The FCO Cockpit
Global Bubble Status Report
June 2021
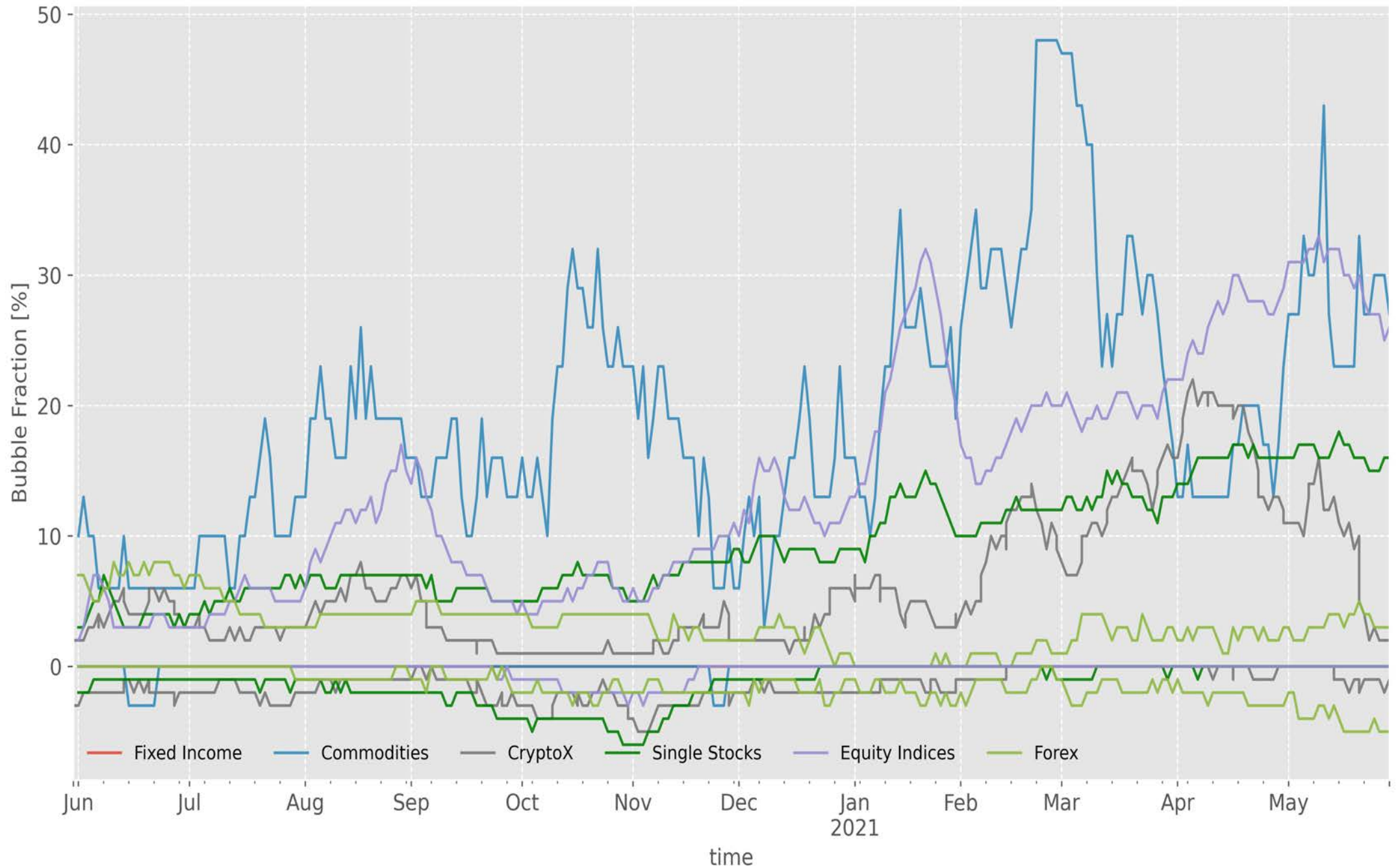
Entrepreneurial Risks

ETH *zürich*

SUSTech — Southern University of Science and Technology

Contents

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

Legend: Fixed Income, Commodities, CryptoX, Single Stocks, Equity Indices, Forex

Y-axis: Bubble Fraction [%]

X-axis: time

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General Results as of 2021-05-31

Region	Analyzed Assets	Fraction of Pos. Bubbles [%]	Fraction of Neg. Bubbles [%]
Fixed Income	18	0	0
Commodities	30	27	0
Single Stocks	1614	16	0
Europe	940	13	0
United States	661	20	0
Equity Indices	887	26	0
Europe	57	18	0
United States	377	31	0
Global	383	25	0
Forex	100	3	5
CryptoX	164	2	1

▸ As with the previous few months, this month has zero bubble signals in the fixed income sector.

▸ In the commodities sector, the positive bubble activity has surged from 17% in the last FCO report to a peak of around 44% in middle May and then dropped to 27% at the end of May. The continued presence of a relatively high bubble fraction in this sector in the recent few months deserve close attention of all investors, particularly its impact on inflation expectation and future investment return.

▸ In both the single stocks and equity indices sectors, the fraction of positive bubbles remains generally unchanged month-on-month at about 16% and 26%, respectively, with equity indices experiencing a slight increase followed by a comparable decrease during the month.

▸ Bubble activity in the Forex sector remains low as in the previous months, but a slight increase is observed simultaneously in both positive and negative bubbles.

▸ In the cryptoX sector, the positive bubble fraction has plunged from 13% to only 2% during this month, while the negative bubble activity remains near zero. This bubble drop reflects a large-scale price pullback this month, but whether it is a local correction or a beginning of bubble burst requires further observation.

FCO Market Outlook

How far are we to herd immunity?

Scientists reckon that if around 70% of the population have complete vaccination (two doses), the herd immunity will be possible. Currently, Israel, Bahrain, Chile, United States, UK, etc., have gone a long way towards this goal. As the best fully vaccination rate country (59.3%), Israel has a low reproduction rate (0.5) in recent weeks. However, Jordan, with about 10% vaccination rate has about the same performance, raising questions on other confounding variables. The numbers of US and UK's new COVID-19 cases also dropped significantly, compared with the January situation, which suggests that the return of everyday life and fully economic reopening are on the way. However, the less developed countries are still facing variant viruses surges, and they still do not have enough domestic medical support for the foreseeable months. The New wave of the Indian variant is still on-going in the East Asian countries.

Supply Chain Rethink:

The price of used cars increased globally, reflecting the shortage of new vehicles due to the lack of chips and the inflated cost of aluminum, copper, and steel. Not only for electrical/petrol-fuel cars, have companies reduced their production, but also Apple's iPhone and IPad are short of components. Besides the chips, the supply of many daily necessities is limited. The modern zero inventory philosophy, Just-In-Time (JIT), contributes to the current supply chain problem. The JIT reduces the supply chain resilience: i.e., when you have a demand takeoff, you can only supply a limited amount of products when starting with almost zero inventory.

The Race Towards Full Vaccination

Share of the population fully vaccinated against Covid-19 as of May 29, 2021*

59.3%	45.4%	41.5%	40.2%
✡ Israel	☾ Bahrain	★ Chile	☆ United States
36.8%	36.7%	36.6%	29.1%
Qatar	United Kingdom	Hungary	Uruguay

* Fully vaccinated = all doses prescribed by the vaccination protocol. Data only available for countries reporting dose breakdown.

Source: Our World in Data   **By Niall McCarthy**

Fix income: Thanks to the Fed, we see bubbles everywhere in the market. The only thing that people are arguing about is whether the inflation risk is temporary or not. Fed considers it is temporary and controllable (the Fed cares more about employment rate and wage growth). On the contrary, some institutions reckon that the Fed is wrong as inflation will last longer than many people expected, and the U.S. dollar would lose value if the Fed keeps printing money and holding to its ultra-low interest rate policy. We reckon the Q4 this year will be a significant milestone for tge Fed to take some fundamental actions about the tapering of its actions. Since the U.S. is likely to have the vaccination rate deemed to yield herd immunity (around 70% population vaccination in the U.S.) at least around Q4, the Fed would surprise the market by implement tough actions. Then, the market volatility will soar accordingly. Moreover, we also notice that the Chinese onshore bond market might have some risk exposure (especially in property area), as Beijing is tightening the credit and commodities' price are soaring.

U.S. equity: The equity market is at a record high globally due to the astonishing money injections by central banks. The U.S. market valuation is still supported by cheap money. As for the business itself, we are considering two significant risks: 1) supply constraints. 2) higher tax rate for next year. Both risks could reduce the expected earnings of US corporations.. We also notice the short-squeeze recently came back again, sending AMC to record high. The lottery-like investment occurs here and there, which is a clear sign of financial instability.

E.M. markets: Indian' worse time just passed, but Indian industries are still far from recovery. The Indian clothing sector is experiencing a hard time. According to the Clothing Manufacturers Association of India (CMAI), more than three-quarters of the Indian garment industry is reducing its staff by at least 25% because of the cancellation of orders from international buyers. The Indian drug sector is impacted as well, as close to 50% of the production is halted due to the pandemic. Ironically, the Nifty-50 reached an all time high. In addition, some of the East Asian countries/regions are having new waves of viruses. As many of those countries are located in the upper global supply chain of many industries (cheap labor and raw material cost), the supply chain risk is still significant.

