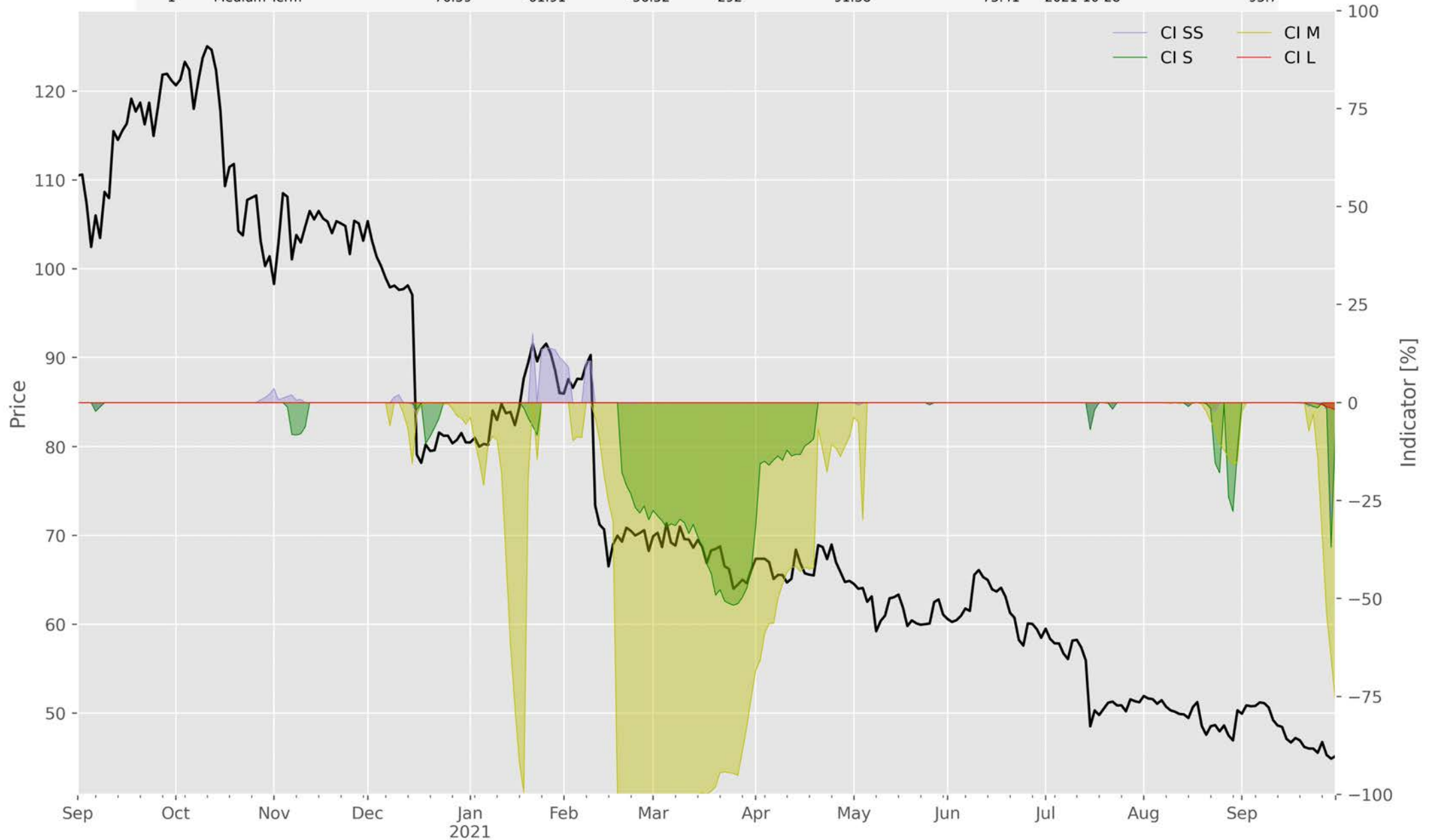
Frasers Group

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	63.93	52.02	68.63	202	98.22	75.53	2021-10-04	99.98



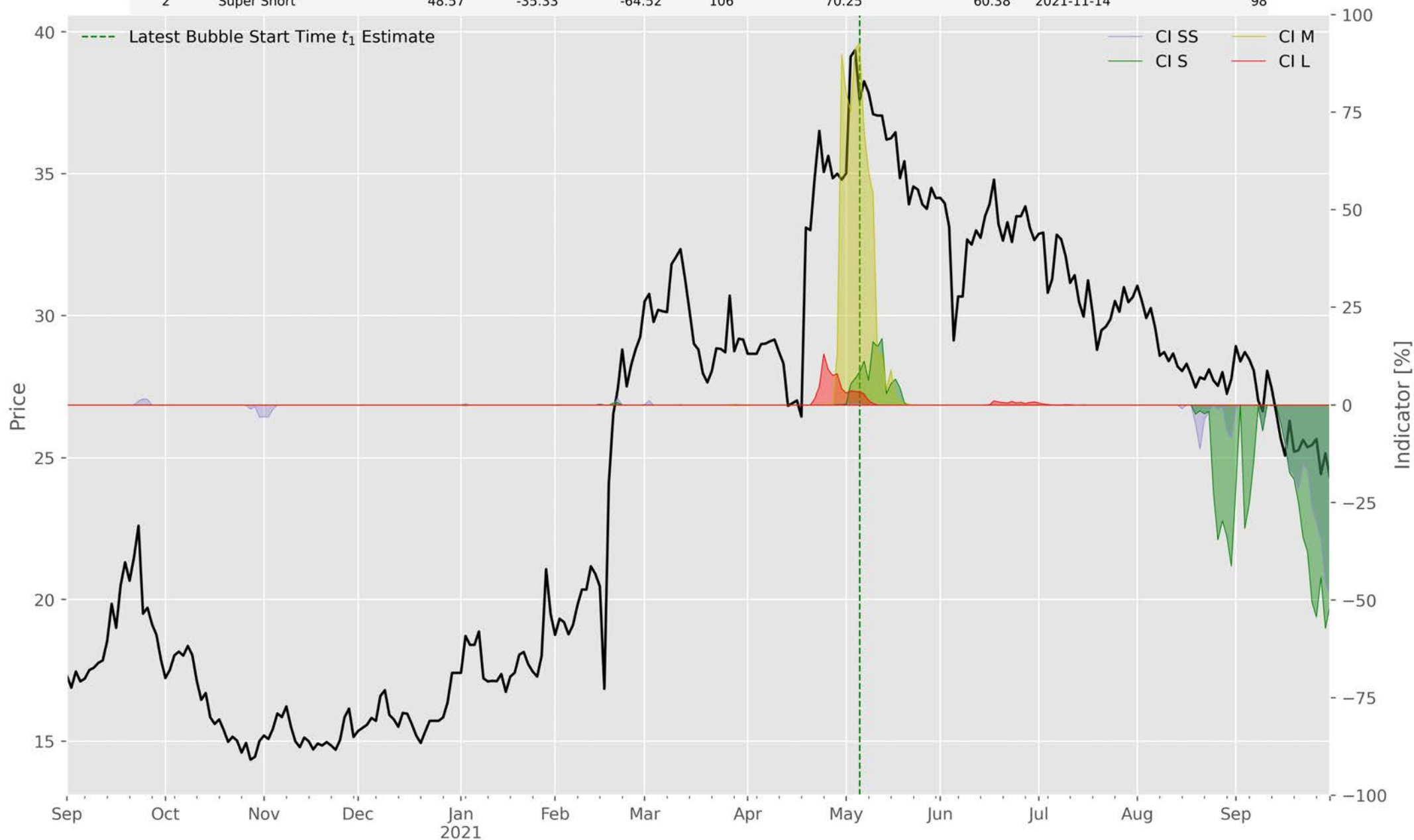
Galapagos

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	76.59	-61.91	-56.52	292	91.38	73.41	2021-10-28	93.7



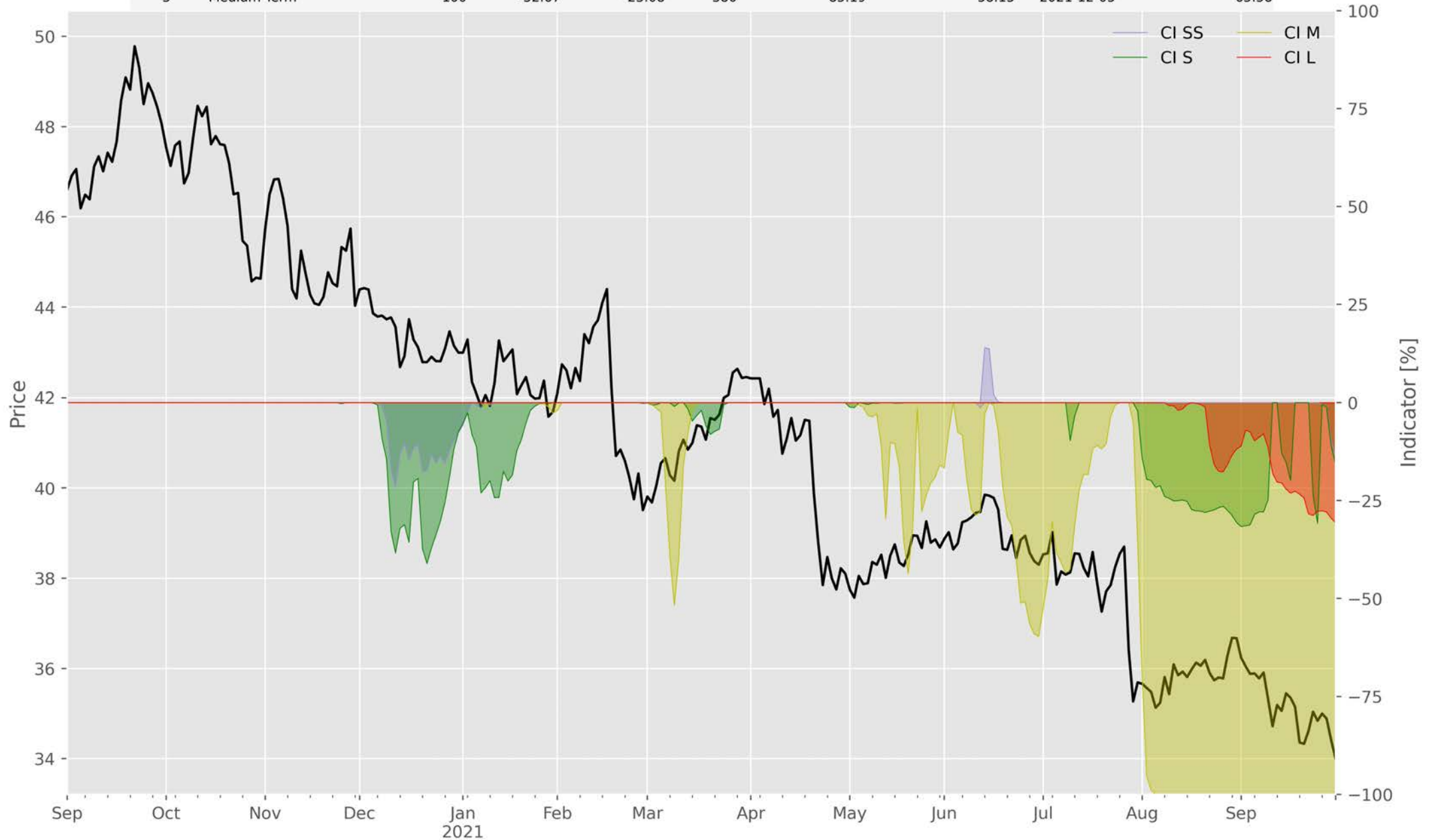
Fingerprint Cards B

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	[%]
2	Super Short	48.57	-35.33	-64.52	106	70.25	60.38	2021-11-14	98



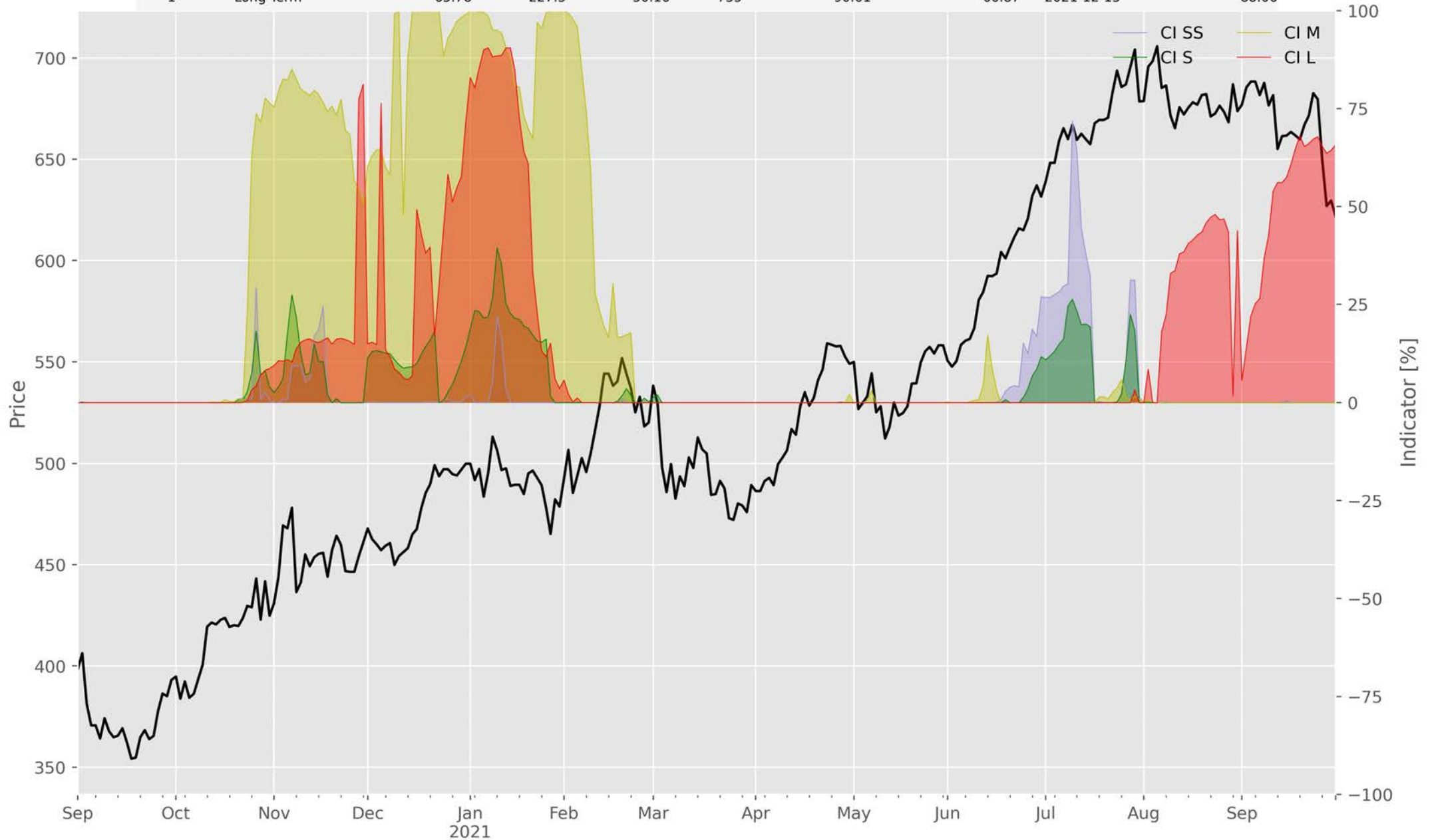
Koninklijke Vopak

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	-32.67	-23.08	380	85.19	58.15	2021-12-05	65.58



Iddex Laboratories

Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		<i>ci</i> [%]	<i>bs</i> [%]	<i>bg</i> [%]	[days]	<i>bp</i> [%]	(<i>ci</i> , <i>bg</i> , <i>bp</i>)	\hat{t}_c	[%]
1	Long Term	65.78	227.3	50.16	735	90.61	66.87	2021-12-15	88.06



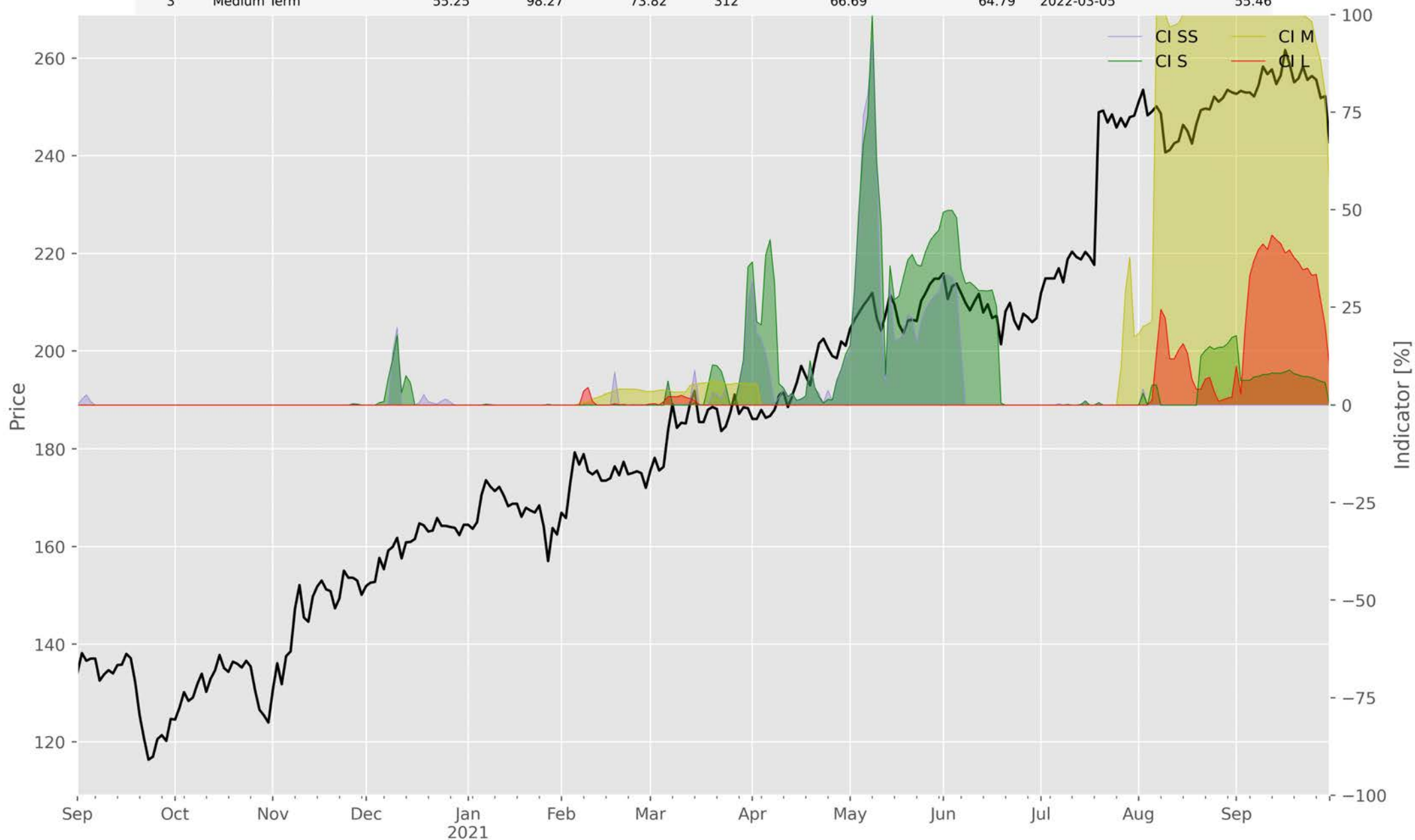
Keysight Technologies

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	82.1	110.2	36.06	608	91.95	64.81	2021-11-22	84.78