Commodities: The king of commodities, oil, is testing $70 a barrel for the first time since late 2018 as vaccinations progress in the U.S., U.K., European countries. Oil price increase traditionally sets the upbeat tune for inflation since the economic reopening might release more petrol consumption activities. Iron ore, copper, coal, aluminum prices all have upward pressure due to different or similar reasons. One interesting fact about Iron ore, every $10 above $55/ ton is worth a $1.2 billion Australian government budget increase and the Iron ore price today is around $201/ton.
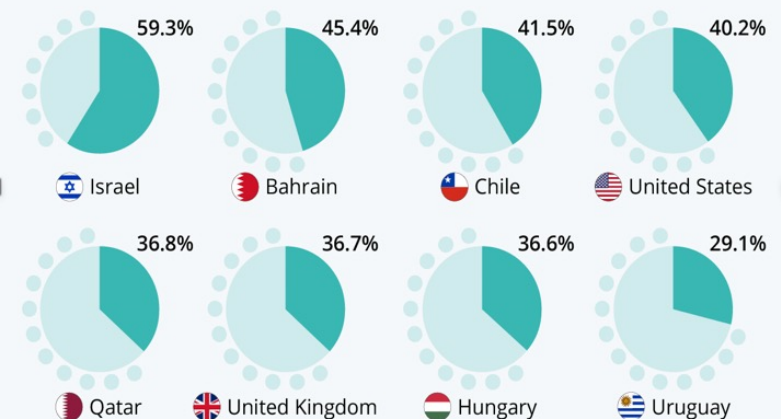
Of Cryptocurrency

Let's start with Seth Klarman's funny canned sardines story:

"There is an old story about the market craze in sardine trading when the sardines disappeared from their traditional waters in Monterey, California. The commodity traders bid them up, and the price of a can of sardines soared. One day a buyer decided to treat himself to an expensive meal and opened a can and started eating. He immediately became ill and told the seller the sardines were no good. The seller said, "You don't understand. These are not eating sardines, they are trading sardines."

The biggest difference between investing and speculation is very clear from the story: i.e., whether you trade the sardines without caring about the intrinsic value. We can also leverage this metaphor into cryptocurrency. Most people trade cryptocurrency without much knowledge about what it is, and they do not even care. So there is an interesting phenomenon, i.e., people rarely use cryptocurrency for daily transactions or payment, and they trade it only because they want to be richer or not left behind.

There exist four major problems with Bitcoin:

1. Highly volatile (Bitcoin cannot be used as a universal equivalent).
2. Only supports 7 transactions/sec maximum, while the VISA can handle 20,000 transactions on average per second. (Bitcoin cannot be used for global daily exchange transactions),
3. Highly concentrated holding (few determine/price all).
4. Anti status quo regulation (Bitcoin cannot be smoothly integrated with the existing system).

There are also three advances associated with Bitcoin:

1. First global financial intermediary that is accessible 24/7 (the first globalized financial market).
2. First major utilization of Distributed Ledger Technology through Blockchain (banks will utilize this technology in the future).
3. Advanced asymmetric encryption (better protection).

The current arguments about the energy efficiency of cryptocurrency are mainly about the consensus mechanism, which allows distributed systems to work together and stay secure. Bitcoin utilizes Proof-of-Work as its consensus mechanism (PoW: people who have more computational power (>51%) can create a new chain). While new Ethereum will upgrade from the PoW to Proof-of-State (PoS), which means that whoever has more stake can validate a new chain. The PoS is more energy efficient since it consume less computational power, and less high functional hardware. However, the four significant Problems of Bitcoin has still present in Ethereum, even though Ethereum is a bit greener.

Many central banks (PBoC, BoE, BoJ, etc.) are creating their own digital currencies: Central Bank Digital Currency (CBDC), which have better transactional infrastructure for payments, less volatile price for value storage, and it also can be a complement to the current system. The cryptocurrency bubble seems to nurture the technology improvement of the central banks. Just as Prof. Didier Sornette claims: Bubbles might lead to extraordinary discoveries and provide the base for the observed accelerating development of technology and the economy. —— 《**Nurturing Breakthroughs: Lessons from Complexity Theory**》 https://arxiv.org/abs/0706.1839

See also our recent paper Vincent Giorgis, Tobias A. Huber and Didier Sornette, "Salvation and Profit": Deconstructing the Clean-Tech Bubble, Research Policy (submitted 10 June 2021): http://ssrn.com/abstract=3852673

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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 t1 is $bs = \frac{p_t}{p_1} - 1$ and the bubble duration is $bd = t - t_1$

▸ By estimation of the start time t1 and the predicted end time tc 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.

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Fixed Income

No bubbles to report

Commodities

Mlcx Copper Spot Index

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 $\bar{t}_c$	Scenario Probability [%]
1	Short Term	57.37	77.41	77.41	252	75.61	69.51	2021-08-20	97.69
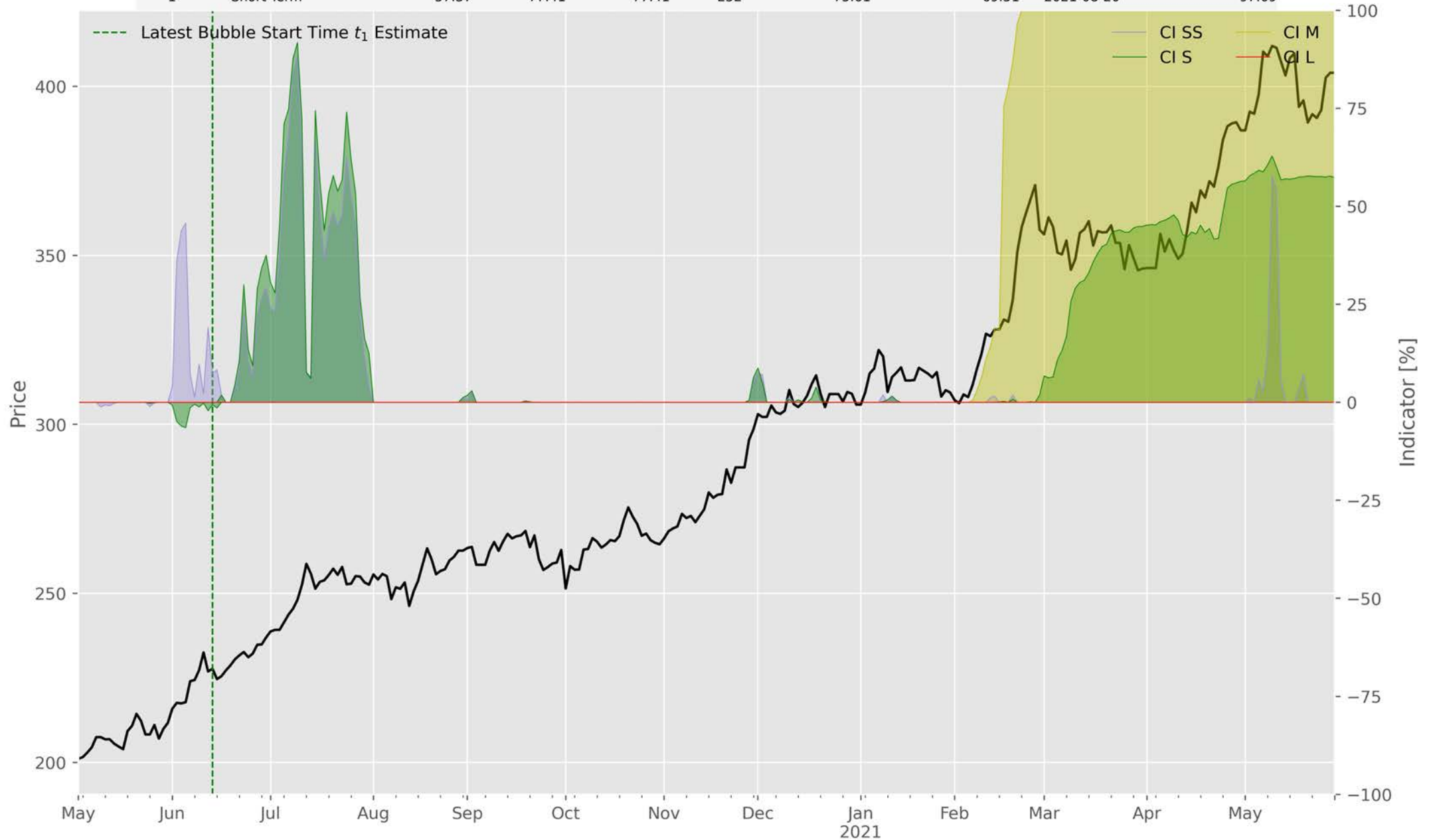
Mlcx - Soybean Oil Spot Index