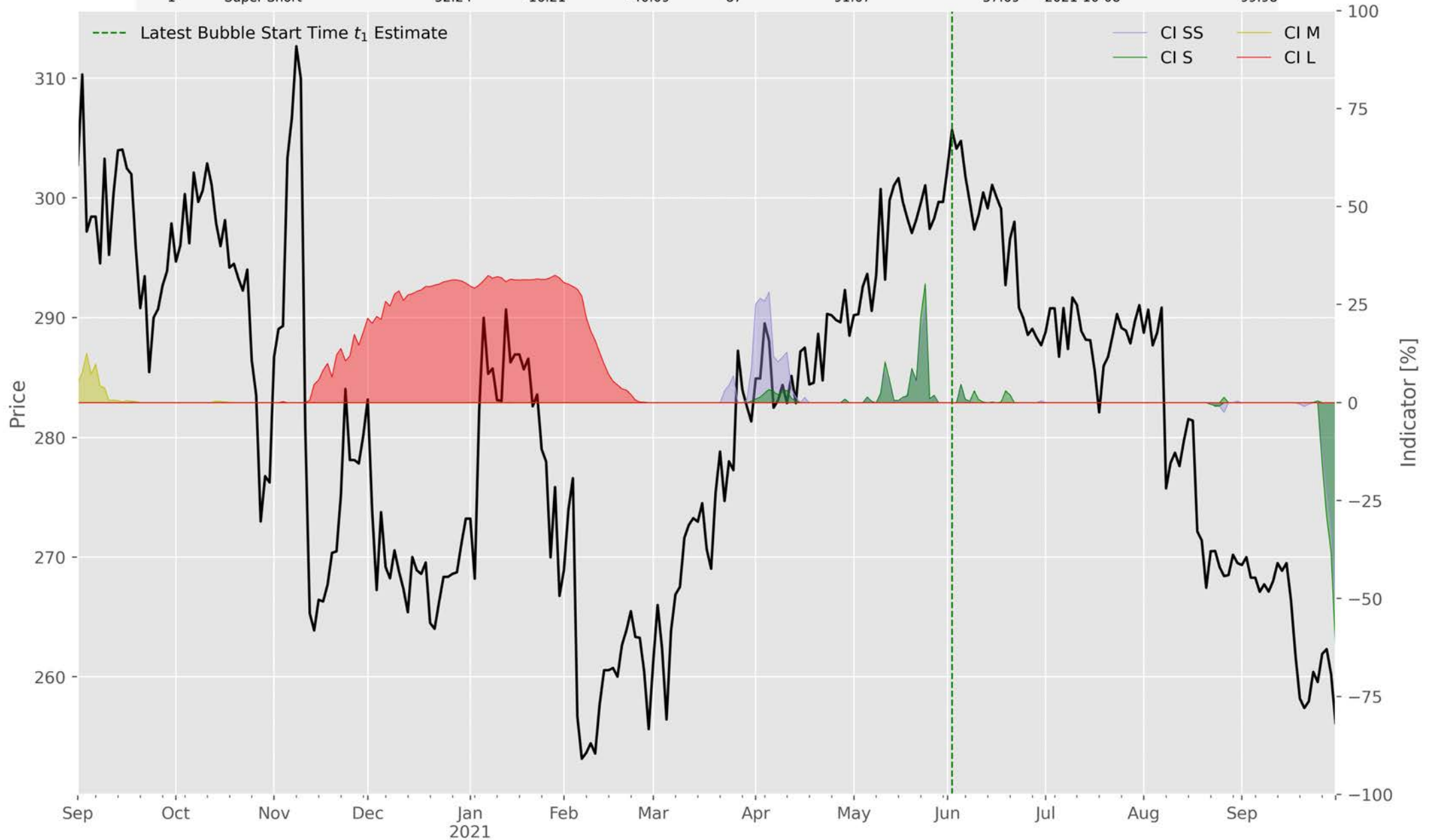
Hca Healthcare

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	55.25	98.27	73.82	312	66.69	64.79	2022-03-05	55.46



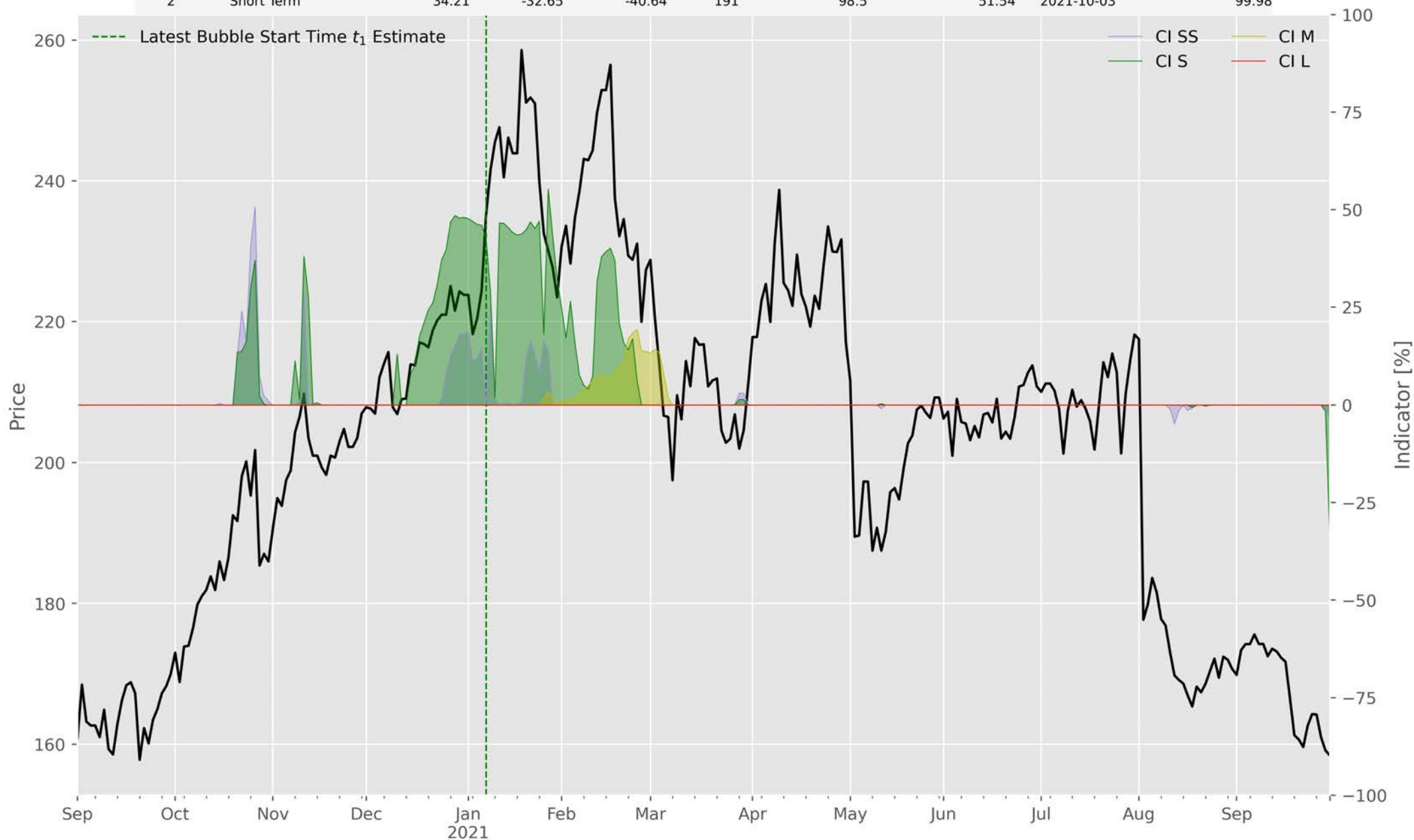
Air Prds.& Chems.

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	52.24	-16.21	-40.09	87	91.67	57.69	2021-10-08	99.98



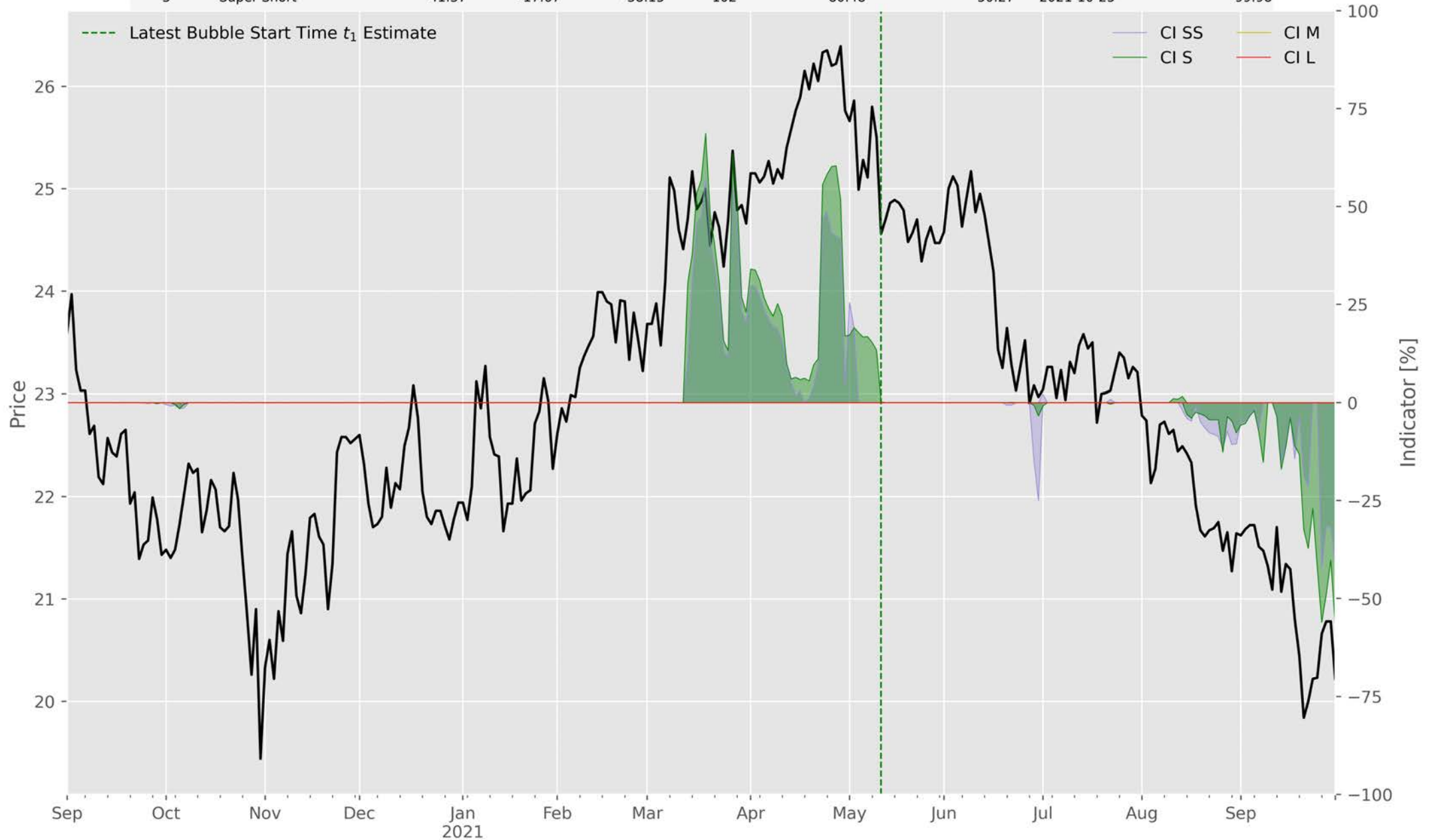
Ipg Photonics

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	34.21	-32.65	-40.64	191	98.5	51.54	2021-10-03	99.98



Western Union

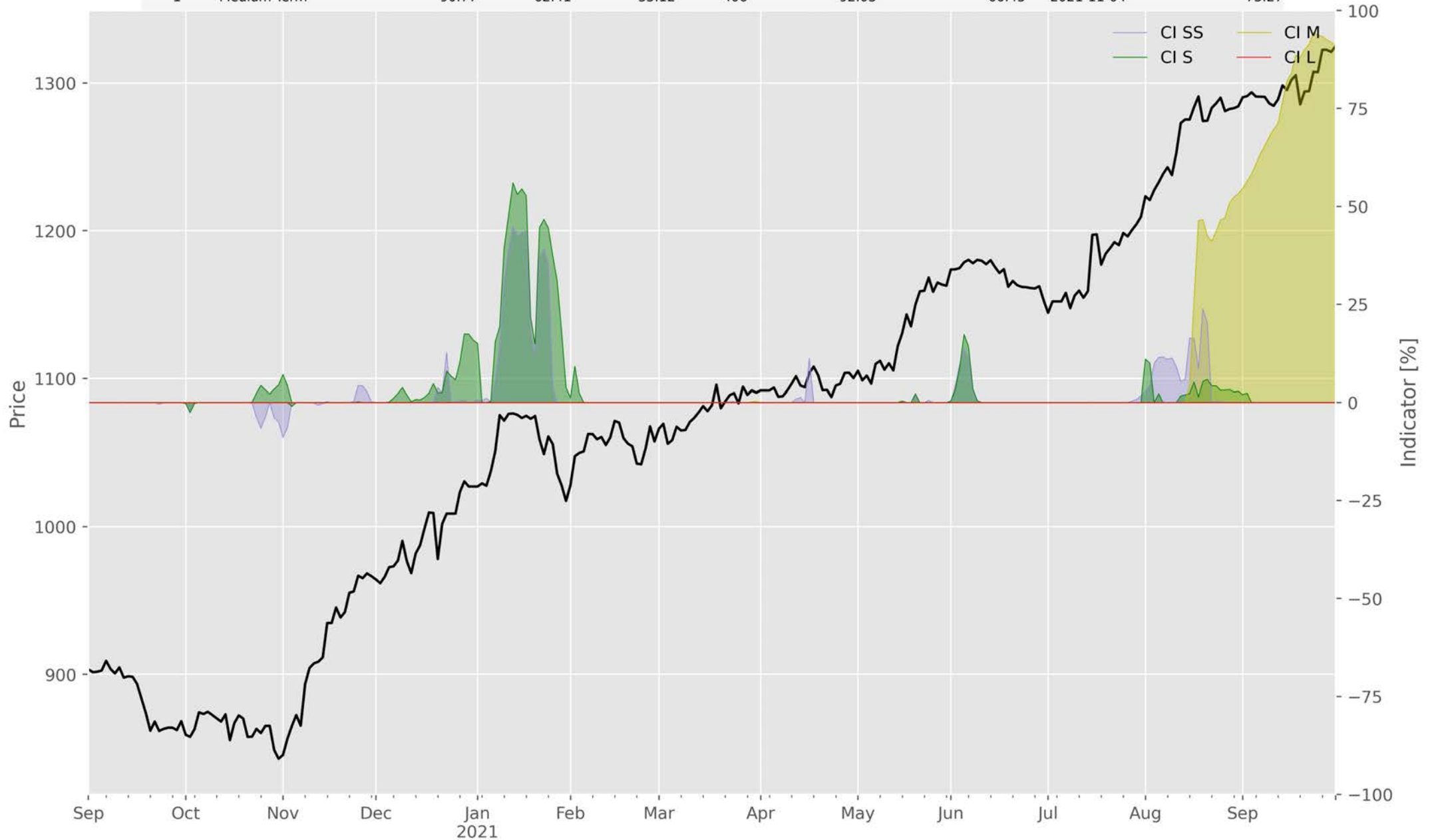
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average (<i>ci</i> , <i>bg</i> , <i>bp</i>)	Critical Time \hat{t}_c	Scenario Probability [%]
3	Super Short	41.37	-17.67	-38.15	102	80.48	50.27	2021-10-25	99.98



Equity Indices

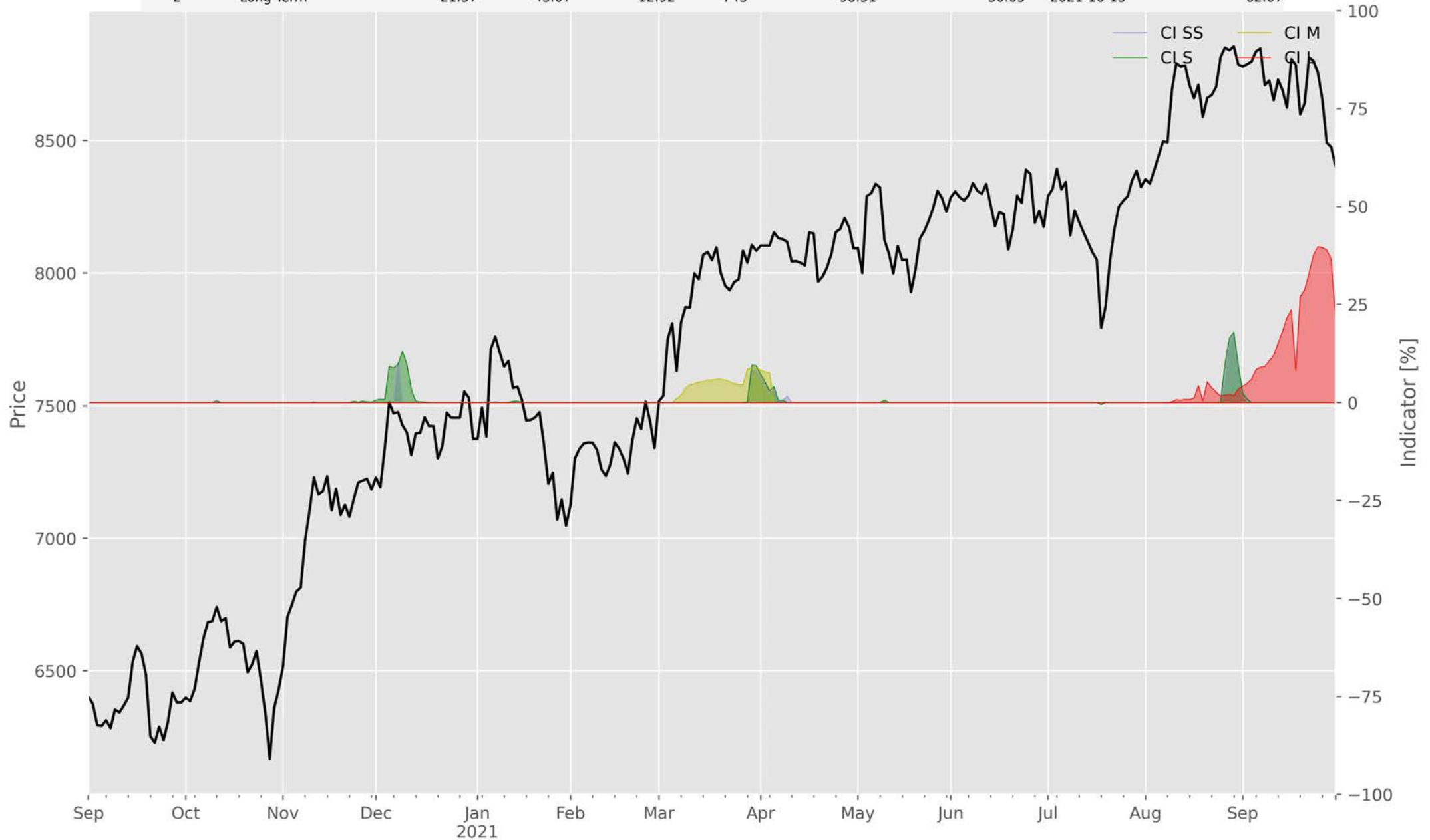
Prague Se Px

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	90.77	62.41	35.12	406	92.03	66.45	2021-11-04	73.27



Iseq All Share 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	Long Term	21.37	43.07	12.92	743	98.31	30.05	2021-10-13	62.07