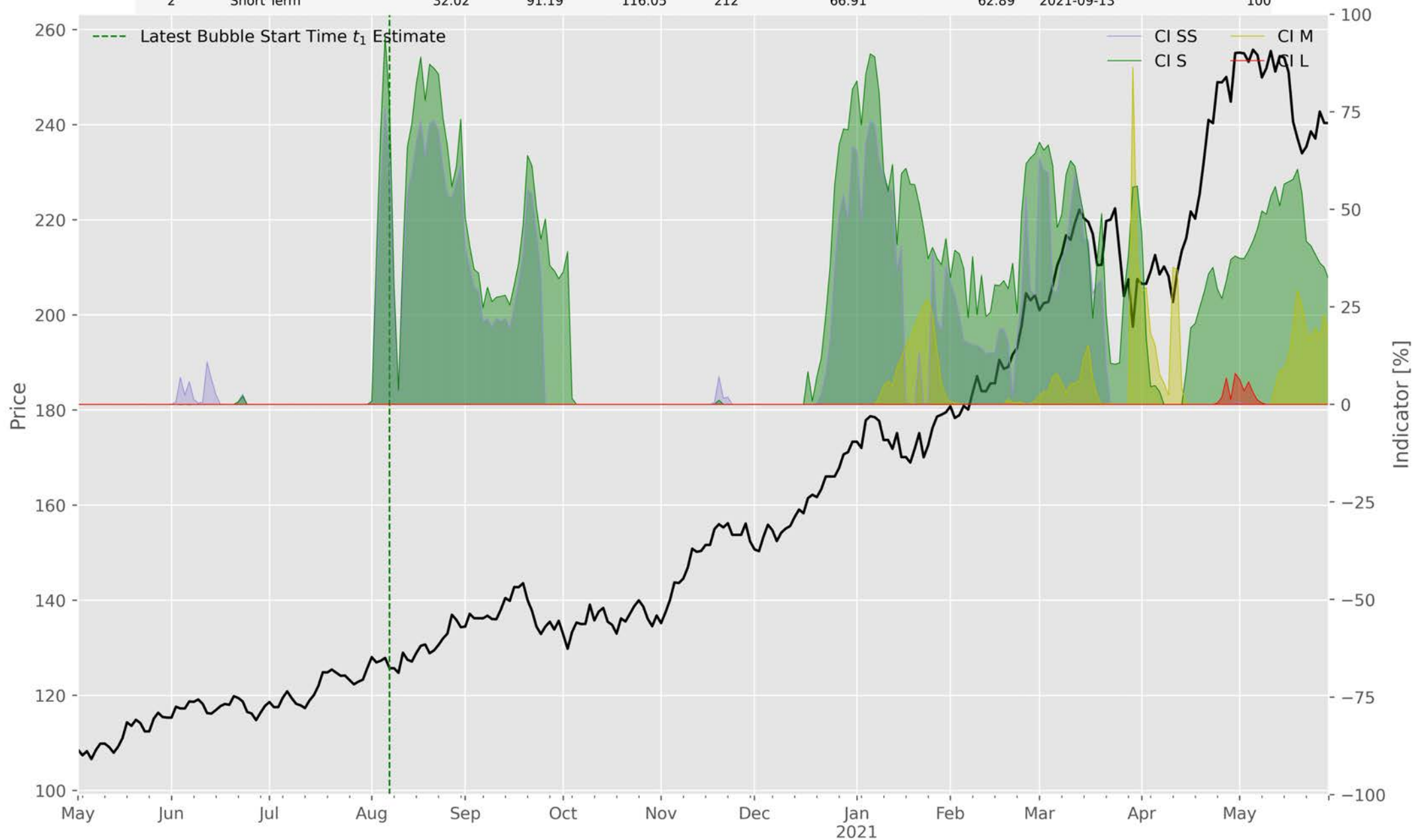| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
2	Short Term	32.02	91.19	116.05	212	66.91	62.89	2021-09-13	100

Mlcx Indus. Metals Spot Index

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 $\bar{t}_c$	Scenario Probability [%]
3	Short Term	55.82	64.67	64.67	252	66.88	62.27	2021-10-03	97.16
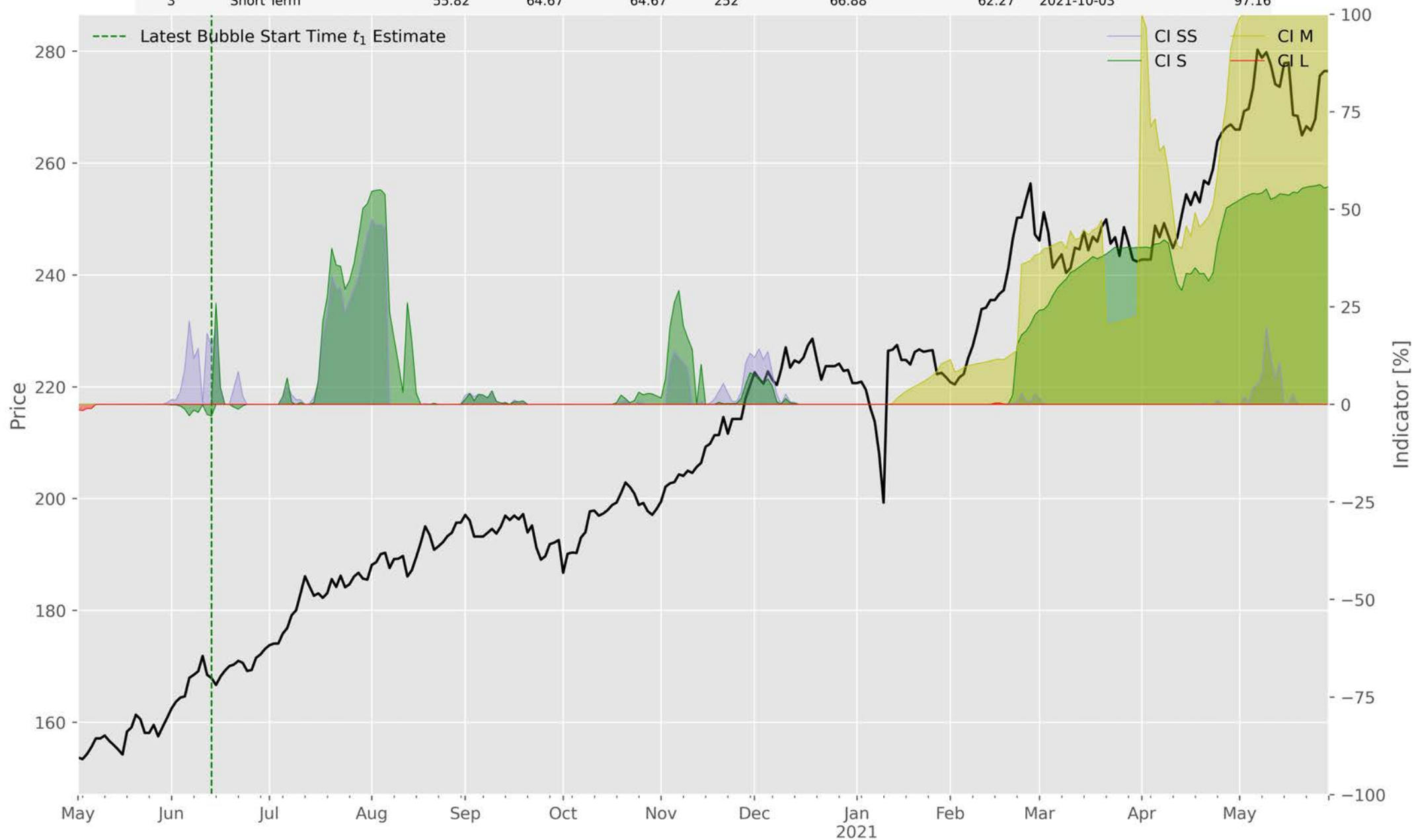
Single Stocks

Boss (Hugo) (Xet)

Rank	Strongest Signal	DS-LPPLS Confidence c_i [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
1	Super Short	74.33	69.46	187.17	126	95.16	109.8	2021-06-06	99.98
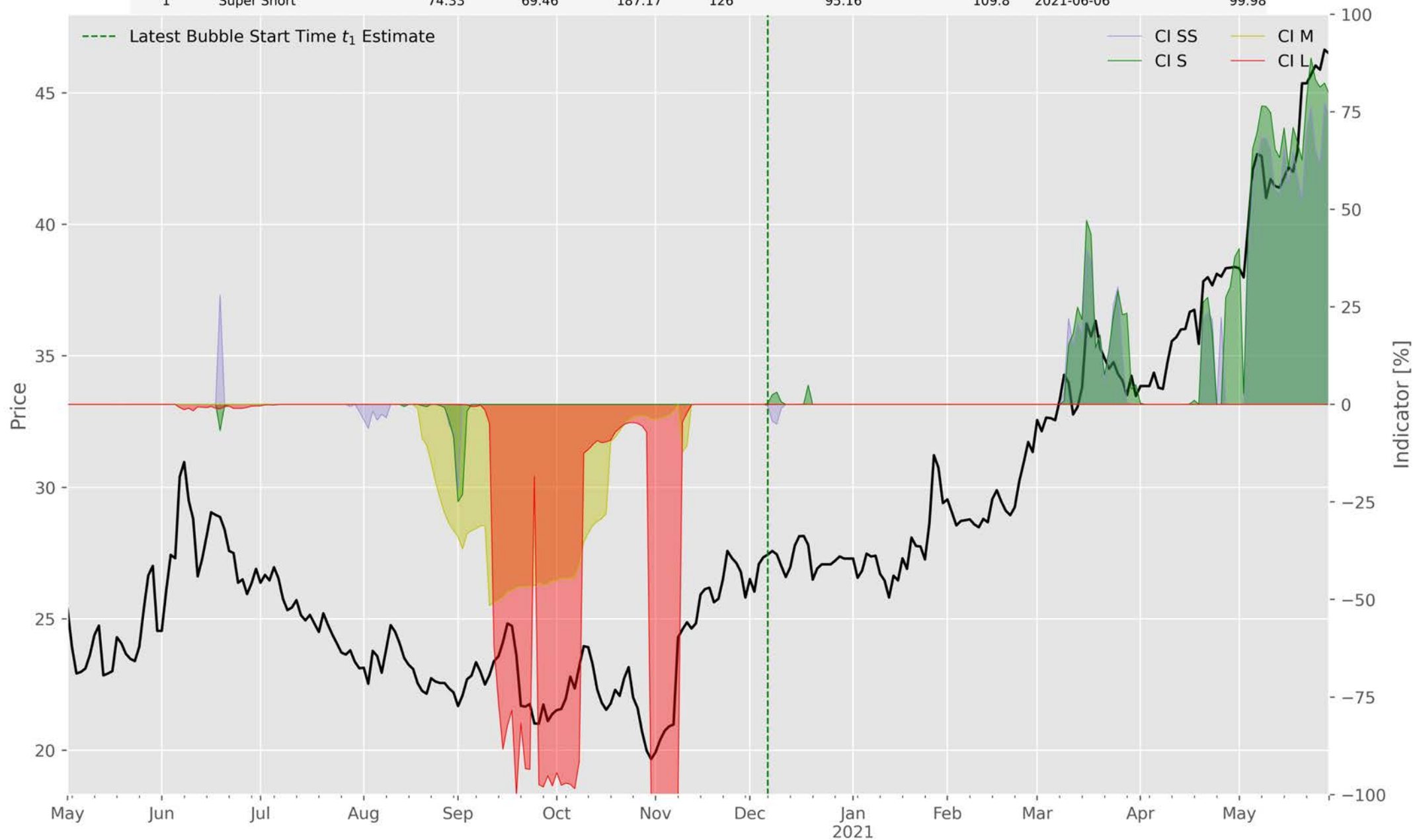
Bank Of Ireland Group