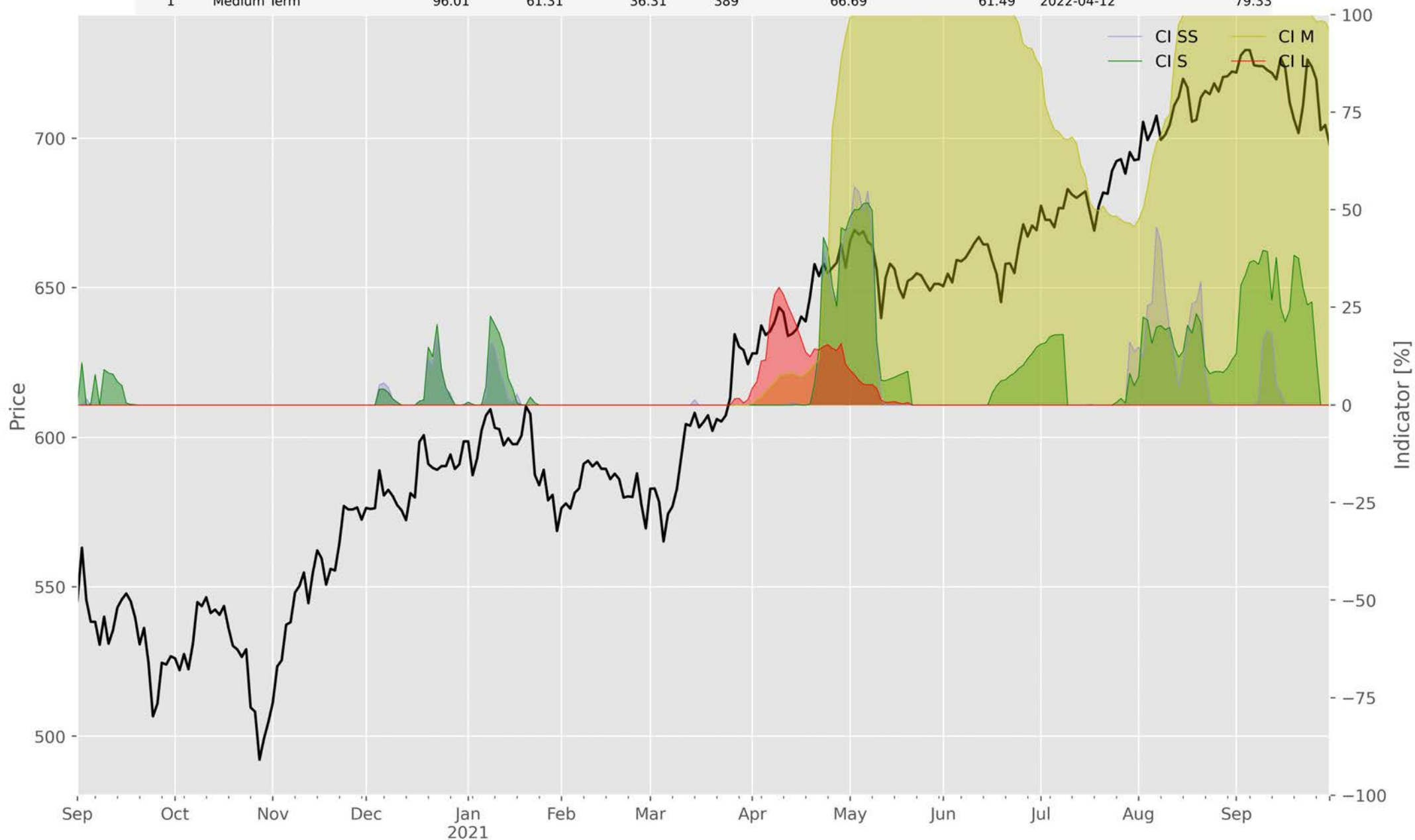
Msci Switzerland U\$

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	Long Term	23.82	33.47	7.93	953	82.06	24.94	2022-04-26	96.53



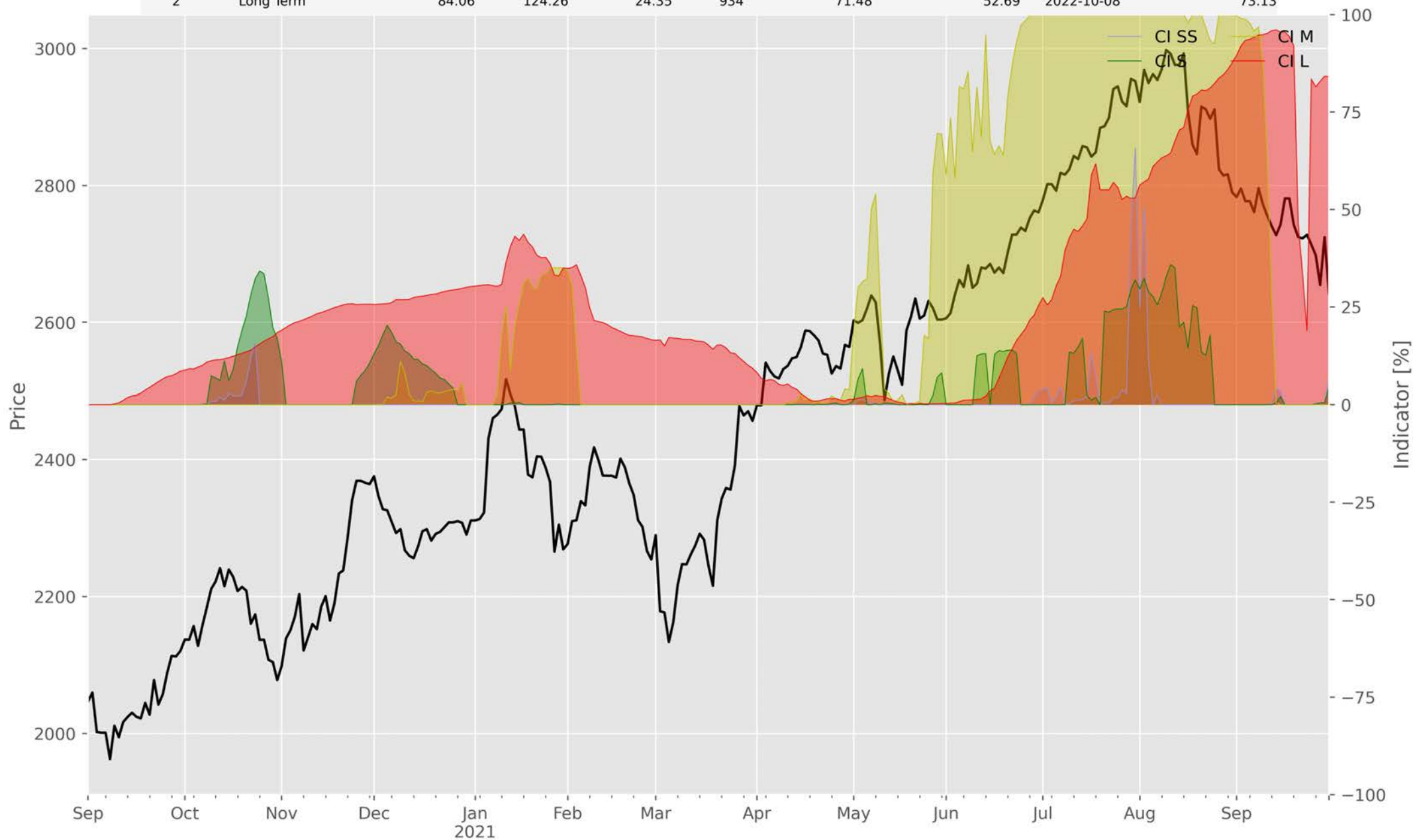
S&P1500 It Cons & O/Svs

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	[%]
1	Medium Term	96.01	61.31	36.31	389	66.69	61.49	2022-04-12	79.33



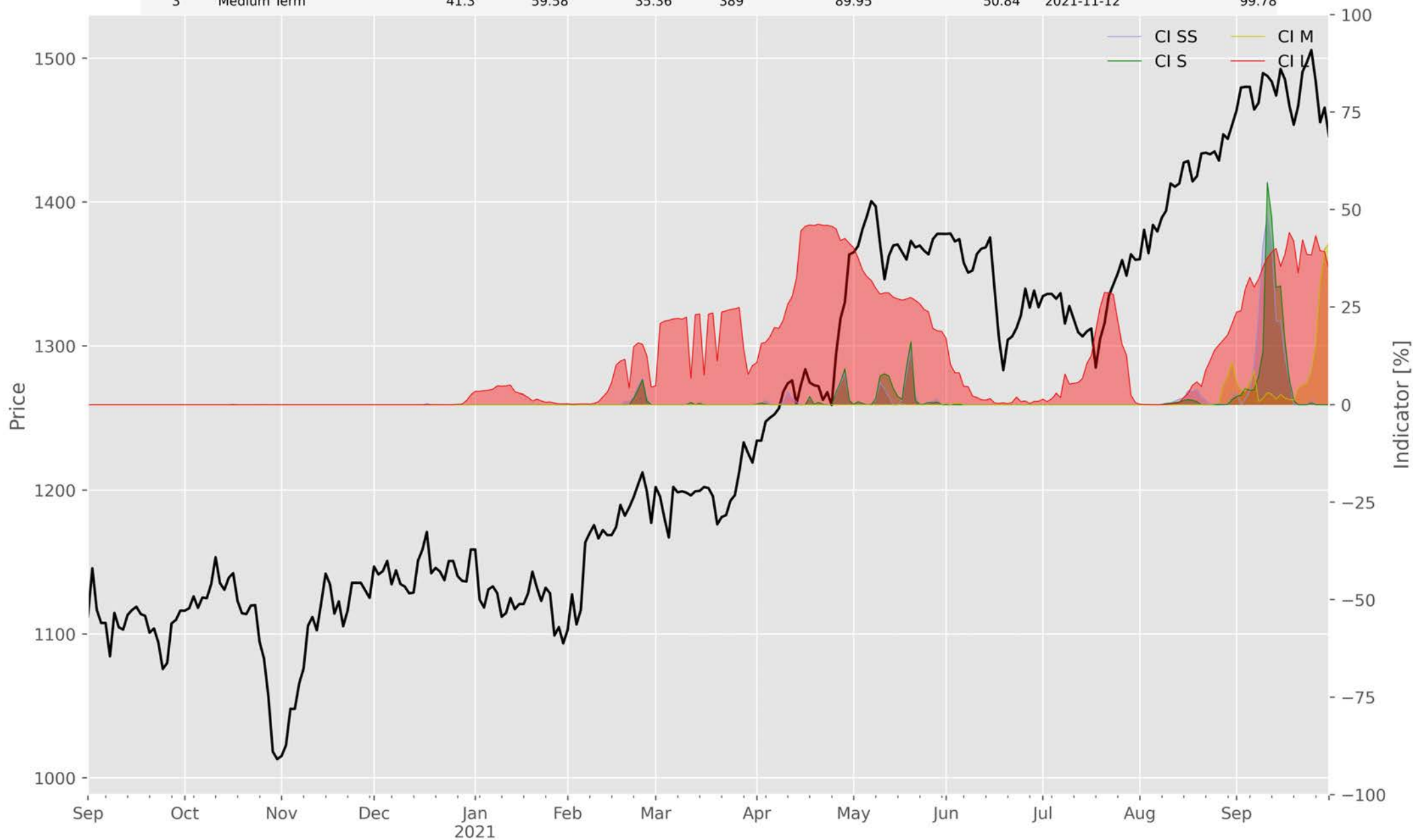
S&P500 General Merch Stores

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	Long Term	84.06	124.26	24.35	934	71.48	52.69	2022-10-08	73.13



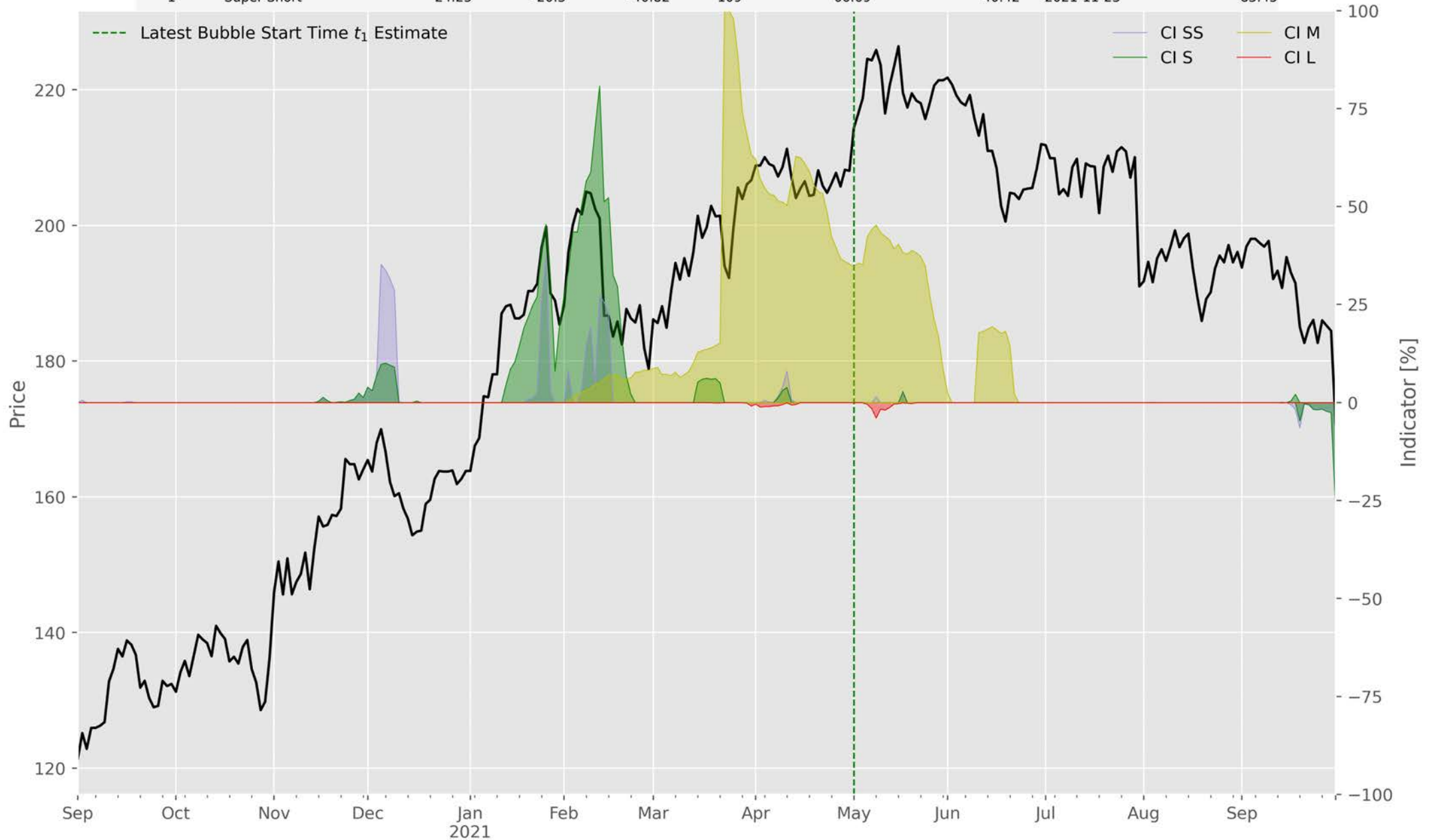
S&P1500 Insurance Brokers

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	41.3	59.58	35.36	389	89.95	50.84	2021-11-12	99.78



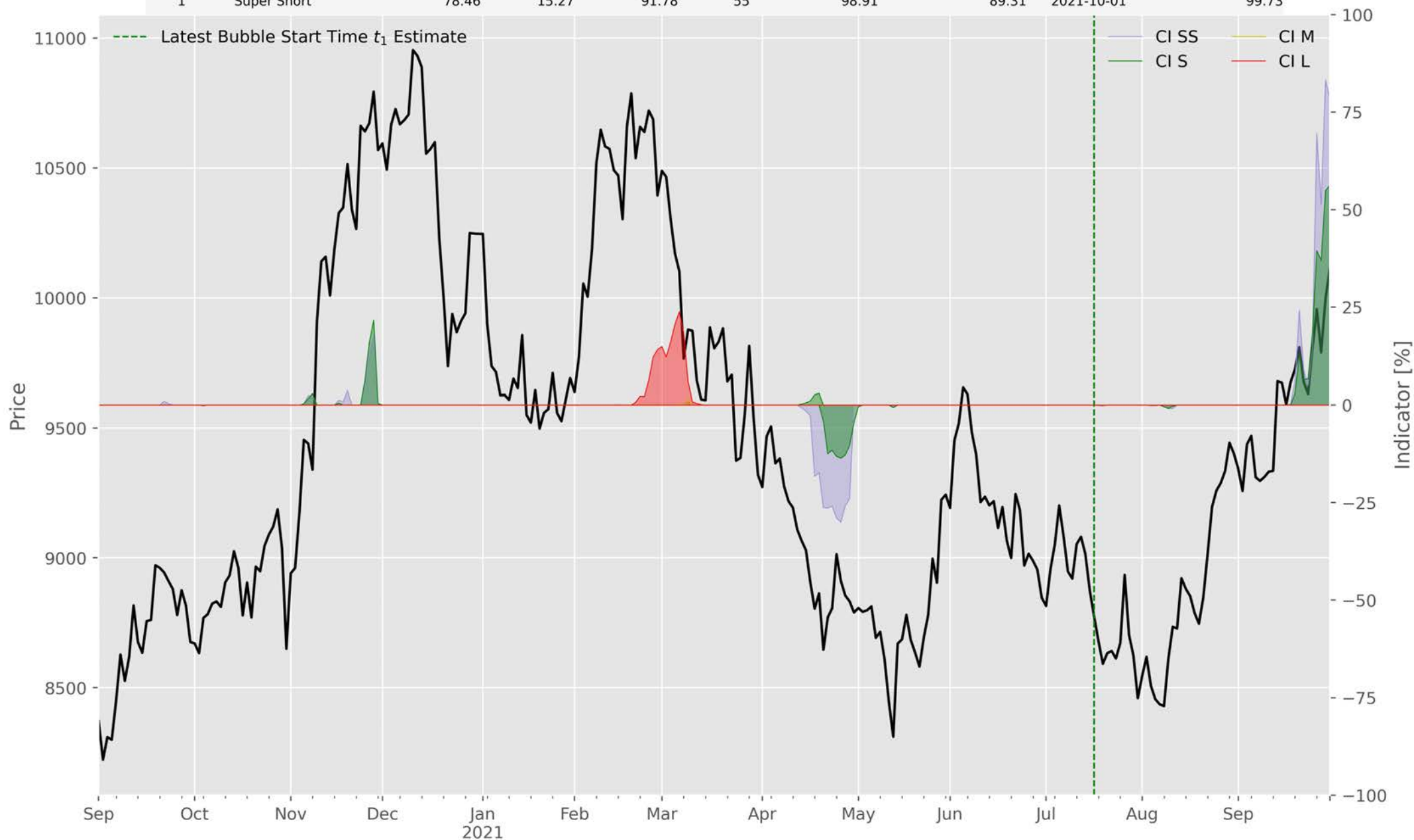
S&P500 Housewares & Specialties

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	Super Short	24.25	-20.3	-40.82	109	66.69	40.42	2021-11-23	83.45