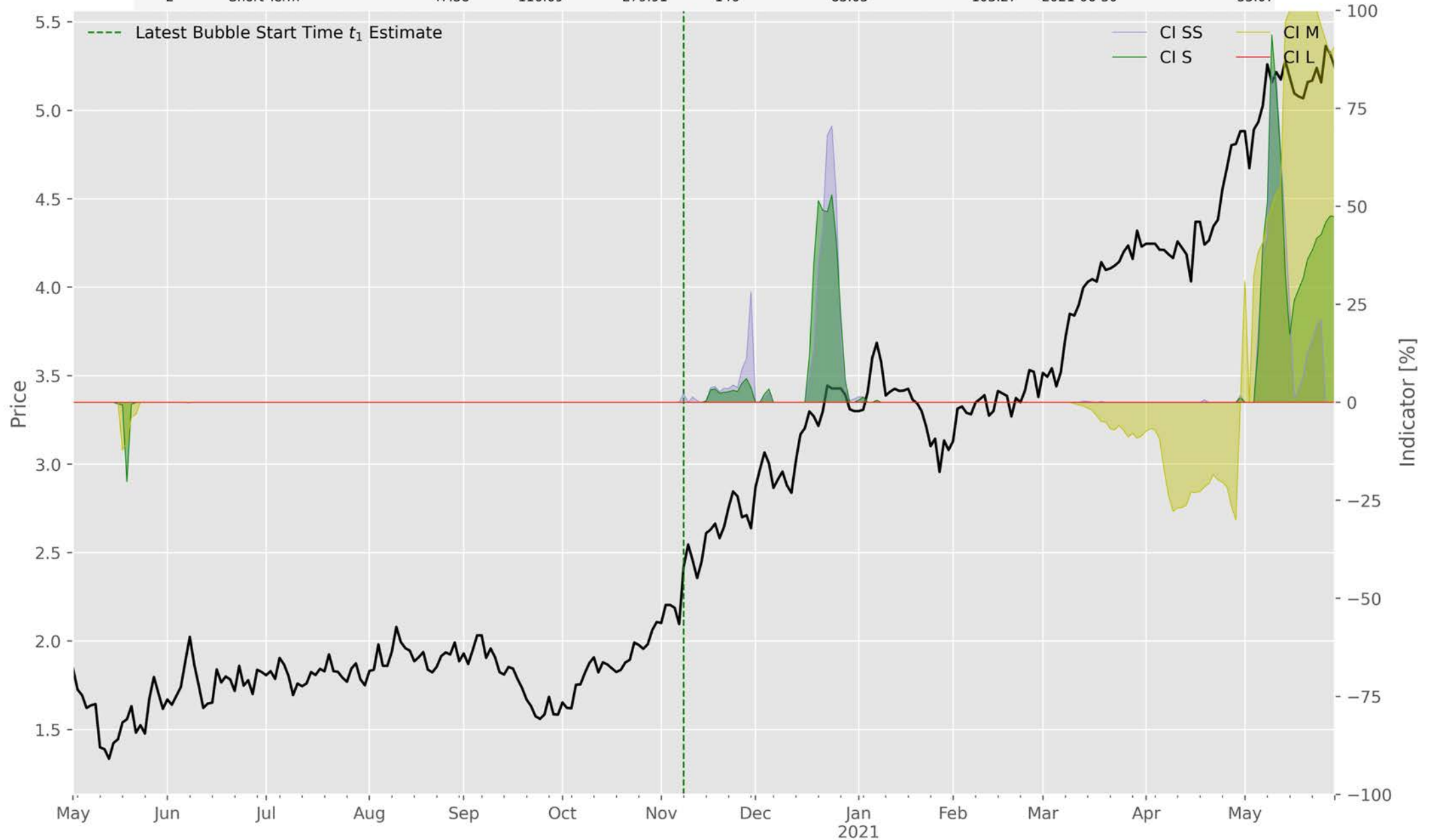| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
2	Short Term	47.38	116.69	279.91	146	83.05	103.27	2021-06-30	55.07

Bank Of Ireland (Lon)

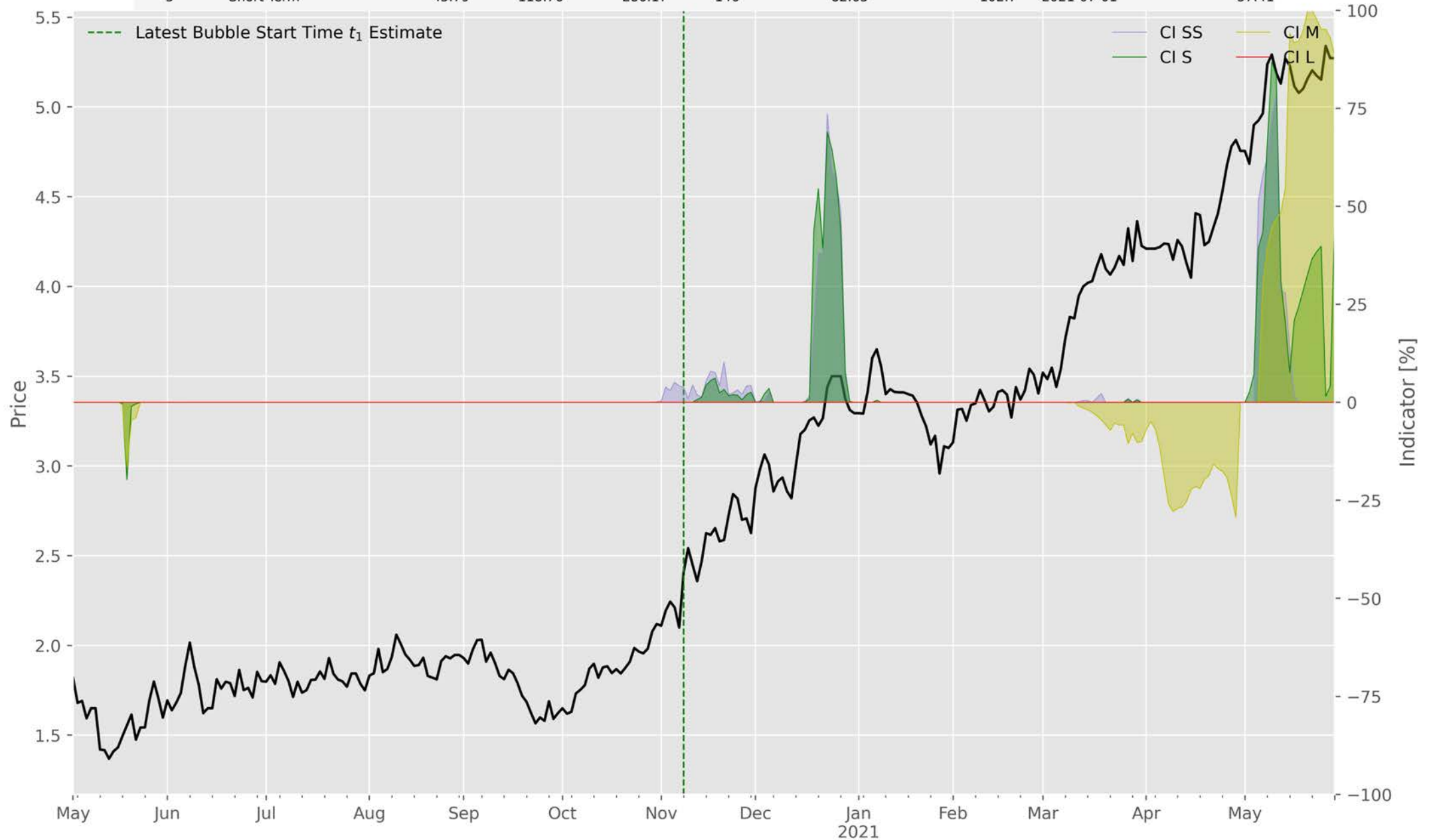| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\tilde{t}_c$	Scenario Probability [%]
3	Short Term	45.79	118.76	286.17	146	82.65	102.7	2021-07-01	57.41

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 $\bar{t}_c$	Scenario Probability [%]
1	Super Short	40.88	-32.08	-67.82	86	70.95	58.15	2021-07-05	52.95
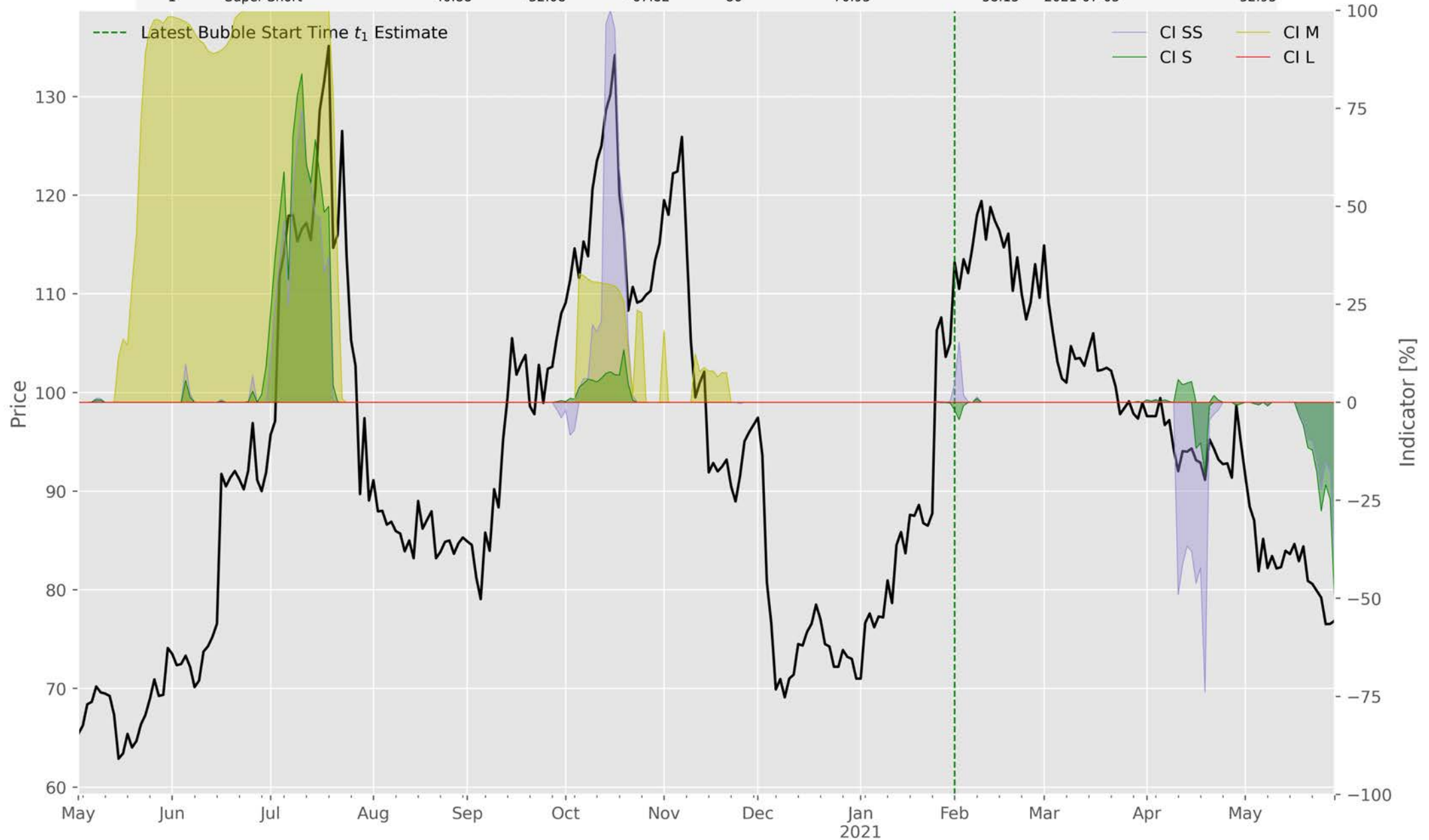
Kudelski 'B'

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 $\bar{t}_c$	Scenario Probability [%]
2	Super Short	12.17	-14.97	-36.83	89	67.15	31.1	2021-07-14	63.11

Koninklijke Vopak

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 $\bar{t}_c$	Scenario Probability [%]
3	Medium Term	15.85	-23.41	-20.56	292	81.3	29.81	2021-08-06	49.62

Dillards '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 $\bar{t}_c$	Scenario Probability [%]
1	Medium Term	69.52	414.67	309.23	293	97	127.76	2021-06-09	92.02
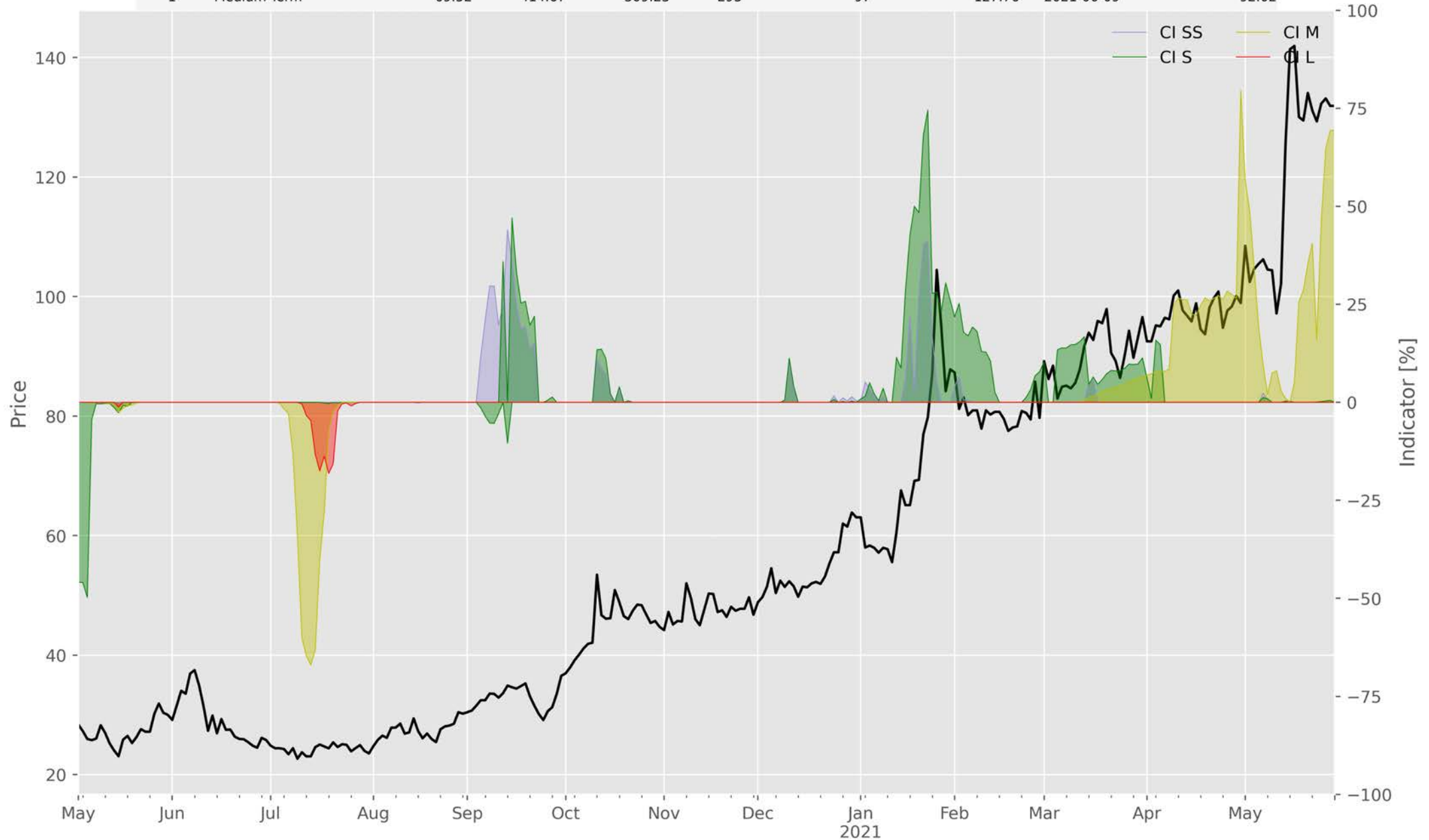
Alliance Data Systems

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 $\bar{t}_c$	Scenario Probability [%]
2	Medium Term	95.38	235.23	162.39	316	92.31	112.66	2021-06-26	63.1

Foot Locker

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 $\bar{t}_c$	Scenario Probability [%]
3	Medium Term	100	188.07	133.76	314	99.25	109.91	2021-06-02	72.9

Equity Indices

Omx Vilnius (Omxv)