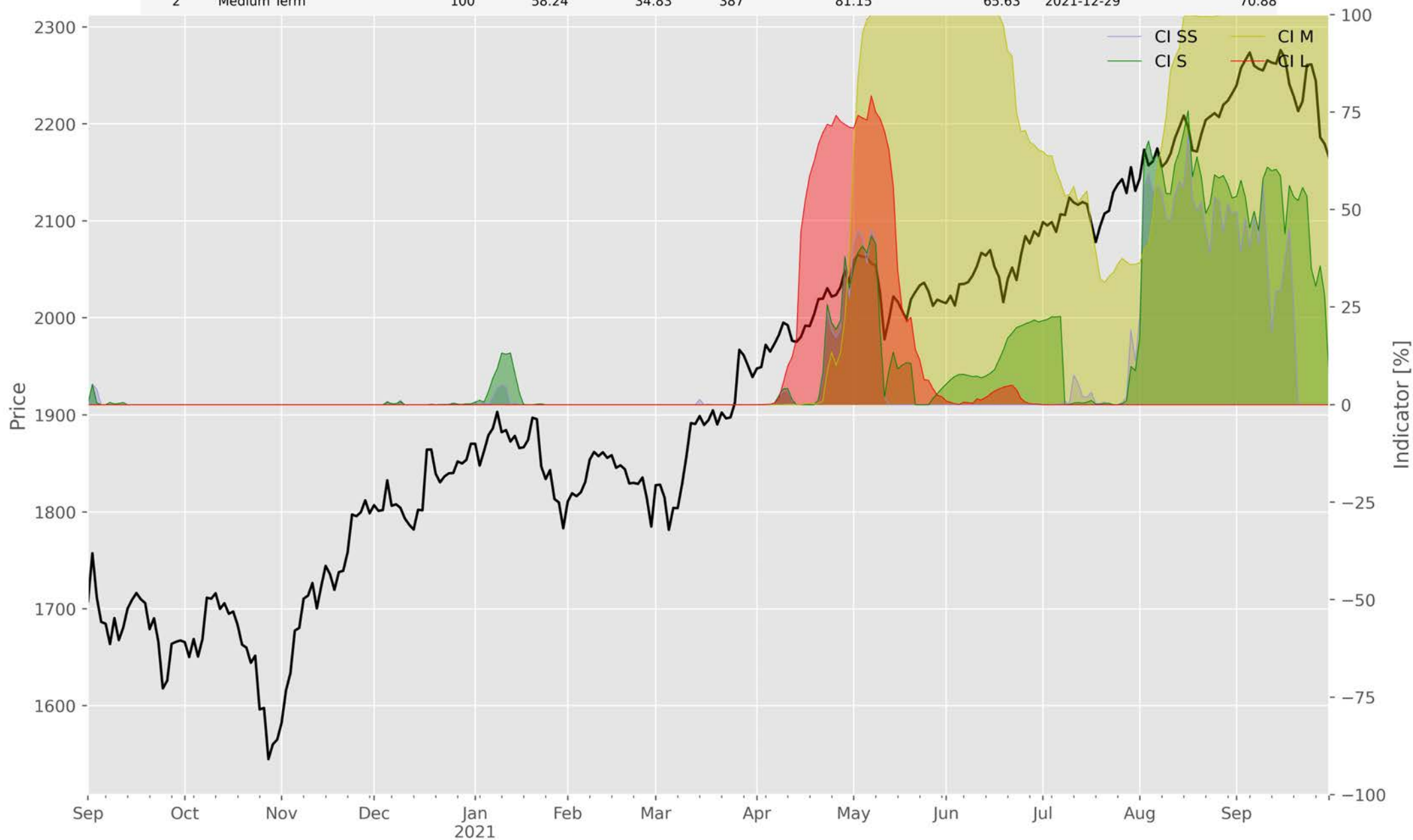
S&P Global 1200 Leis Facilities

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	78.46	15.27	91.78	55	98.91	89.31	2021-10-01	99.73



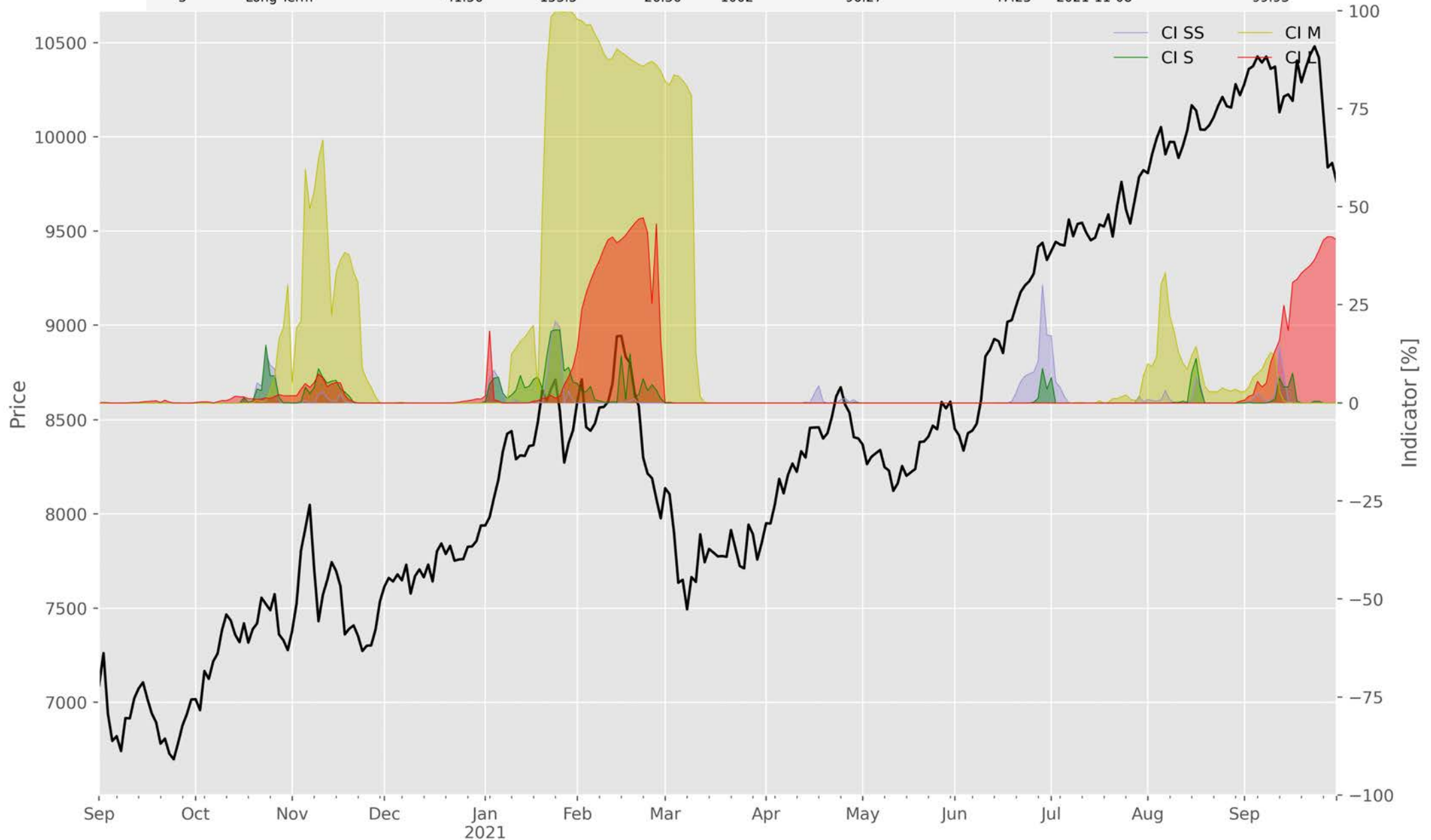
S&P Global 1200 It Consult& Svs

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	Medium Term	100	58.24	34.83	387	81.15	65.63	2021-12-29	70.88



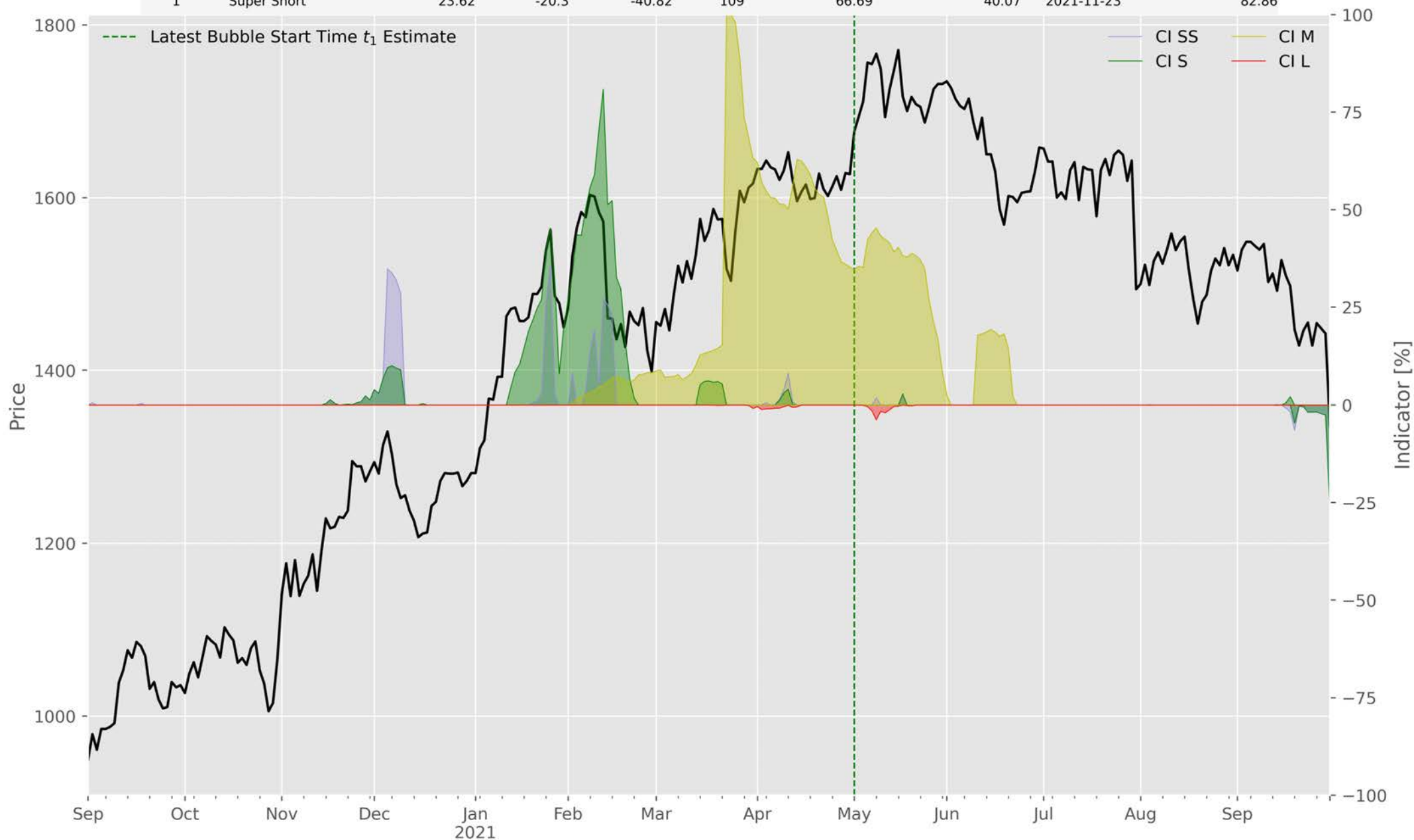
S&P Global 1200 Life Sci & Svs

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)	\tilde{t}_c	[%]
3	Long Term	41.56	153.5	26.36	1002	96.27	47.25	2021-11-08	99.93



S&P Global 1200 H/Ware & Spec

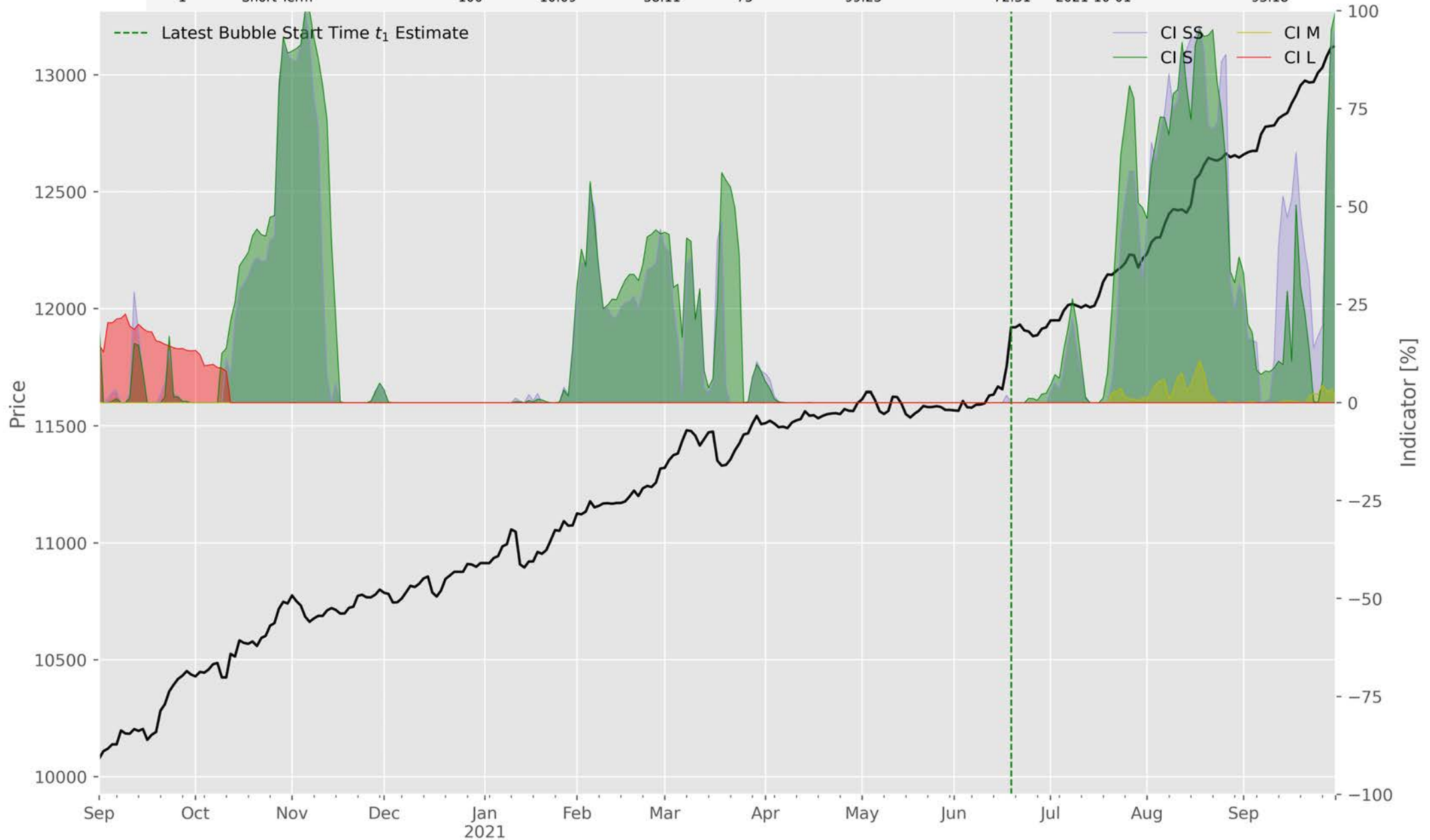
Rank	Strongest Signal	DS-LPPLS Confidence <i>ci</i> [%]	Bubble Size <i>bs</i> [%]	Bubble CAGR <i>bg</i> [%]	Duration [days]	Bubble Progress <i>bp</i> [%]	Geometric Average (<i>ci</i> , <i>bg</i> , <i>bp</i>)	Critical Time \hat{t}_c	Scenario Probability [%]
1	Super Short	23.62	-20.3	-40.82	109	66.69	40.07	2021-11-23	82.86



Forex

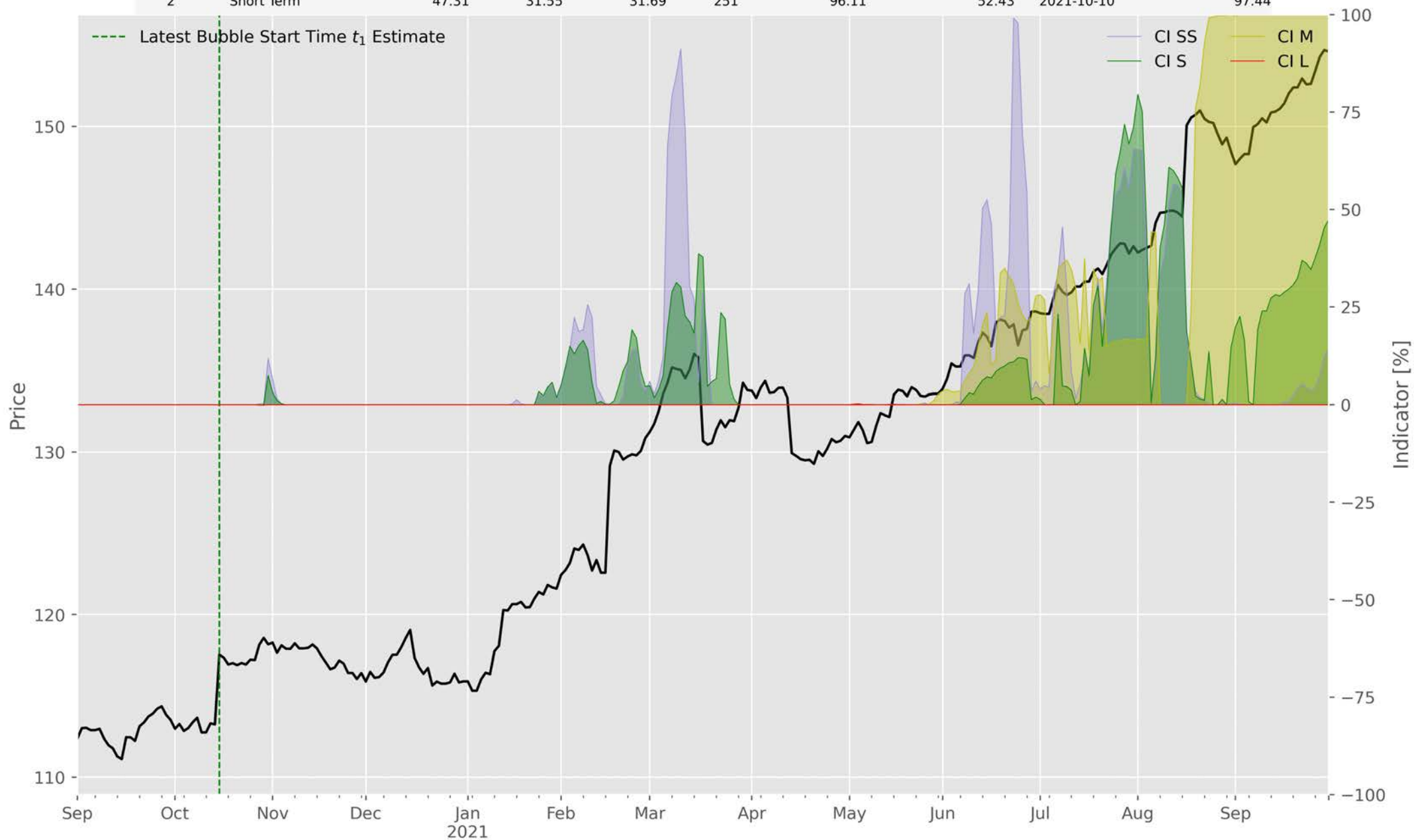
Jpm Venezuela Reer Ppi (2010=100)

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	Short Term	100	10.09	38.11	75	99.23	72.31	2021-10-01	93.18



Jpm Ukraine Reer Ppi (2010=100)