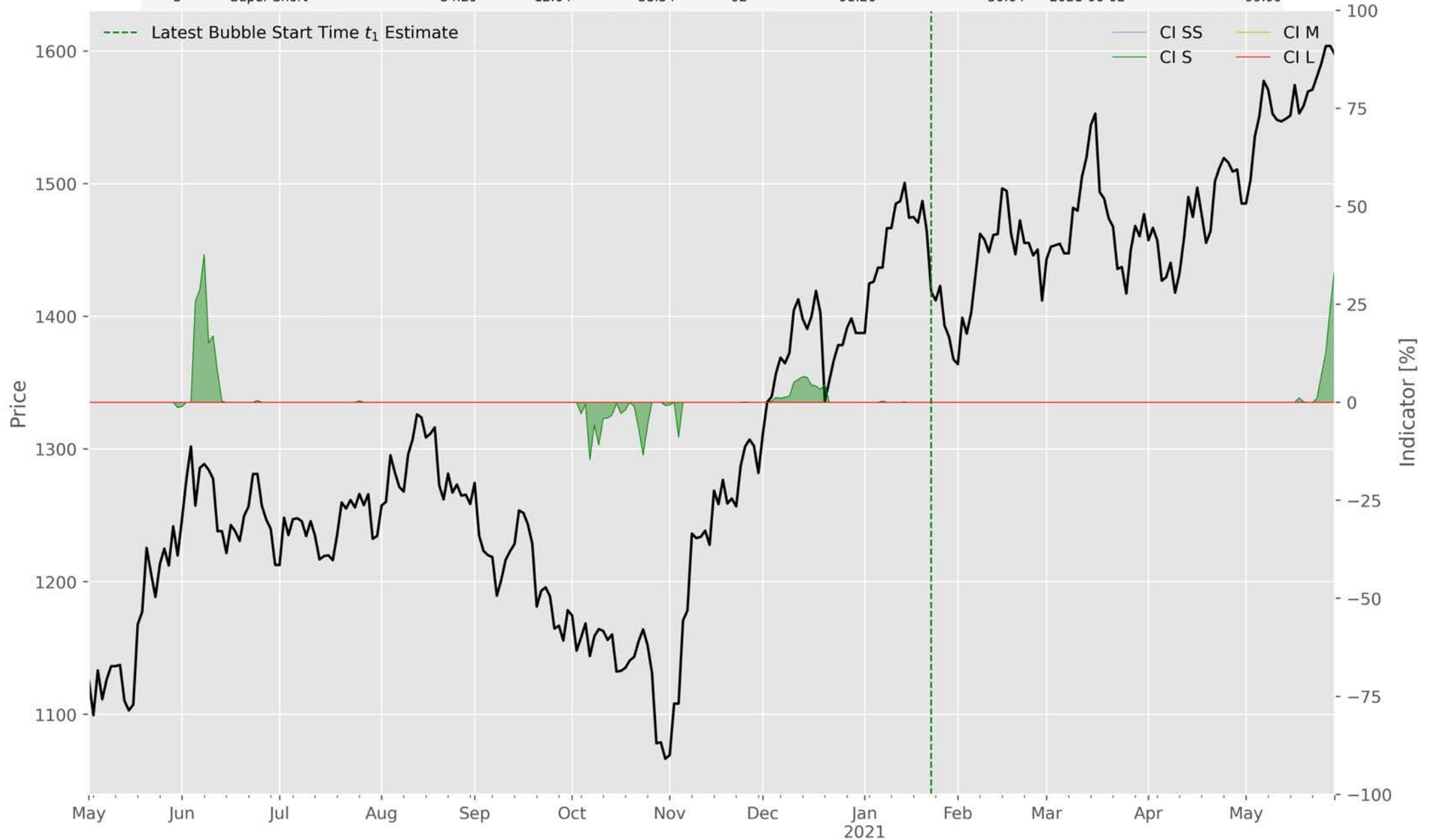| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
1	Super Short	70	10.02	40.33	71	94.85	64.45	2021-06-04	86.36
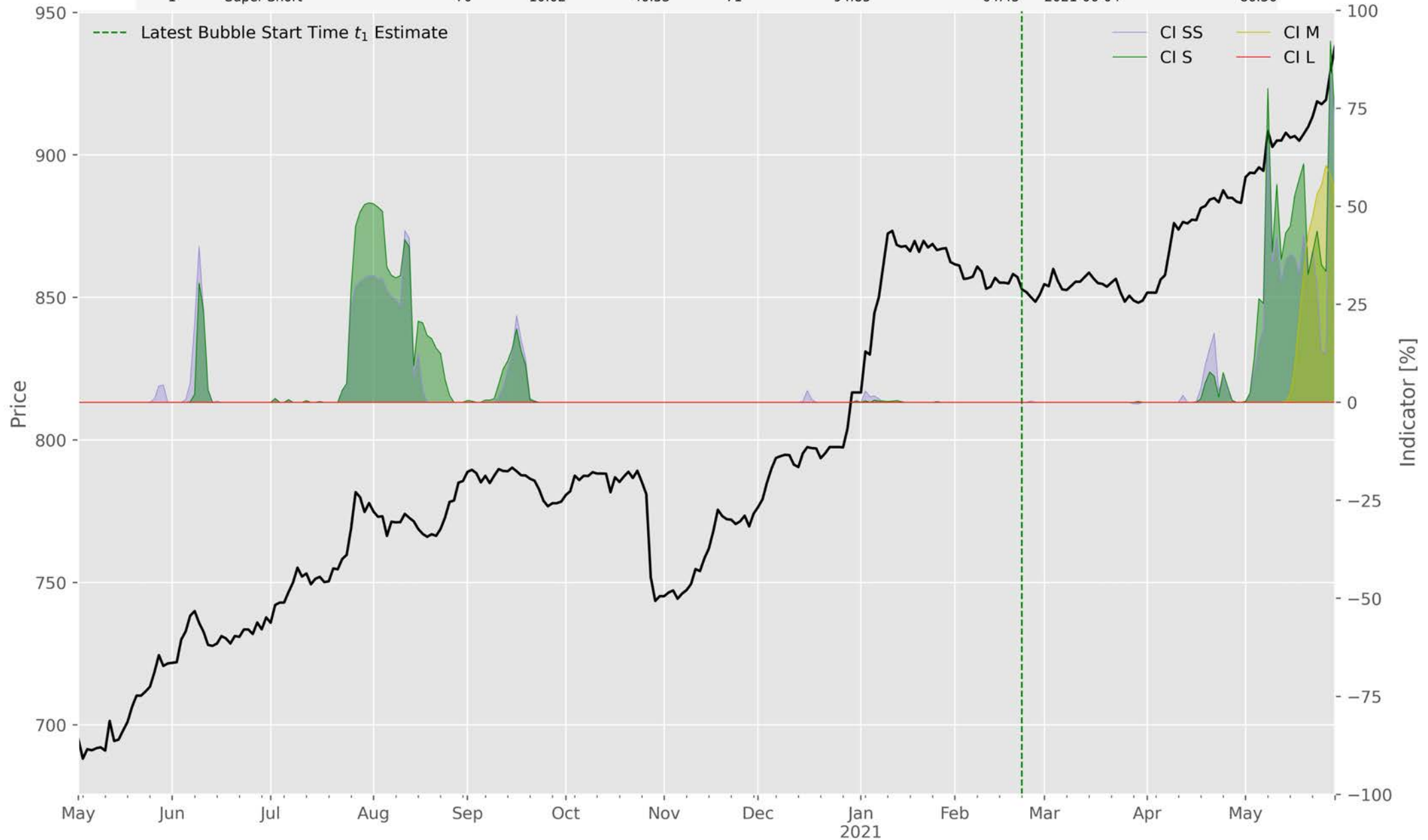
Msci France U$

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 $\bar{t}_c$	Scenario Probability [%]
2	Medium Term	28.96	73.84	54.99	318	99.97	54.2	2021-05-31	94.44

Russia Rts Index

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 $\bar{t}_c$	Scenario Probability [%]
3	Super Short	34.29	12.64	38.54	92	98.26	50.64	2021-06-02	99.99

S&P1500 Multi-Line Insurance

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 $\bar{t}_c$	Scenario Probability [%]
1	Medium Term	100	111.45	81.69	316	95.37	92.02	2021-06-15	89.41

S&P500 Agricultural Products

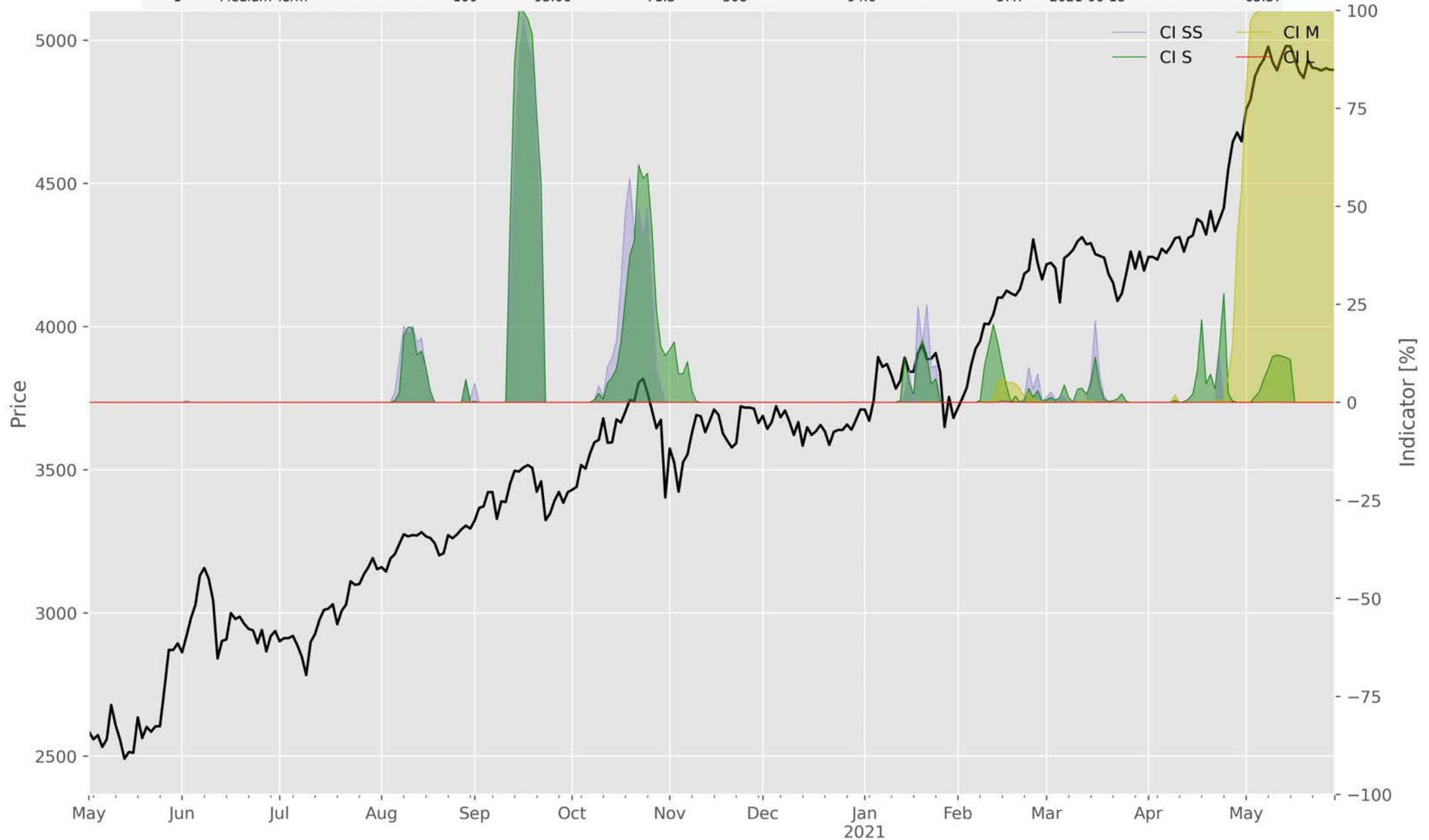| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
2	Medium Term	100	93.06	71.3	308	94.6	87.7	2021-06-18	65.24
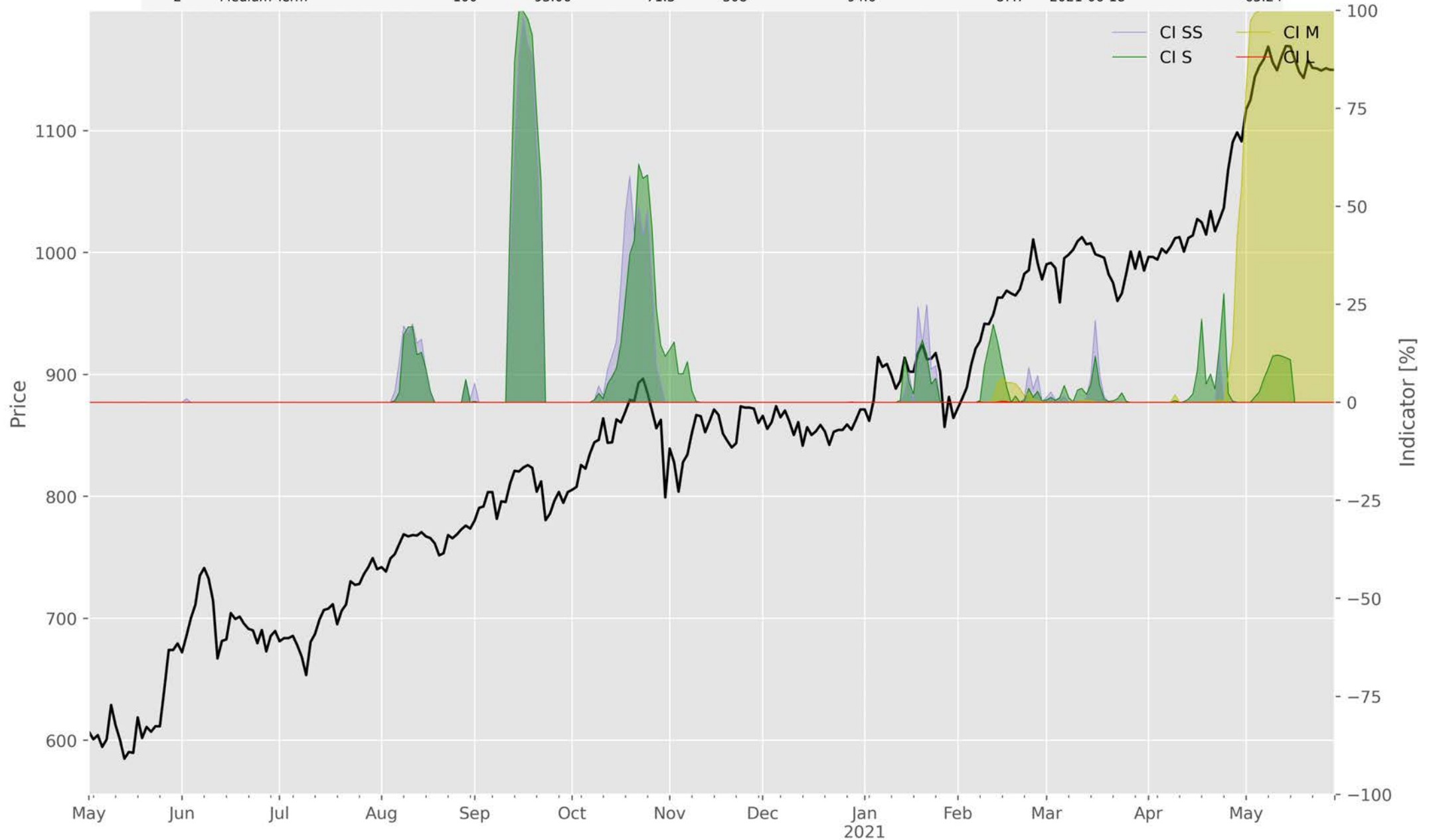
S&P1500 Computer & Electr Retail

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 $\bar{t}_c$	Scenario Probability [%]
3	Long Term	100	146.17	54.1	525	86.15	77.53	2021-08-23	99.51
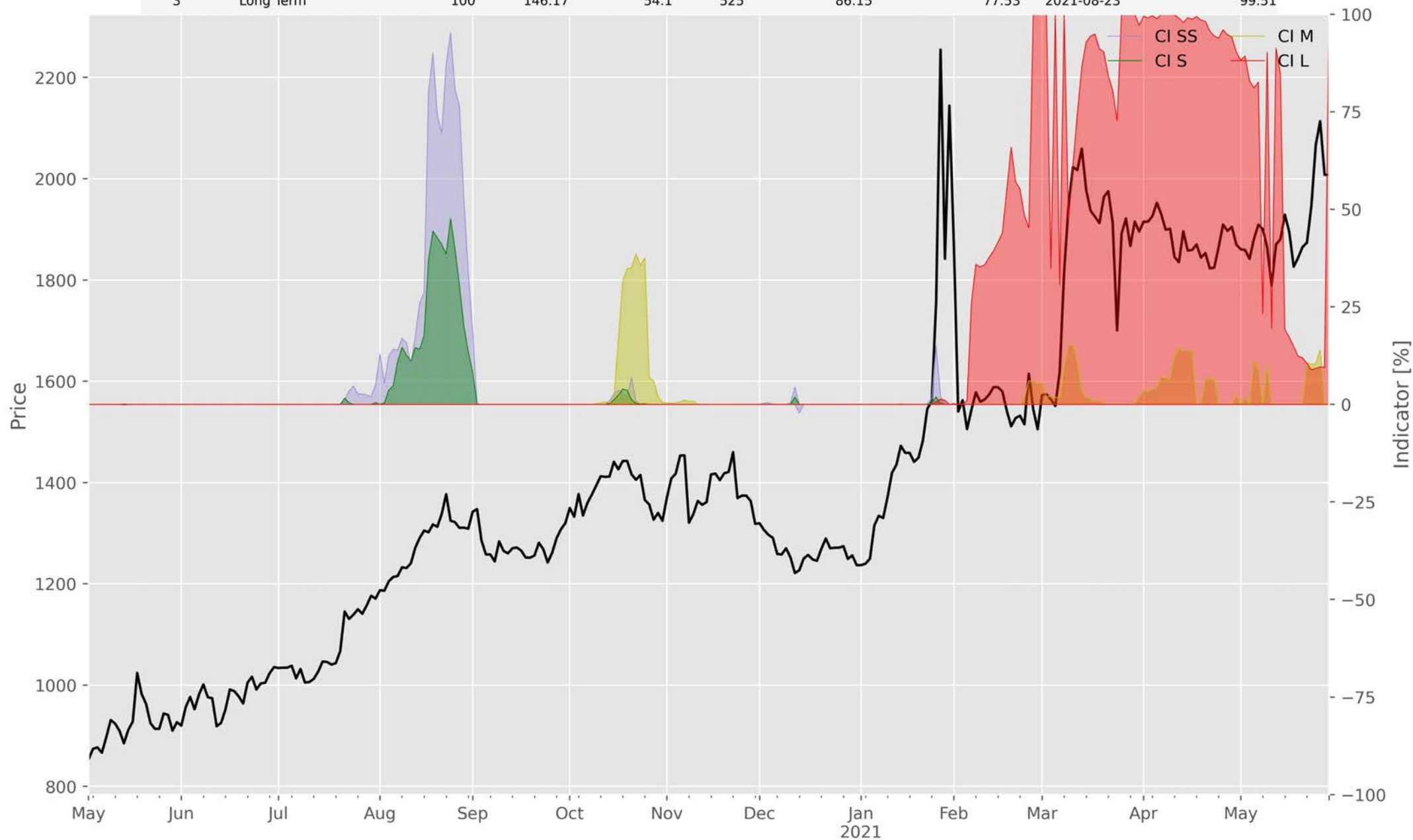
S&P Global 1200 Agri Prods