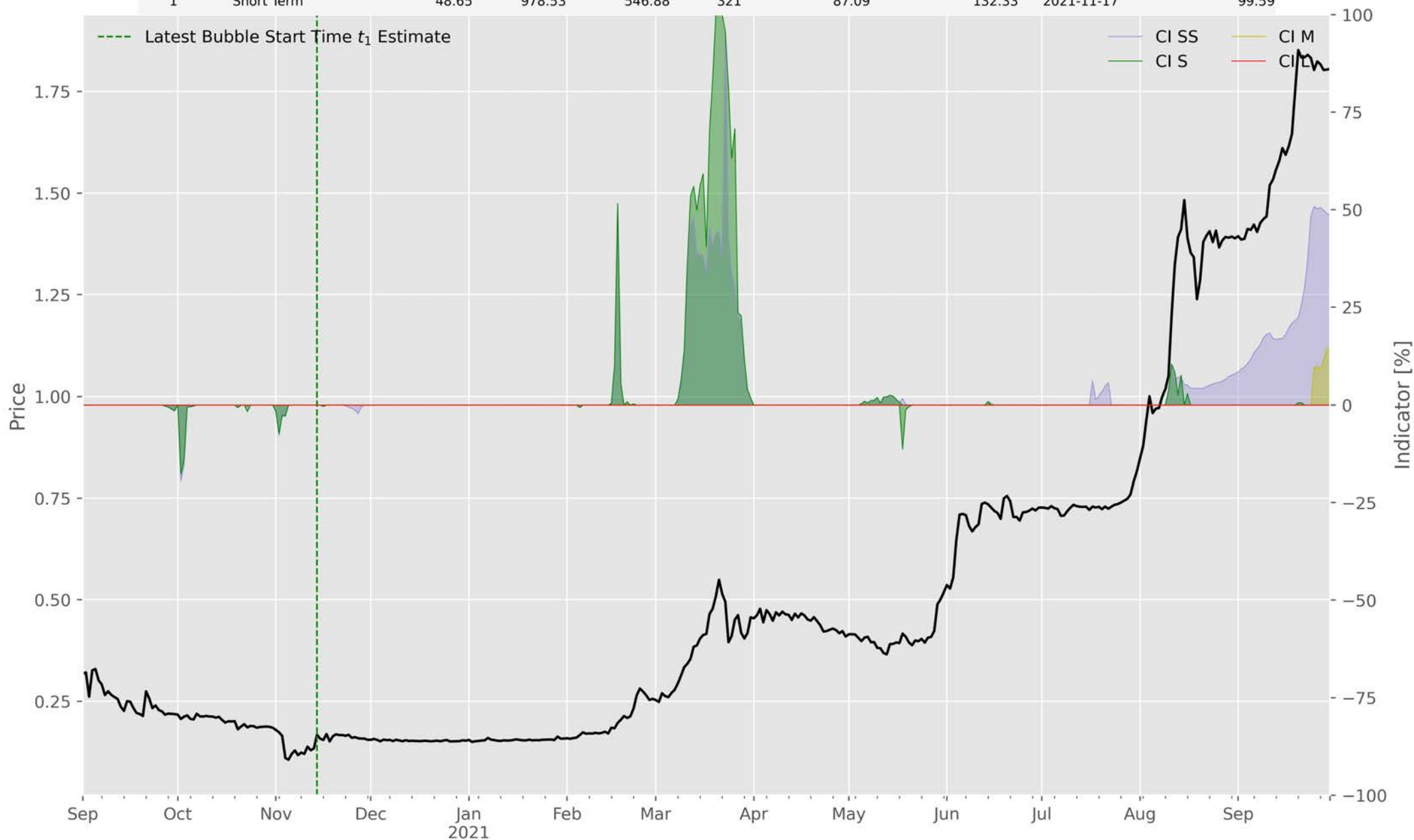
Rank	Strongest Signal	DS-LPPLS Confidence	Bubble Size	Bubble CAGR	Duration	Bubble Progress	Geometric Average	Critical Time	Scenario Probability
		ci [%]	bs [%]	bg [%]	[days]	bp [%]	(ci, bg, bp)	\hat{t}_c	[%]
2	Short Term	47.31	31.55	31.69	251	96.11	52.43	2021-10-10	97.44



CryptoX

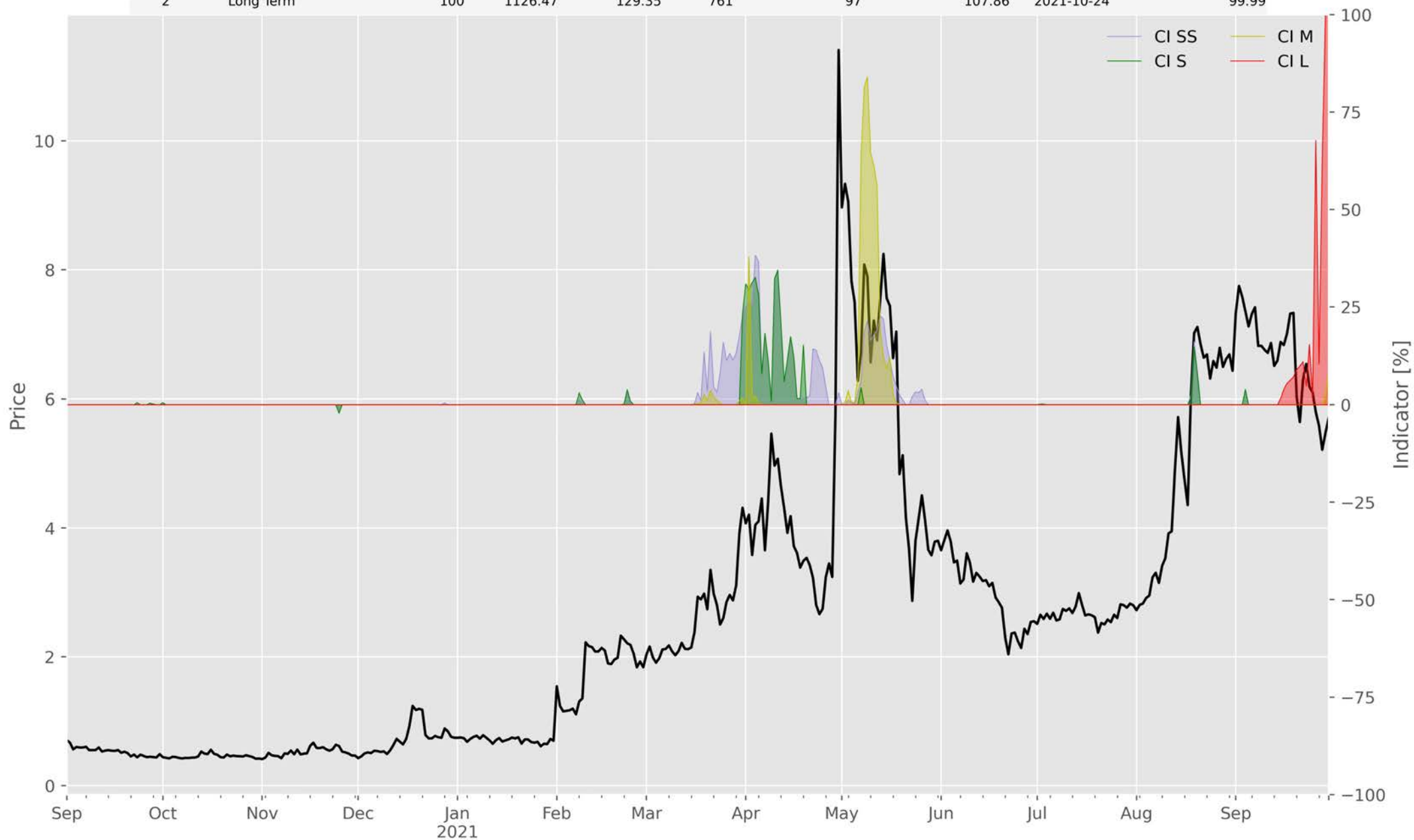
Molecular Future/USD

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	Short Term	48.65	978.53	546.88	321	87.09	132.33	2021-11-17	99.59



Radium/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)	\tilde{t}_c	[%]
2	Long Term	100	1126.47	129.35	761	97	107.86	2021-10-24	99.99



Bitcore/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	25	-54.7	-94.91	67	89.19	59.59	2021-10-08	100

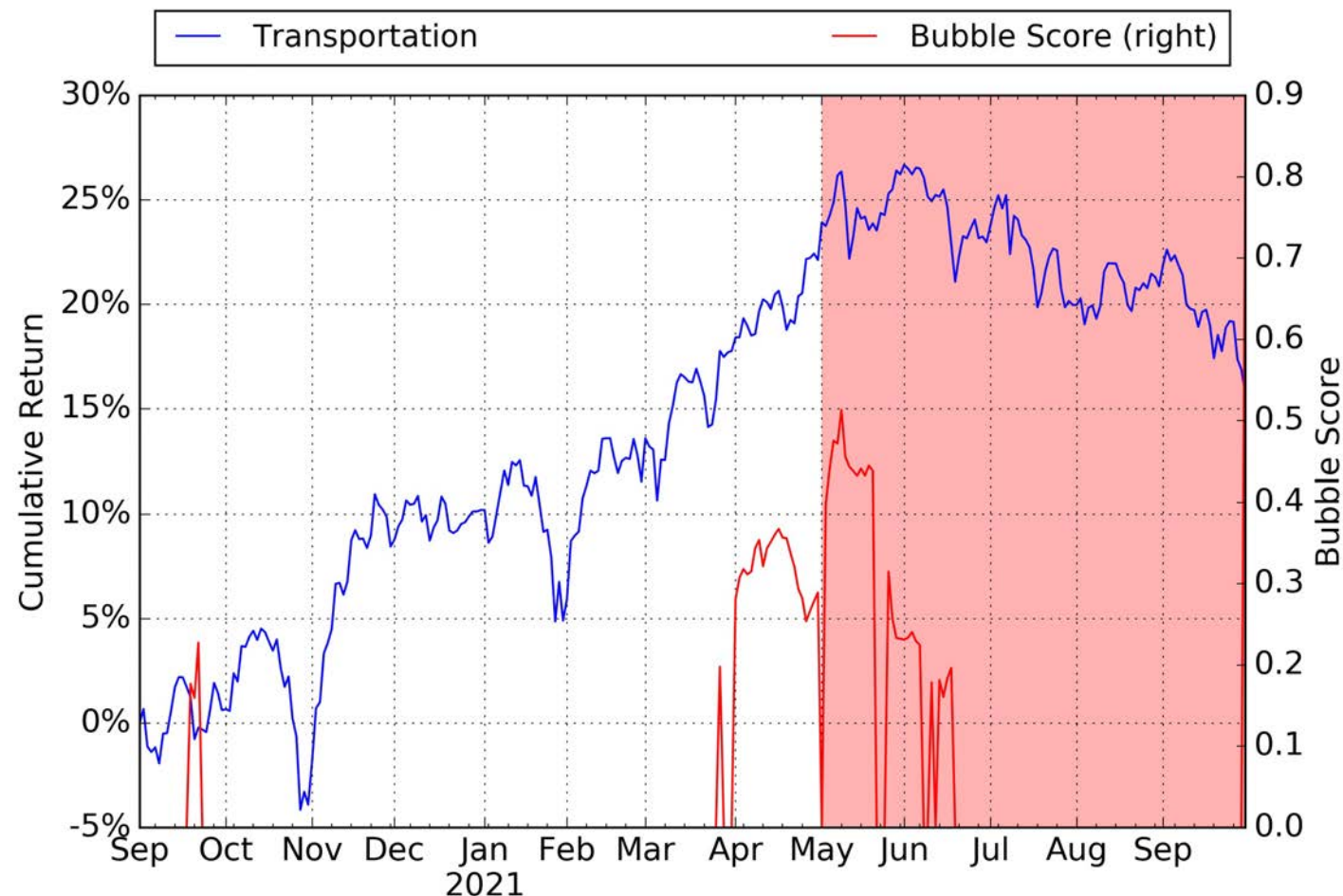


Sectors

GICS Industry Group Name	Yearly Return		Bubble Size		Bubble Score		Value Score		Growth Score	
	Oct 1st	Sep 1st	Oct 1st	Sep 1st	Oct 1st	Sep 1st	Oct 1st	Sep 1st	Oct 1st	Sep 1st
Pharmaceuticals, Biotechnology & Life Sciences	12.6%	19.2%	0.0%	18.8%	0.0%	88.7%	64.7%	65.0%	57.1%	57.2%
Consumer Services	22.8%	23.6%	0.0%	0.0%	0.0%	0.0%	24.2%	23.1%	59.5%	58.6%
Retailing	7.8%	19.8%	0.0%	0.0%	0.0%	0.0%	18.3%	17.9%	44.8%	44.2%
Transportation	10.7%	18.8%	-6.6%	0.0%	-81.6%	0.0%	42.9%	43.5%	54.3%	54.6%
Consumer Durables & Apparel	23.4%	34.1%	0.0%	0.0%	0.0%	0.0%	33.7%	33.8%	48.6%	48.7%
Semiconductors & Semiconductor Equipment	36.8%	58.7%	0.0%	0.0%	0.0%	0.0%	54.5%	54.8%	42.0%	41.5%
Technology Hardware & Equipment	22.2%	36.0%	0.0%	0.0%	0.0%	0.0%	50.8%	47.8%	51.3%	51.5%
Automobiles & Components	49.9%	49.4%	0.0%	0.0%	0.0%	0.0%	52.3%	52.5%	42.6%	42.6%
Telecommunication Services	4.1%	6.3%	0.0%	0.0%	0.0%	0.0%	58.9%	60.7%	43.5%	43.2%
Energy	60.5%	38.0%	0.0%	0.0%	0.0%	0.0%	50.7%	50.6%	70.3%	69.5%
Software & Services	18.1%	33.7%	0.0%	31.3%	0.0%	15.6%	36.8%	35.0%	51.8%	51.3%
Materials	14.9%	23.9%	0.0%	0.0%	0.0%	0.0%	49.4%	49.1%	51.2%	51.5%
Health Care Equipment & Services	19.1%	30.5%	0.0%	15.8%	0.0%	70.5%	48.1%	47.8%	52.5%	52.7%
Capital Goods	24.2%	32.9%	0.0%	0.0%	0.0%	0.0%	48.8%	49.0%	49.4%	49.7%
Media & Entertainment	37.2%	52.3%	0.0%	21.7%	0.0%	32.1%	30.2%	28.5%	32.5%	32.5%
Commercial & Professional Services	19.8%	26.7%	0.0%	20.3%	0.0%	33.5%	29.1%	29.0%	52.2%	51.9%
Food & Staples Retailing	11.3%	21.8%	0.0%	18.9%	0.0%	24.1%	38.8%	38.7%	62.3%	64.5%
Household & Personal Products	-5.0%	1.6%	0.0%	0.0%	0.0%	0.0%	27.7%	28.0%	53.5%	53.5%
Food, Beverage & Tobacco	7.5%	11.8%	0.0%	0.0%	0.0%	0.0%	47.8%	47.4%	57.0%	57.4%
Utilities	-0.9%	12.8%	0.0%	0.0%	0.0%	0.0%	44.8%	45.5%	53.5%	53.7%
Insurance	29.1%	29.3%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Real Estate	20.4%	26.9%	0.0%	0.0%	0.0%	0.0%	-	-	-	-
Diversified Financials	40.1%	49.0%	0.0%	22.2%	0.0%	30.9%	-	-	-	-
Banks	58.4%	50.5%	0.0%	0.0%	0.0%	0.0%	-	-	-	-

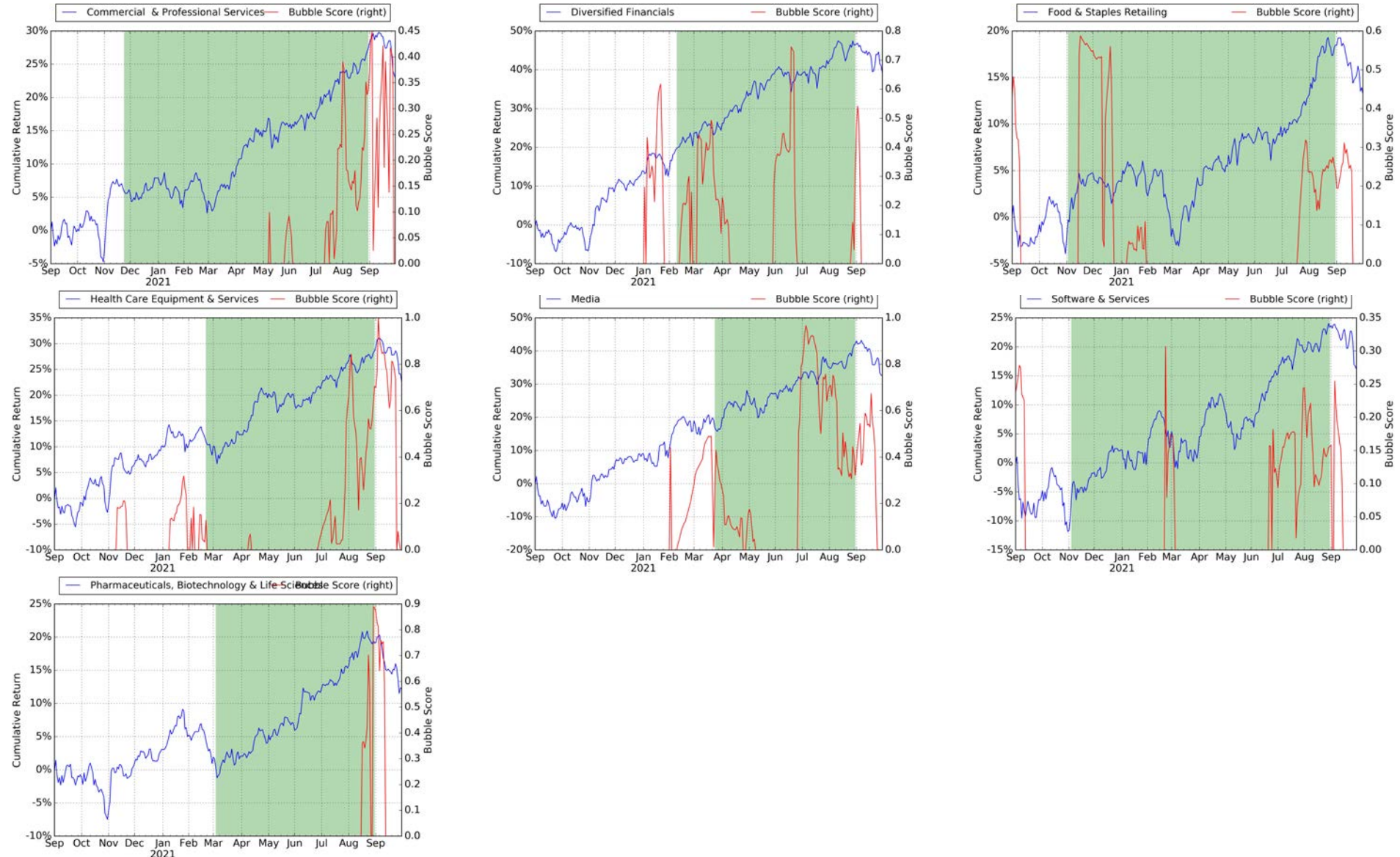
Sectors

- ▶ 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.
- ▶ For the first time in the past two years, we observe a negative bubble in the 24 MSCI World Industry Group Indices (see below): *Transportation*. Meanwhile, the seven positive bubbles we identified last month have ended their bubble regimes (see next page).



Sectors

- The seven potential bubbles identified last month that have all peaked and started their drawdown.



Portfolio Construction & Performance

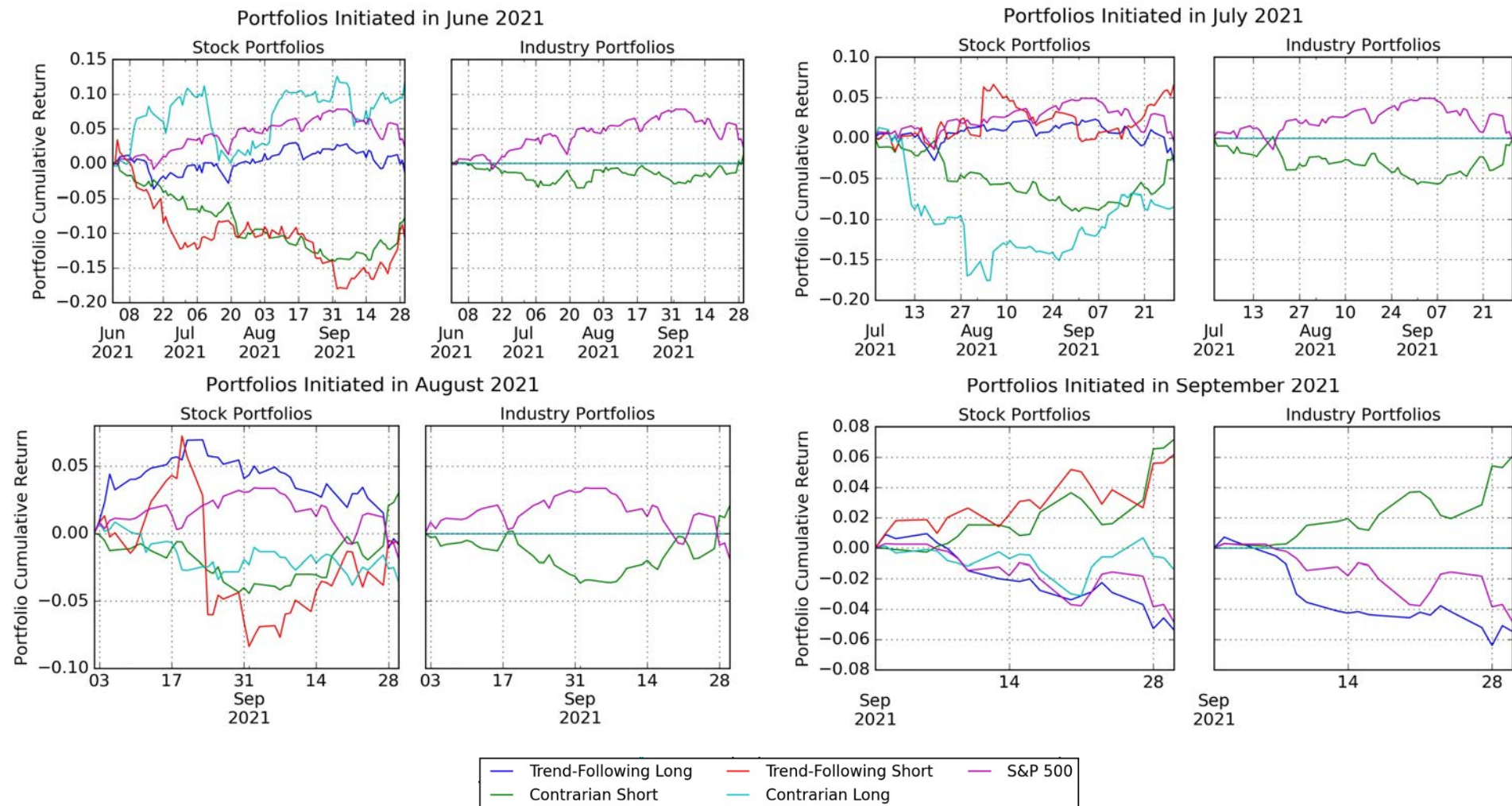
- ▶ Here we illustrate the methodology of the portfolio construction process based on the results of our previous analyses.
- ▶ For individual stocks that we identified in the 4 quadrants, we constructed 4 portfolios based on the 4 quadrants defined in the last report. Each portfolio consists of all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

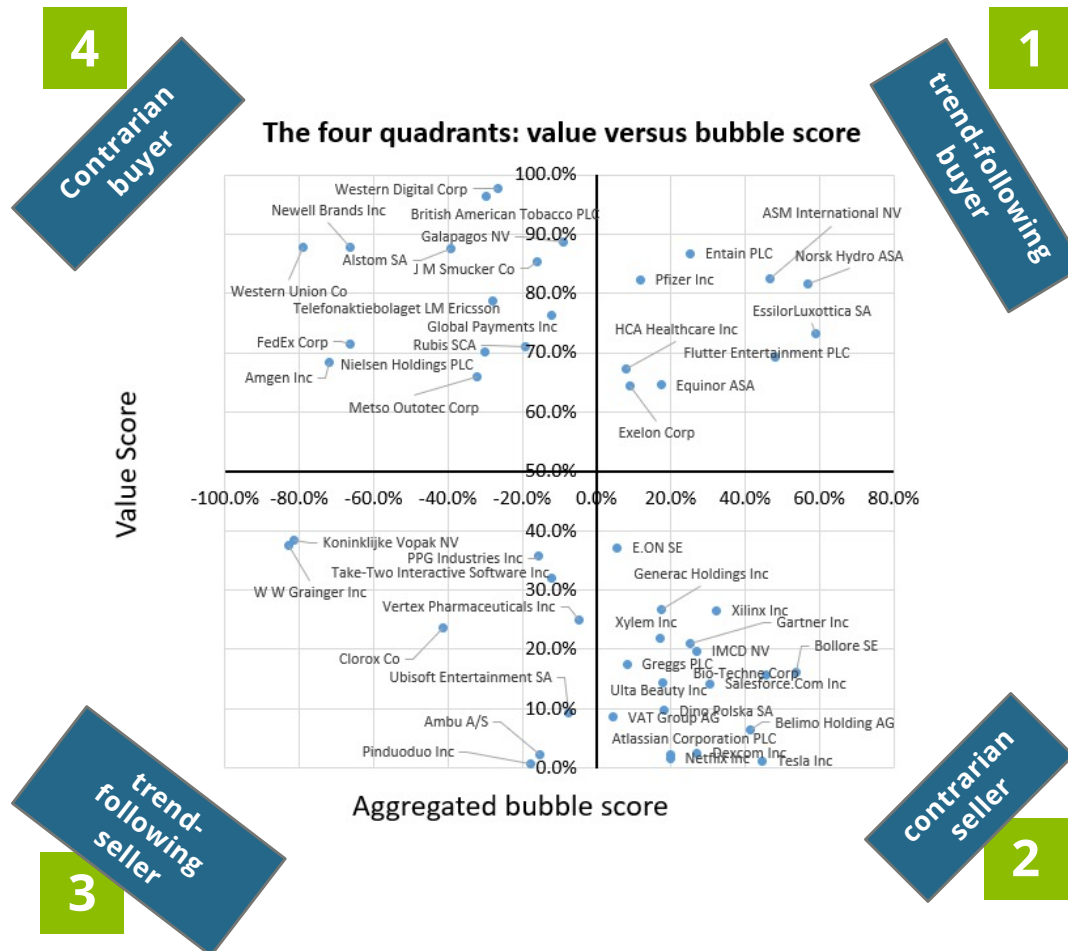
Portfolio Construction & Performance

- ▶ The market has entered a volatile period in the past month with Short Portfolios starting to outperform. 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. 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. Xilinx Inc
- **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. Ambu A/S
- **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. Amgen Inc.

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.

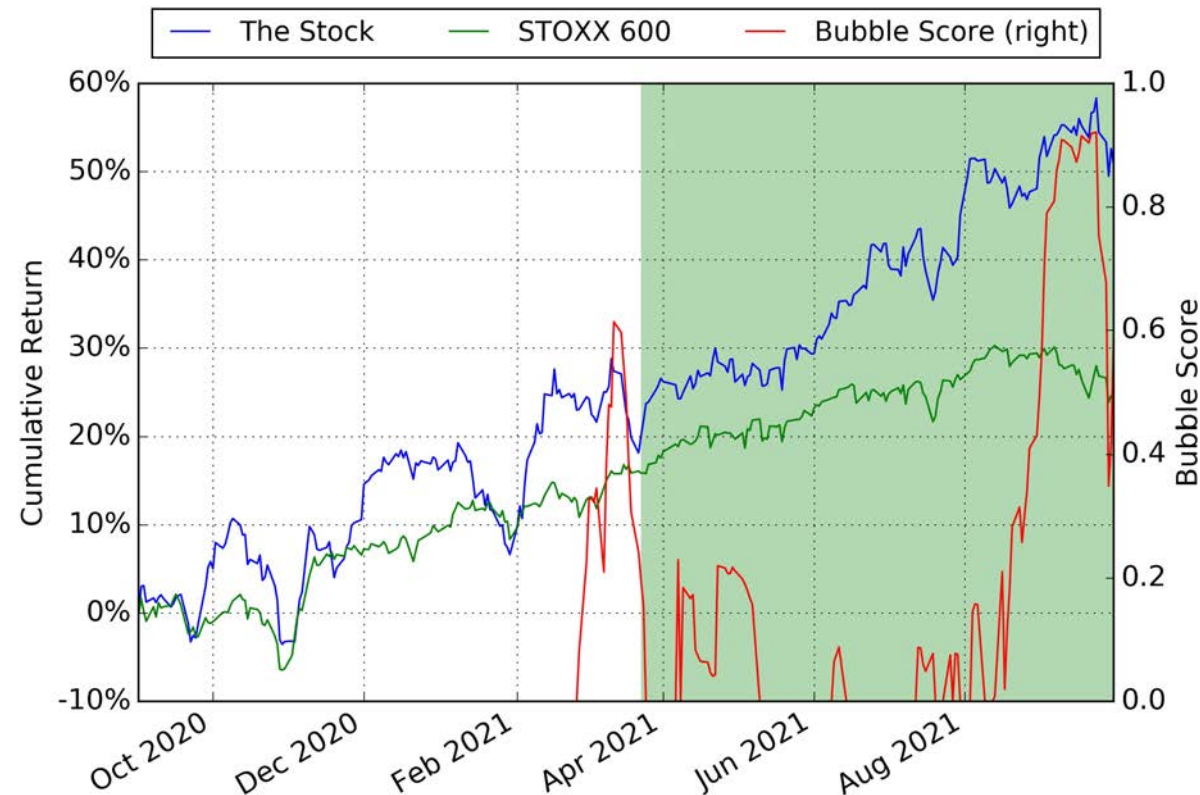
Single Stocks

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
Exelon Corp	United States of America	Utilities	23.3%	20.9%	Oct-20	9.0%	64.4%	25.7%
HCA Healthcare Inc	United States of America	Health Care Equipment & Services	81.2%	64.8%	Nov-20	8.0%	67.2%	26.4%
Pfizer Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	23.3%	14.1%	Dec-20	11.8%	82.3%	95.6%
Flutter Entertainment PLC	Ireland; Republic of	Consumer Services	12.9%	16.3%	May-21	48.1%	69.4%	83.2%
Norsk Hydro ASA	Norway	Materials	152.0%	42.3%	Feb-21	56.9%	81.6%	90.6%
Entain PLC	Isle of Man	Consumer Services	95.3%	58.7%	Feb-21	25.3%	86.7%	82.2%
EssilorLuxottica SA	France	Consumer Durables & Apparel	36.2%	23.9%	Mar-21	59.1%	73.2%	60.5%
ASM International NV	Netherlands	Semiconductors & Semiconductor Equipment	152.5%	36.2%	Apr-21	46.8%	82.6%	34.7%
Equinor ASA	Norway	Energy	63.9%	38.3%	Jan-21	17.4%	64.5%	94.0%
SES SA	Luxembourg	Media & Entertainment	17.7%	21.4%	Apr-21	25.9%	79.6%	99.4%

Single Stocks

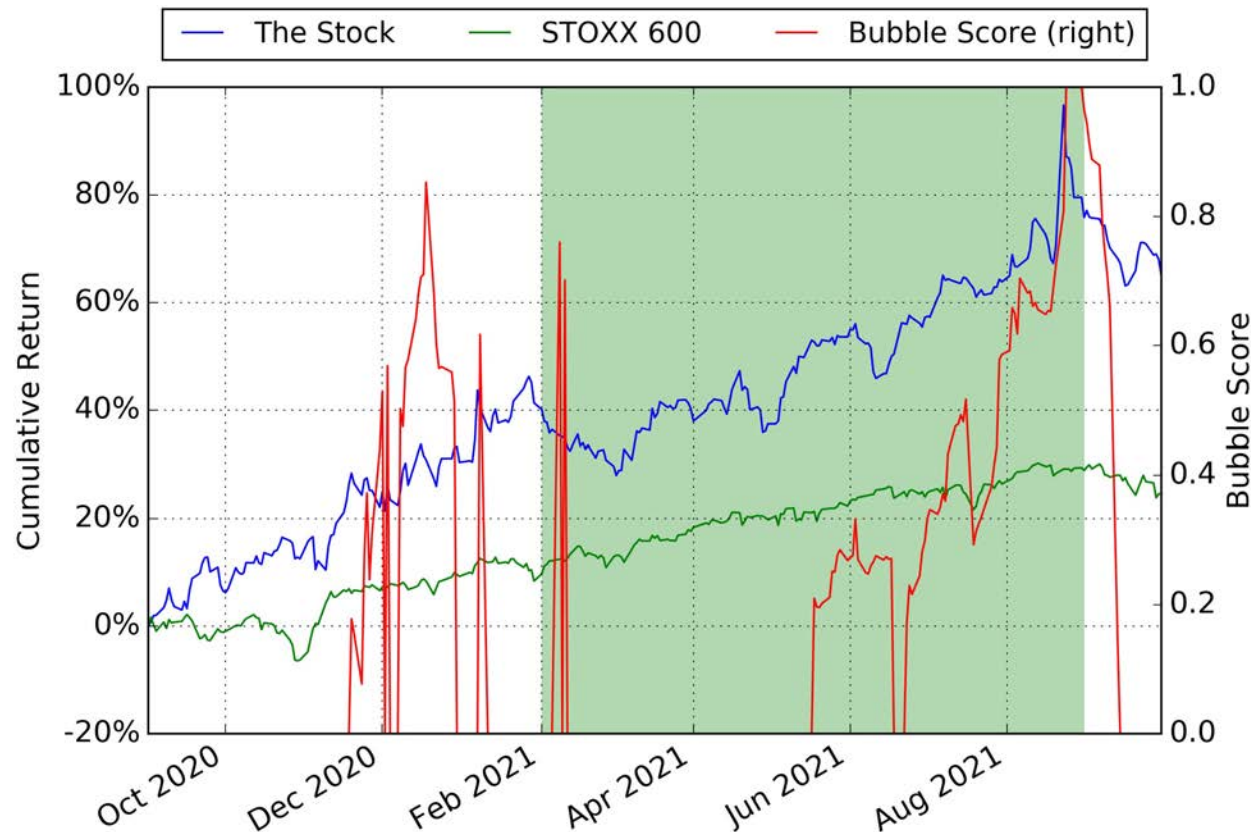
Quadrant 1 Stocks Current Month Example – EssilorLuxottica SA.



- 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 green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this six-month bubble has reached 59.1% with a bubble size 23.9%.

Single Stocks

Quadrant 1 Stocks Last Month Example – J Sainsbury PLC.



- 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 ended its bubble regime with a 20% drawdown in the past month, which is in agreement with our strong bubble signal identified last month but still surprising, given the strong fundamentals.

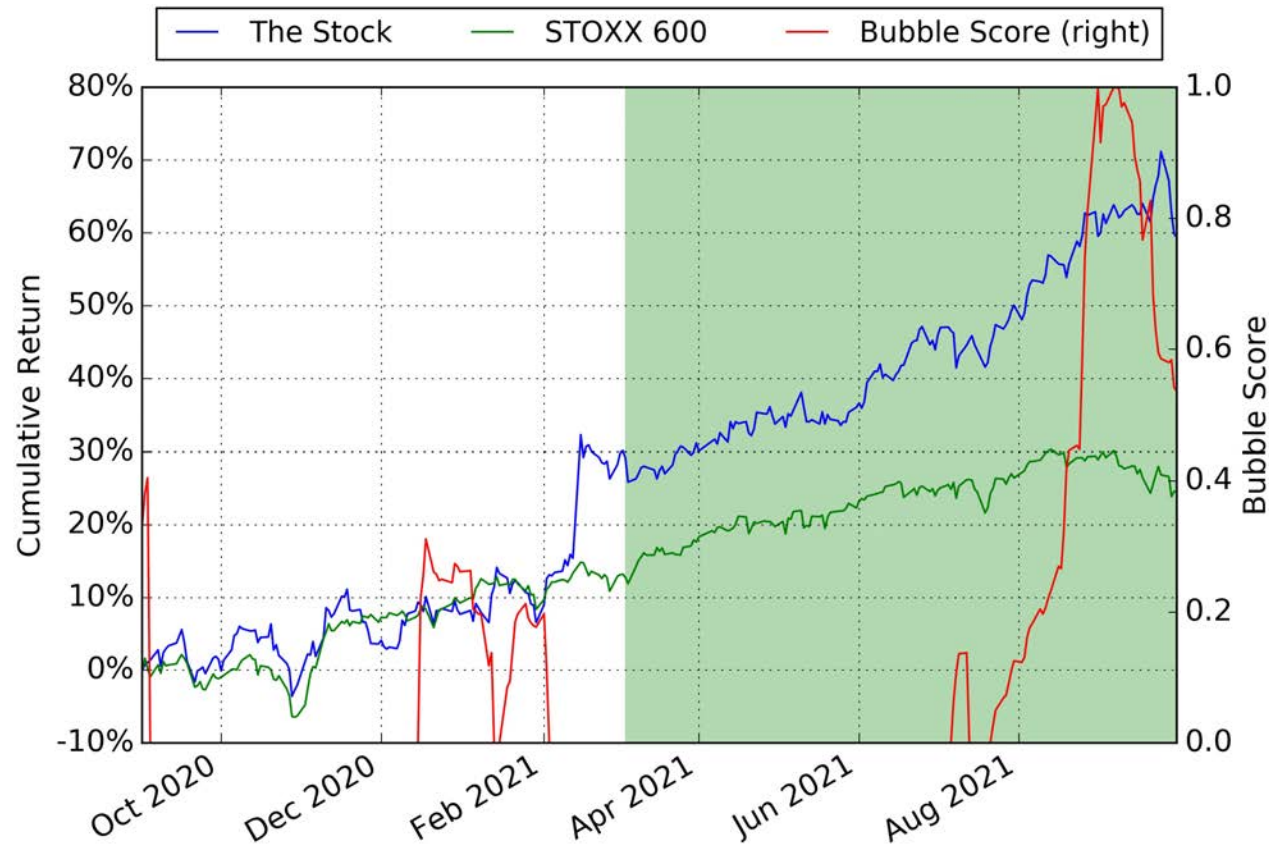
Single Stocks

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
Bio-Techne Corp	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	82.8%	26.9%	Mar-21	45.5%	15.6%	50.6%
Generac Holdings Inc	United States of America	Capital Goods	98.8%	98.8%	Oct-20	17.3%	26.8%	54.7%
Dexcom Inc	United States of America	Health Care Equipment & Services	41.7%	53.7%	Mar-21	27.1%	2.4%	53.1%
Gartner Inc	United States of America	Software & Services	140.4%	65.4%	Feb-21	25.2%	21.0%	23.4%
Xilinx Inc	United States of America	Semiconductors & Semiconductor Equipment	24.8%	22.2%	May-21	32.4%	26.6%	62.3%
Ulta Beauty Inc	United States of America	Retailing	54.5%	31.1%	Nov-20	18.0%	14.3%	21.5%
Netflix Inc	United States of America	Media & Entertainment	13.1%	19.9%	Apr-21	19.8%	1.6%	59.1%
Tesla Inc	United States of America	Automobiles & Components	78.7%	23.3%	May-21	44.7%	1.2%	72.6%
Salesforce.Com Inc	United States of America	Software & Services	2.0%	24.9%	May-21	30.6%	14.1%	41.5%
Xylem Inc	United States of America	Capital Goods	36.5%	36.2%	Nov-20	17.0%	21.9%	47.7%
Atlassian Corporation PLC	United Kingdom	Software & Services	96.8%	71.5%	Apr-21	19.8%	2.3%	64.9%
Bolloré SE	France	Media & Entertainment	50.8%	26.6%	Mar-21	53.7%	16.1%	93.6%
Dino Polska SA	Poland	Food & Staples Retailing	54.4%	37.8%	Feb-21	18.3%	9.6%	72.5%
Belimo Holding AG	Switzerland	Capital Goods	34.4%	49.0%	Feb-21	41.3%	6.5%	24.3%
Greggs PLC	United Kingdom	Consumer Services	109.5%	47.6%	Jan-21	8.2%	17.4%	18.6%
VAT Group AG	Switzerland	Capital Goods	105.4%	117.8%	Oct-20	4.4%	8.5%	84.5%
E.ON SE	Germany	Utilities	8.5%	17.9%	Oct-20	5.6%	37.1%	26.9%
IMCD NV	Netherlands	Capital Goods	60.3%	62.1%	Dec-20	27.0%	19.7%	29.6%

Single Stocks

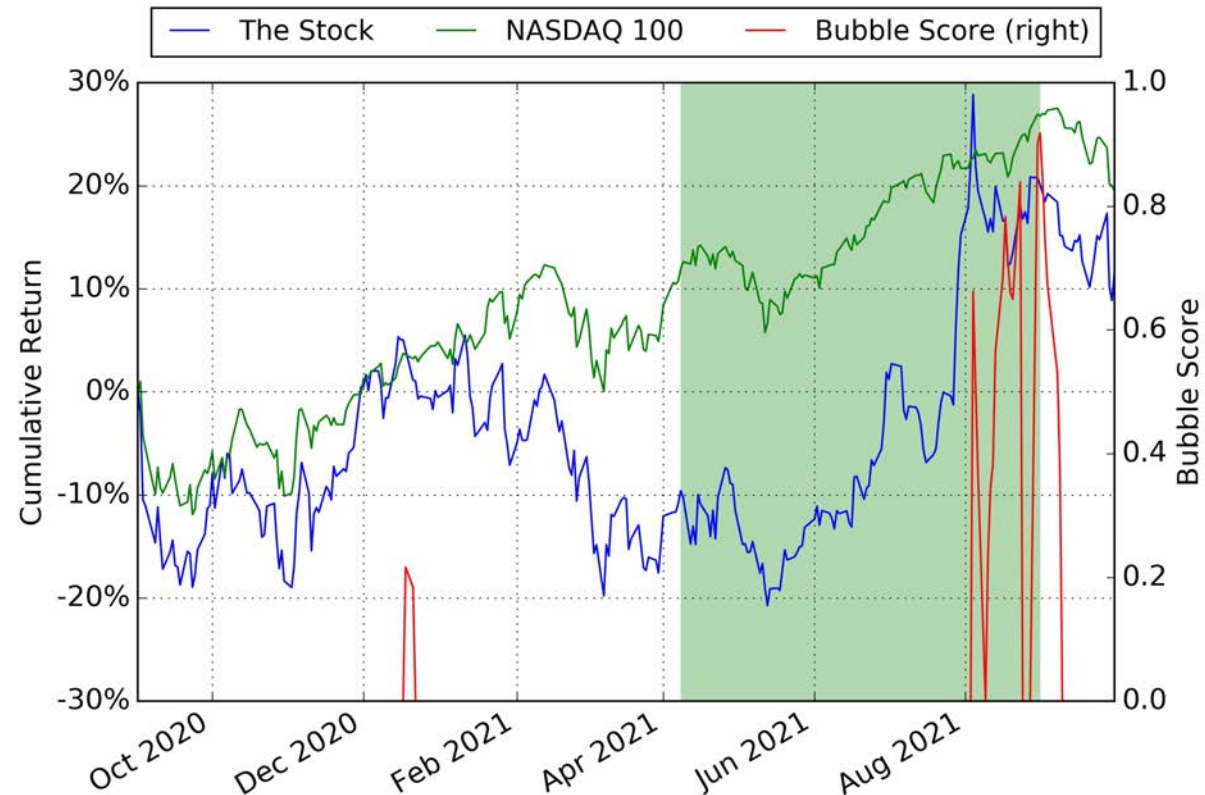
Quadrant 2 Stocks Current Month Example – Bollore SE.



- 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 green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this seven-month bubble has reached 53.7% with a bubble size 26.6%. 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 – Advanced Micro Devices 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 will continue, further amplified by the overall correction occurring in the NASDAQ 100 index over the past month.

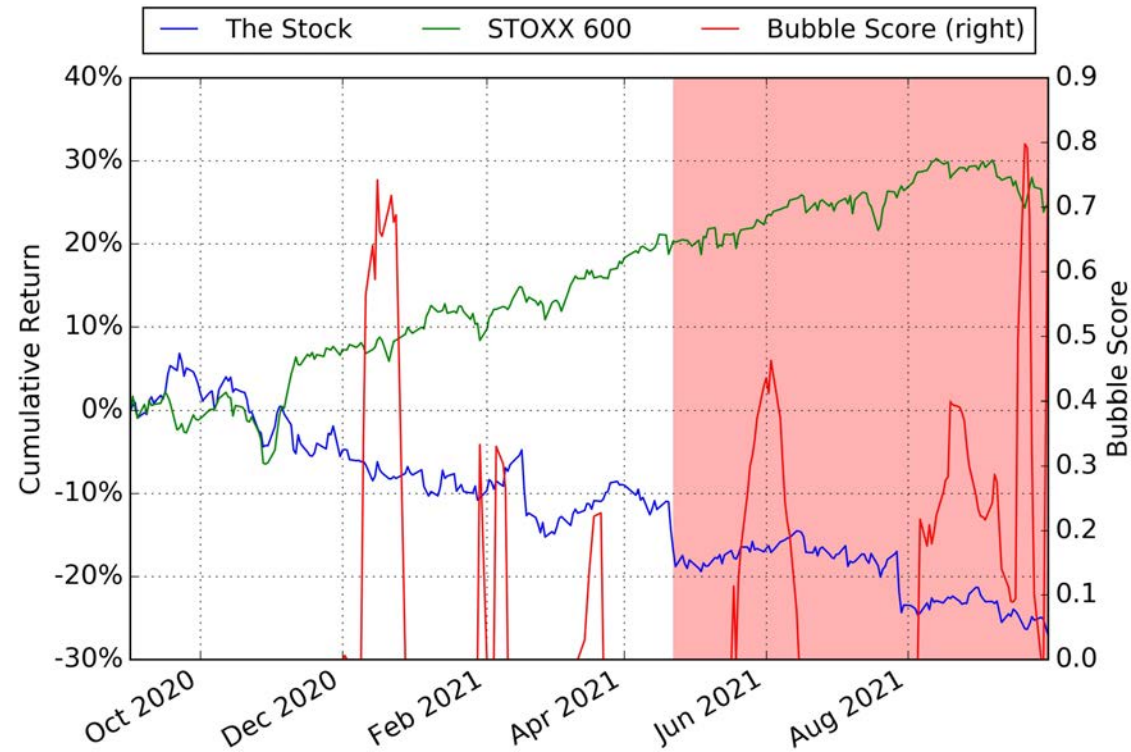
Single Stocks

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
Take-Two Interactive Software Inc	United States of America	Media & Entertainment	-4.7%	-22.0%	Dec-20	-12.0%	32.1%	14.1%
Vertex Pharmaceuticals Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	-32.8%	-23.4%	Dec-20	-4.9%	24.9%	34.3%
Clorox Co	United States of America	Household & Personal Products	-22.9%	-19.2%	Nov-20	-41.4%	23.6%	76.2%
W W Grainger Inc	United States of America	Capital Goods	2.0%	-14.7%	May-21	-82.7%	37.5%	76.7%
PPG Industries Inc	United States of America	Materials	5.2%	-17.6%	Apr-21	-15.5%	35.8%	66.3%
Pinduoduo Inc	China	Retailing	14.0%	-36.8%	Nov-20	-17.8%	0.6%	71.5%
Ubisoft Entertainment SA	France	Media & Entertainment	-36.6%	-22.5%	Mar-21	-7.7%	9.4%	88.2%
Koninklijke Vopak NV	Netherlands	Energy	-28.8%	-12.3%	Apr-21	-81.4%	38.5%	93.5%
Ambu A/S	Denmark	Health Care Equipment & Services	1.3%	-20.0%	Dec-20	-15.2%	2.2%	81.0%

Single Stocks

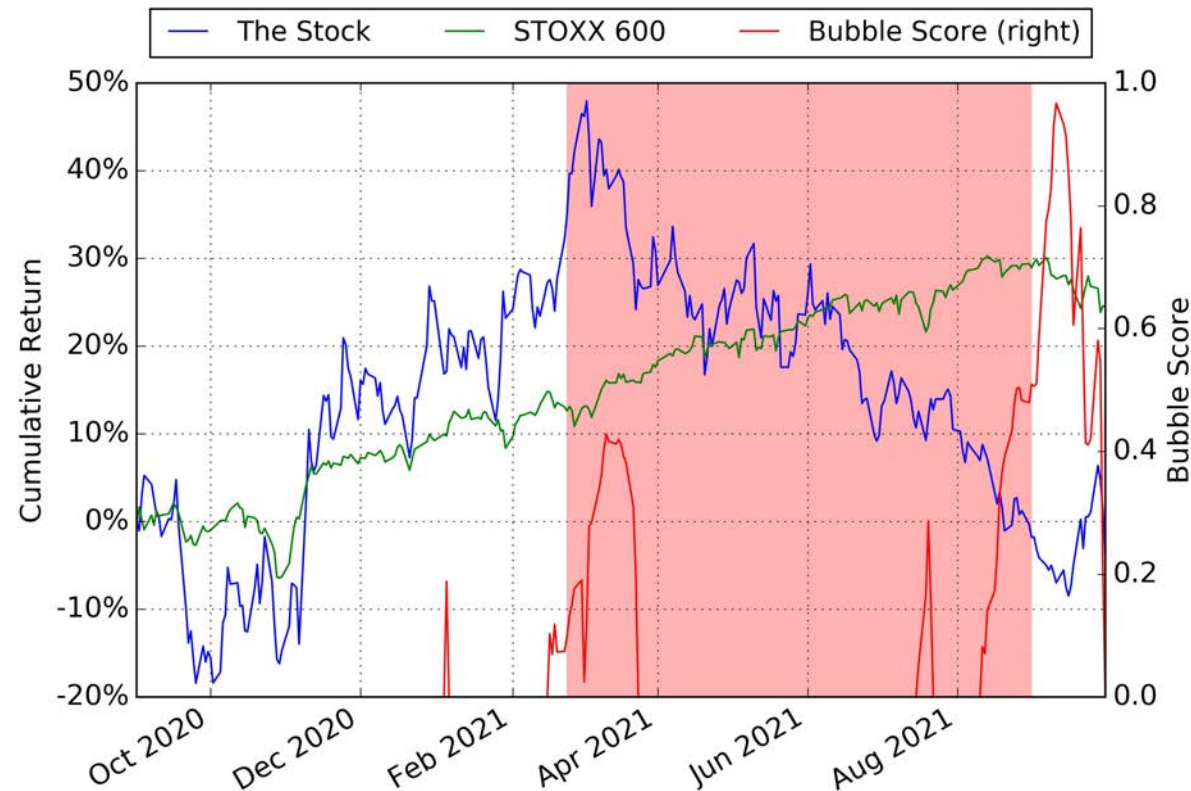
Quadrant 3 Stocks Current Month Example – Koninklijke Vopak NV.



- 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 six-month bubble has reached 81.4% with a bubble size -12.3%.

Single Stocks

Quadrant 3 Stocks Last Month Example – Deutsche Lufthansa AG.



- 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 ended its negative bubble regime we identified last month with a 10% rebound in the past month. One should remain cautious given the weak fundamentals of this stock.

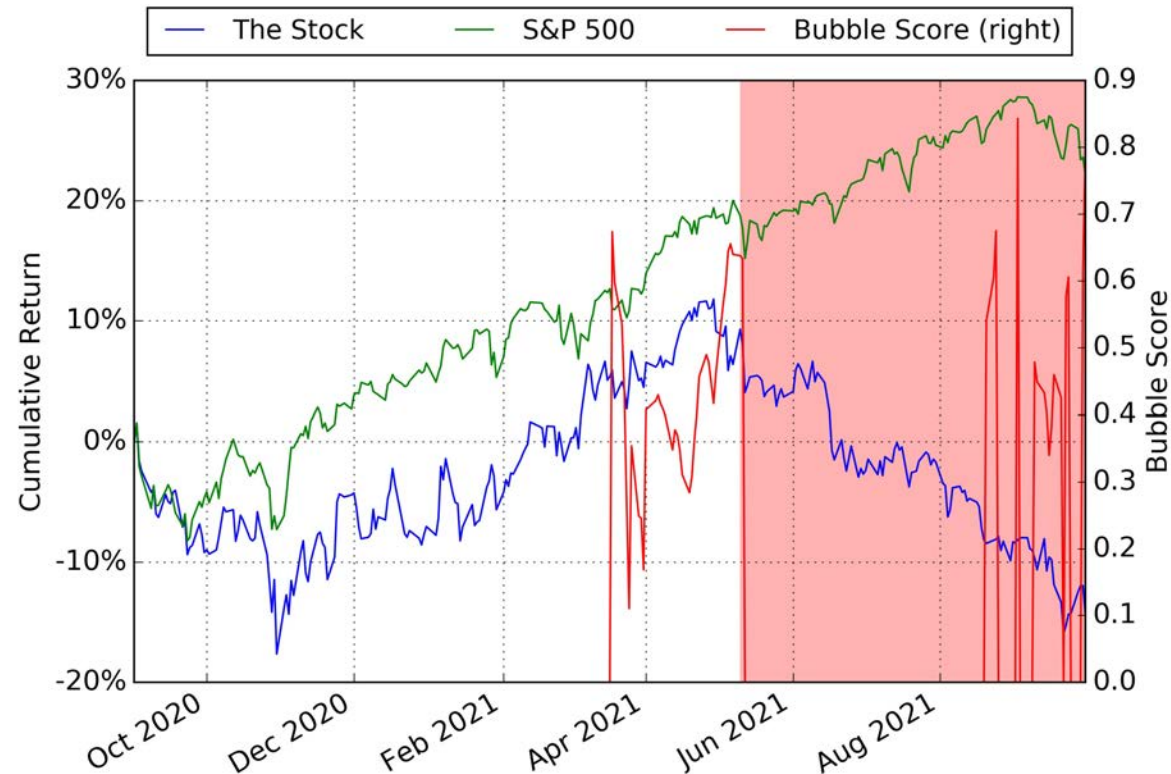
Single Stocks

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
Western Digital Corp	United States of America	Technology Hardware & Equipment	48.1%	-20.9%	Apr-21	-26.6%	97.6%	5.6%
Newell Brands Inc	United States of America	Consumer Durables & Apparel	22.9%	-20.3%	May-21	-66.2%	87.7%	8.4%
Western Union Co	United States of America	Software & Services	-9.0%	-17.7%	May-21	-79.1%	87.9%	68.8%
J M Smucker Co	United States of America	Food, Beverage & Tobacco	1.1%	-8.9%	Apr-21	-16.1%	85.3%	20.8%
FedEx Corp	United States of America	Transportation	-19.2%	-28.0%	May-21	-66.4%	71.5%	22.1%
Global Payments Inc	United States of America	Software & Services	-14.3%	-22.5%	Mar-21	-12.0%	76.2%	61.3%
Amgen Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	-10.2%	-15.4%	May-21	-71.9%	68.4%	26.7%
Nielsen Holdings PLC	United States of America	Commercial & Professional Services	39.6%	-26.9%	Mar-21	-30.2%	70.1%	23.7%
British American Tobacco PLC	United Kingdom	Food, Beverage & Tobacco	-3.9%	-5.3%	Mar-21	-29.6%	96.3%	33.9%
Rubis SCA	France	Utilities	-1.9%	-26.6%	Mar-21	-19.1%	71.0%	87.1%
Metso Outotec Corp	Finland	Capital Goods	30.4%	-16.7%	Mar-21	-32.2%	66.0%	97.4%
Alstom SA	France	Capital Goods	-13.0%	-29.7%	Dec-20	-39.1%	87.6%	97.2%
Galapagos NV	Belgium	Pharmaceuticals, Biotechnology & Life Sciences	-63.5%	-42.9%	Dec-20	-9.0%	88.6%	98.7%
Telefonaktiebolaget LM Ericsson	Sweden	Technology Hardware & Equipment	3.2%	-12.5%	Mar-21	-27.9%	78.7%	11.9%
Johnson Matthey PLC	United Kingdom	Materials	10.9%	-13.4%	Apr-21	-3.5%	66.3%	16.1%
ITV PLC	United Kingdom	Media & Entertainment	39.6%	-14.2%	May-21	-12.9%	93.0%	2.5%
KGHM Polska Miedz SA	Poland	Materials	31.4%	-24.7%	May-21	-98.1%	91.5%	98.3%

Single Stocks

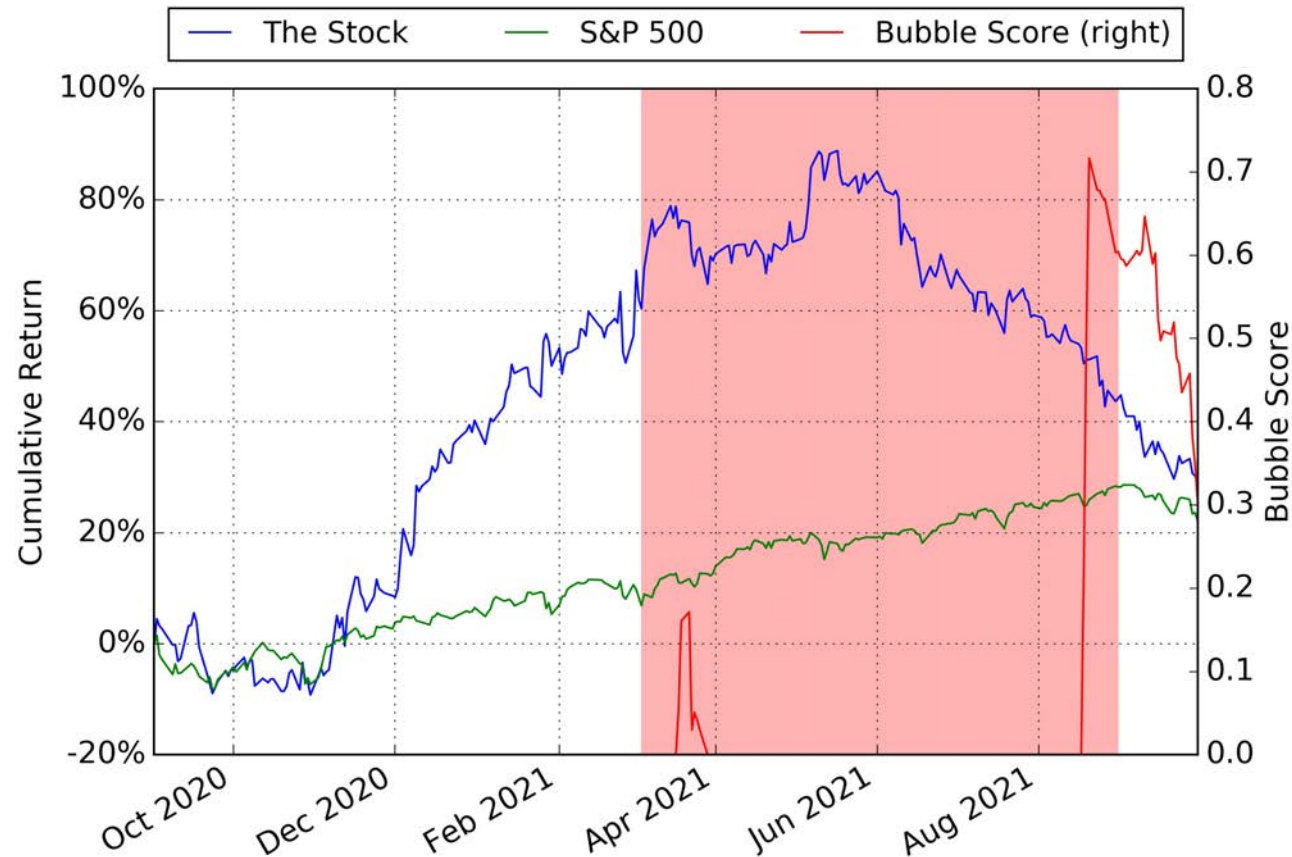
Quadrant 4 Stocks Current Month Example – Western Union Co.



- 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 five-month bubble has reached 79.1% with a negative bubble size -17.7%. 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 – Nielsen Holdings PLC.



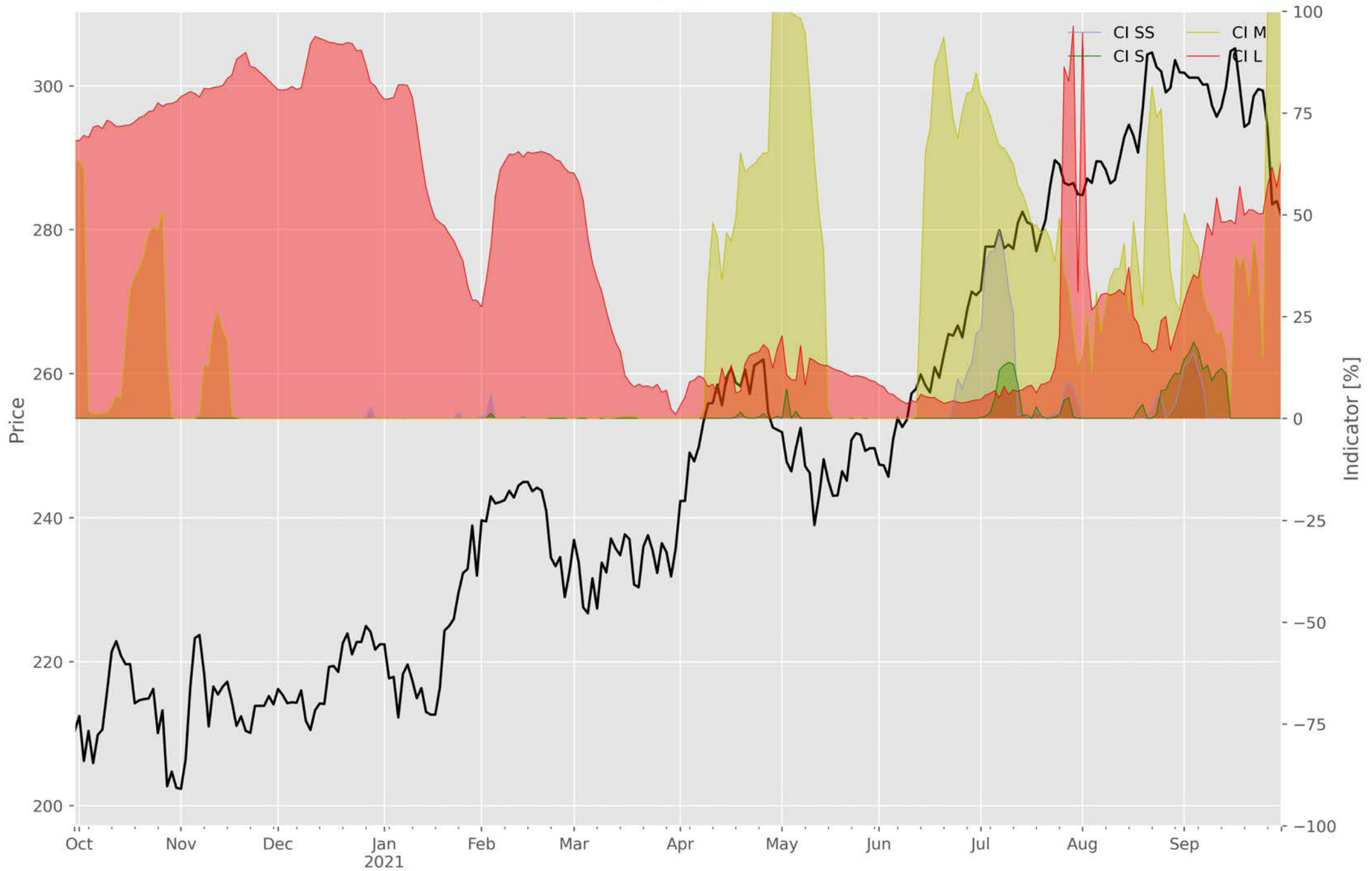
- The figure above plots the one-year cumulative return of the stock (blue), S&P 500 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock price continued to go down in the past month, which means that the strong negative bubble signal we identified last month may be a false positive or that the negative bubble has not matured yet and a rebound can still be expected. The bubble score is still running at 30%, marking the negative bubble still developing.

Appendix

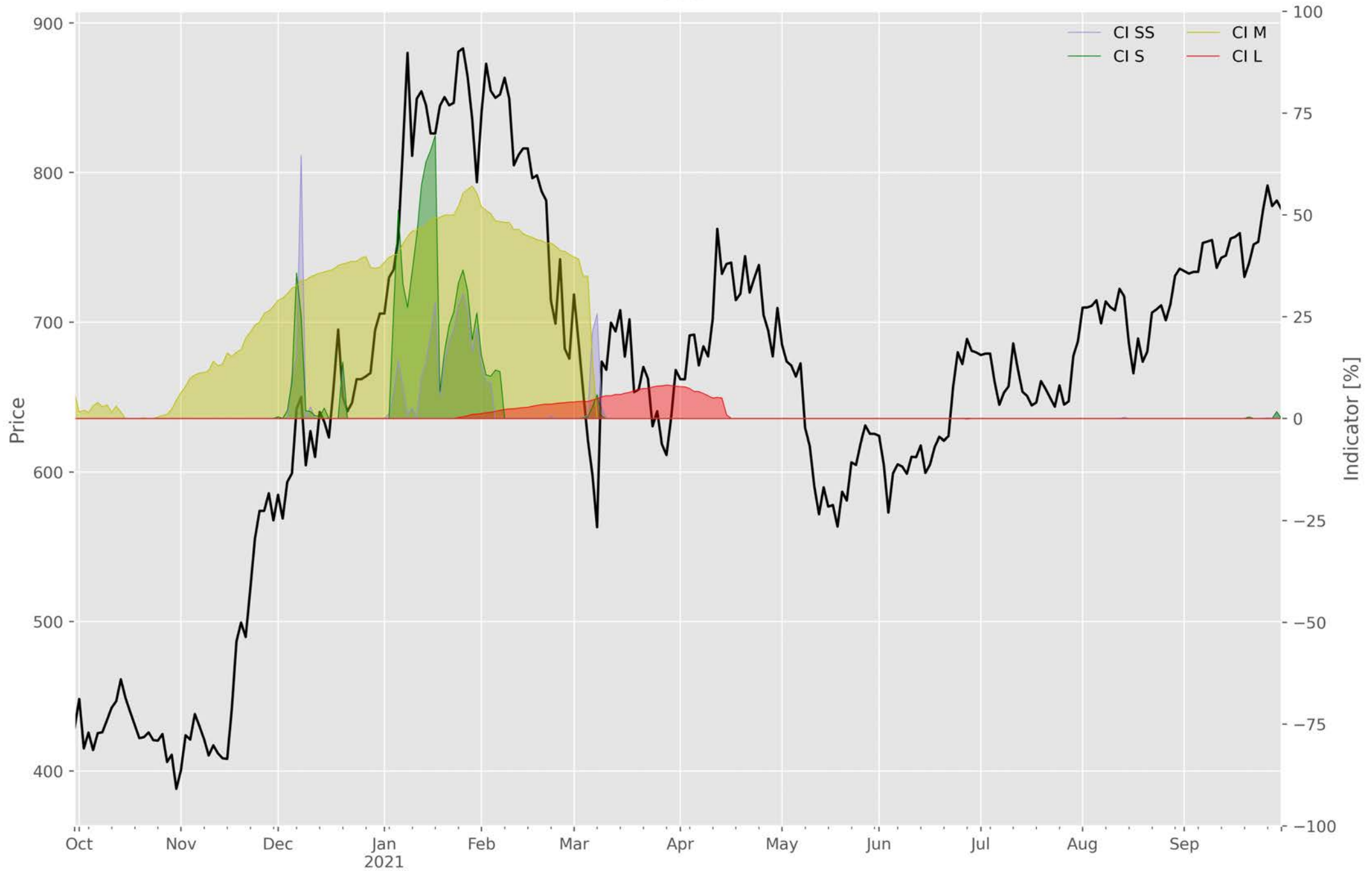
Amazon.Com



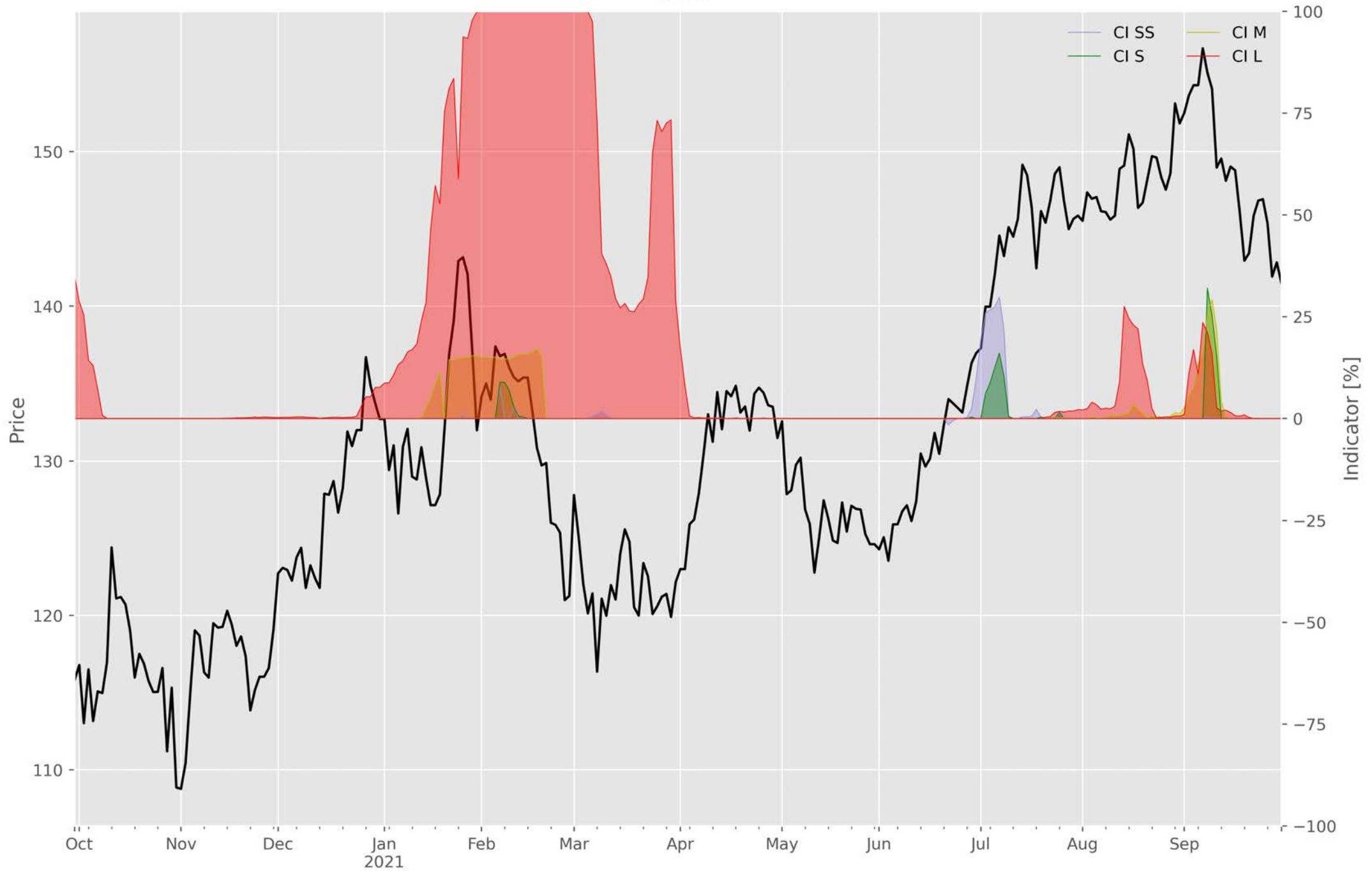
Microsoft



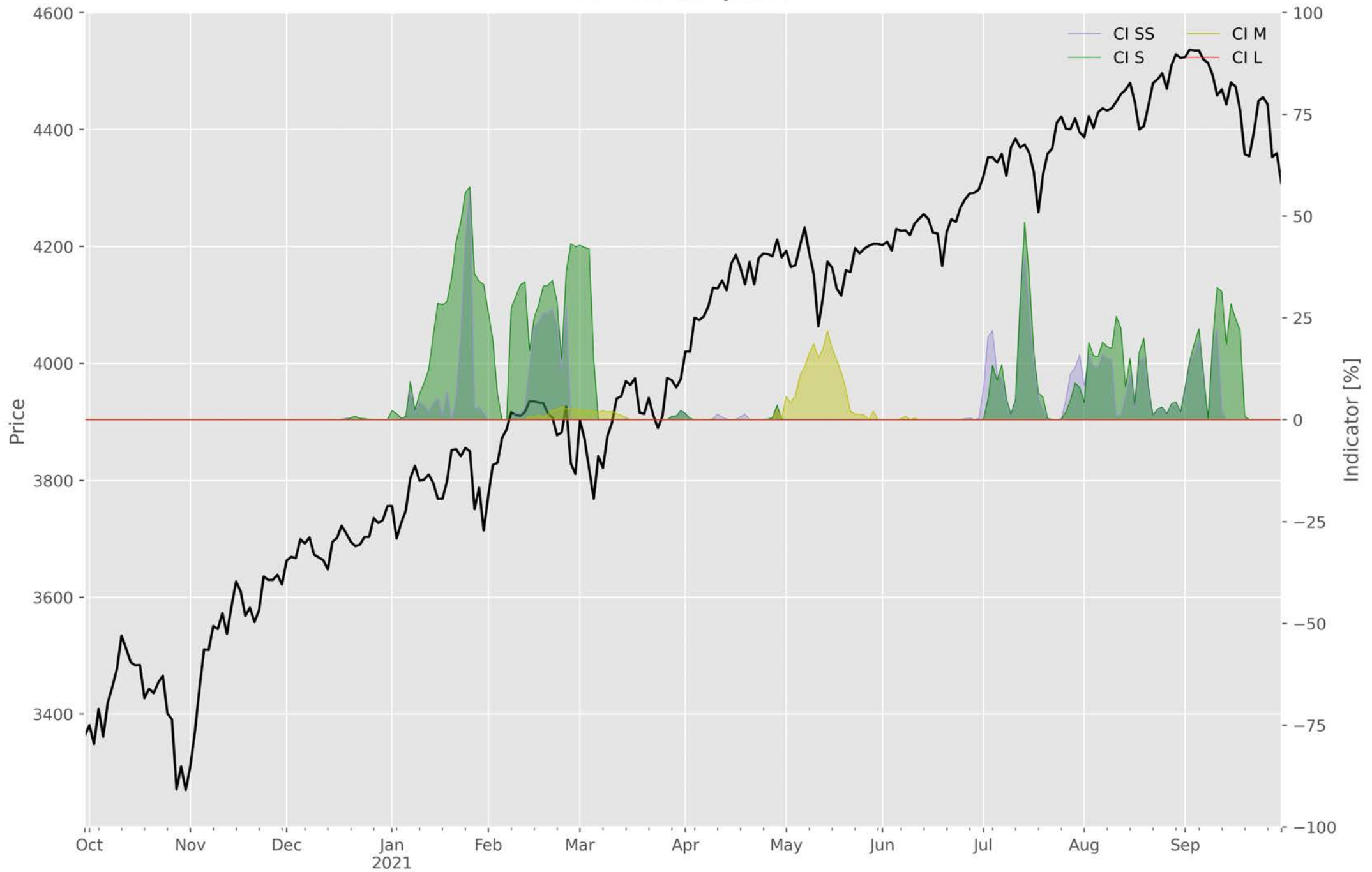
Tesla



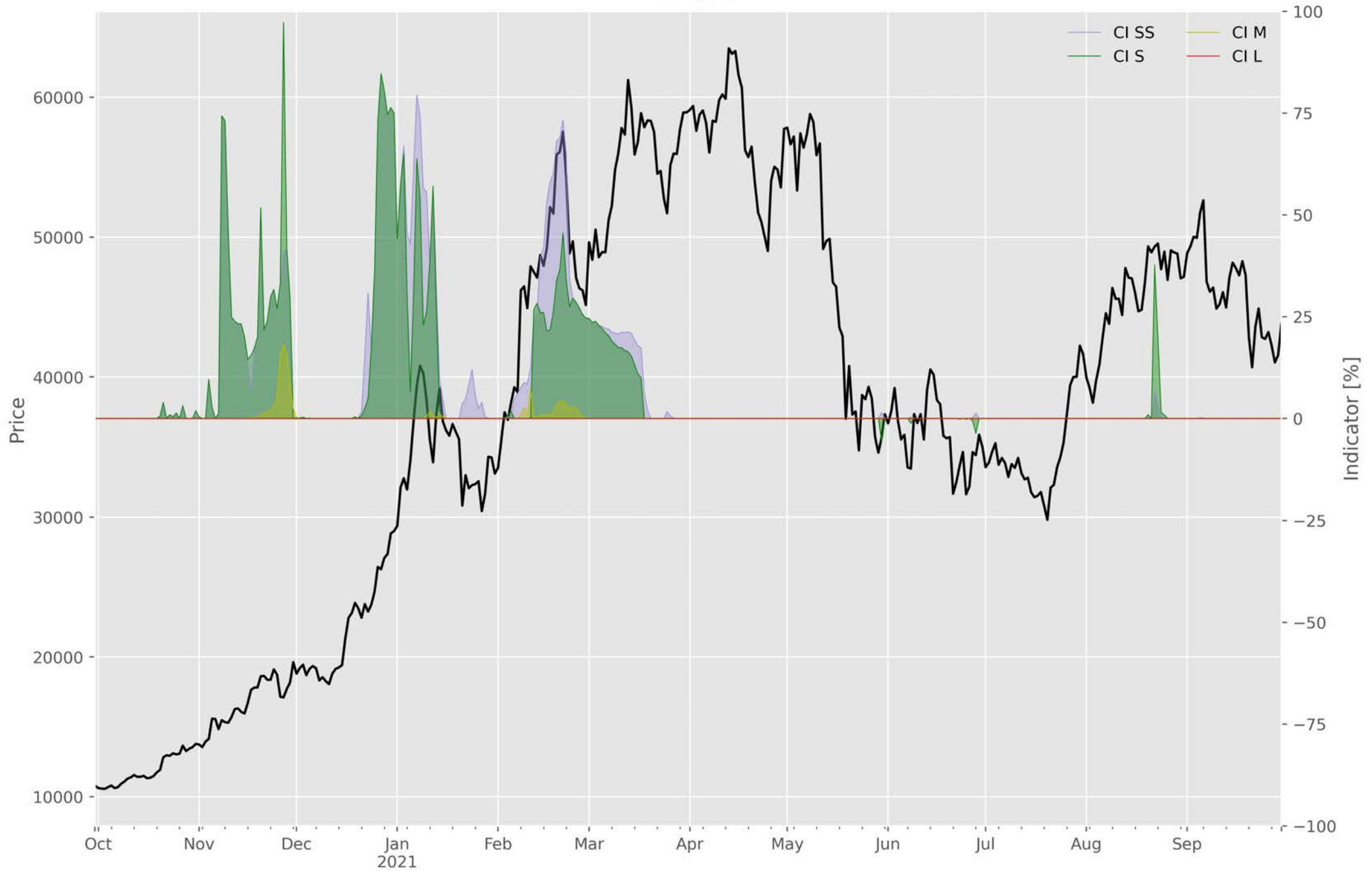
Apple



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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