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 $\bar{t}_c$	Scenario Probability [%]
1	Medium Term	100	93.06	71.3	308	94.6	87.7	2021-06-18	65.37

S&P Global 1200 Motor Manufac

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 $\bar{t}_c$	Scenario Probability [%]
2	Medium Term	63.65	144.92	105.21	314	91.31	84.88	2021-06-30	81.55

S&P Global 1200 Coal & Cons Fuel

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 $\bar{t}_c$	Scenario Probability [%]
3	Super Short	16.36	52.31	205.3	95	98.76	69.23	2021-06-01	99.99

---- Latest Bubble Start Time t_1 Estimate
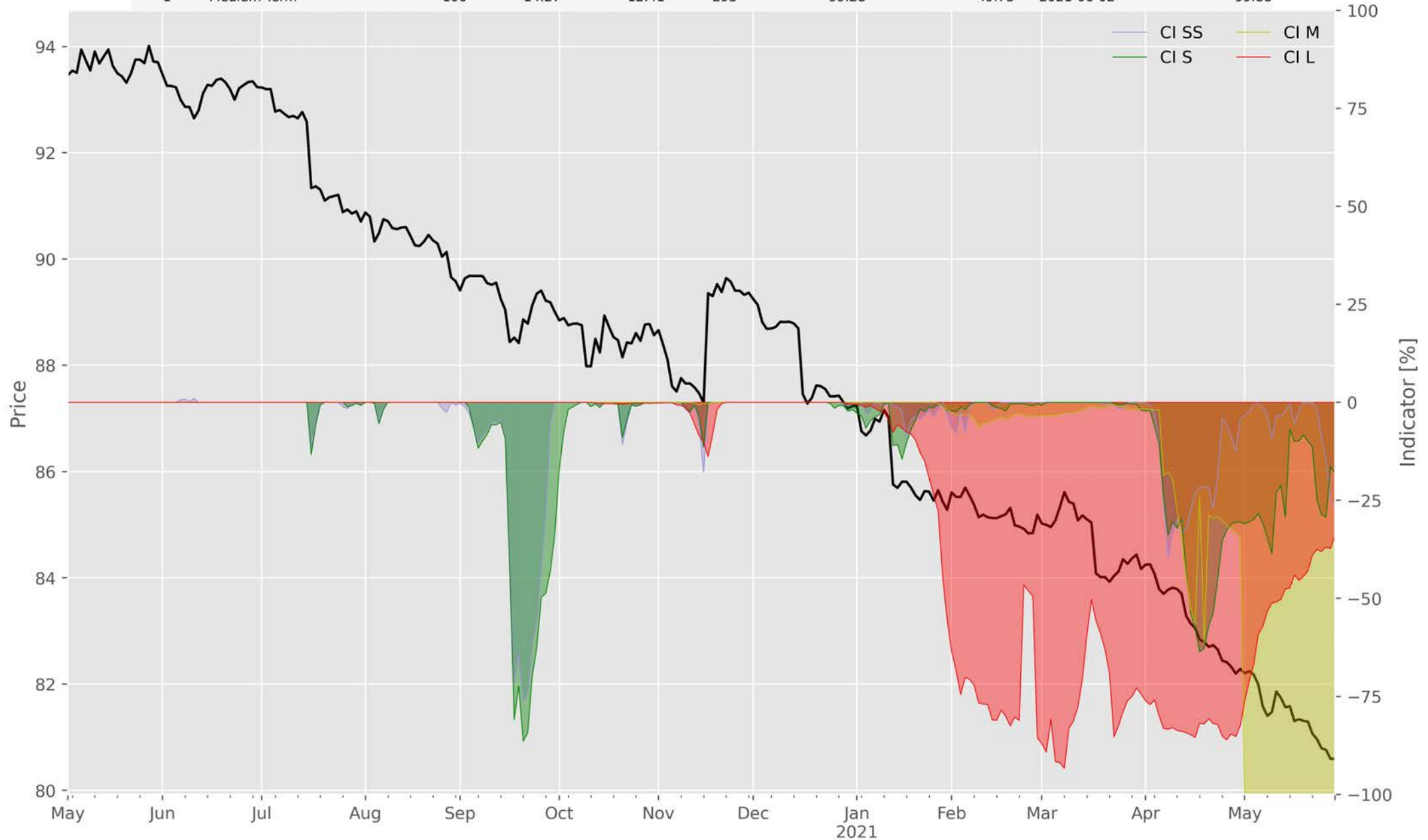
CI SS CI M
CI S   CI L

Forex

Jpm Sth. Africa Reer Cpi (2010=100)

| Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\tilde{t}_c$	Scenario Probability [%]
1	Short Term	48.43	20.77	24.51	217	94.48	48.22	2021-06-13	99.98

Jpm Russia Reer Ppi (2010=100)

Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
2	Short Term	22.99	11.13	15.64	183	99.48	32.95	2021-06-01	99.99

Jpm Hong Kong Reer Ppi (2010=100)

Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
1	Medium Term	100	-14.27	-12.41	293	99.28	49.75	2021-06-02	99.88

Jpm Ecuador Reer Ppi (2010=100)

Rank	Strongest Signal	DS-LPPLS Confidence ci [%]	Bubble Size bs [%]	Bubble CAGR bg [%]	Duration [days]	Bubble Progress bp [%]	Geometric Average (ci, bg, bp)	Critical Time $\bar{t}_c$	Scenario Probability [%]
2	Medium Term	84.63	-16.59	-13.39	318	66.74	42.29	2021-11-05	99.24
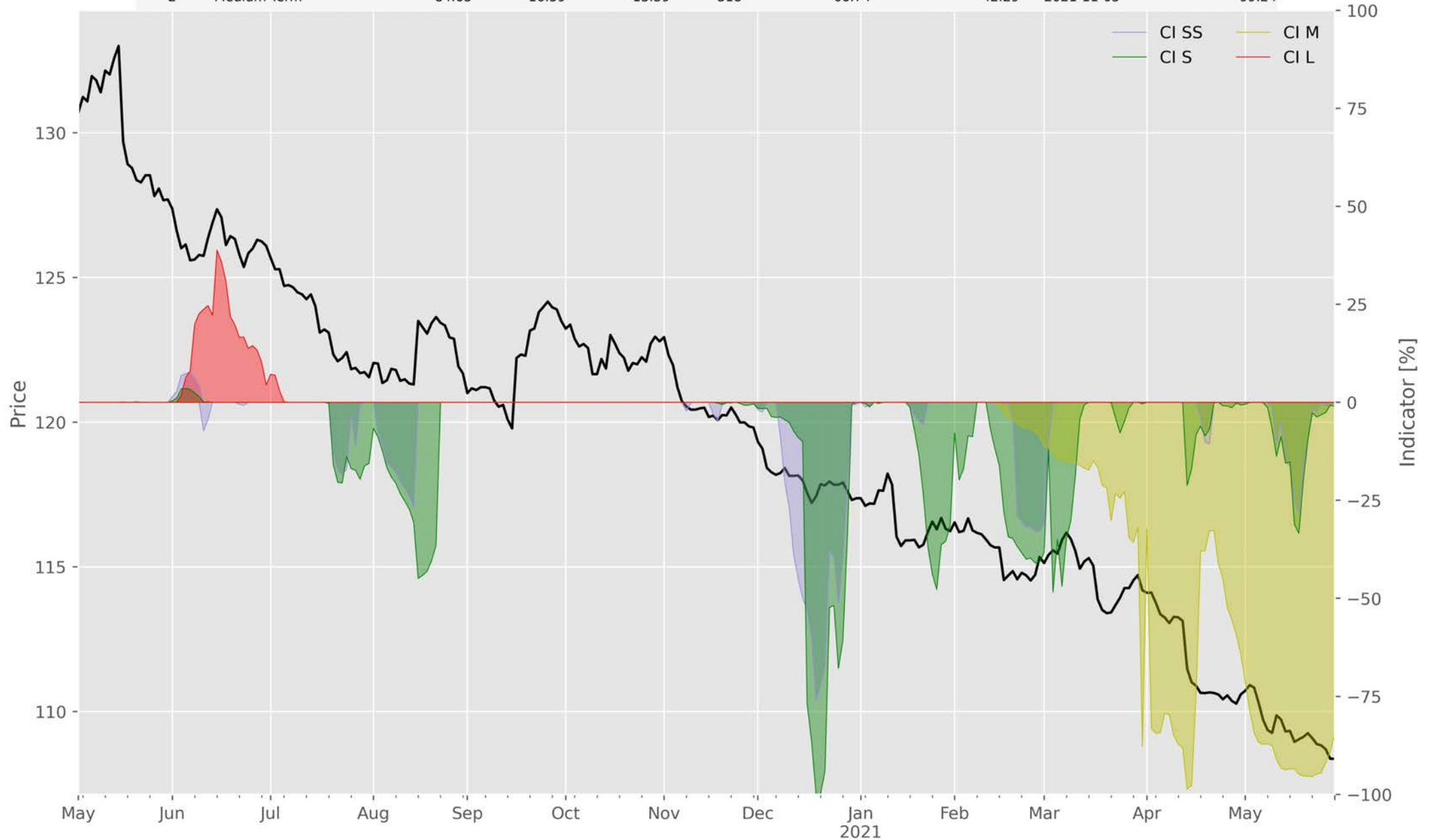
CryptoX

Vitae/USD

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 $\tilde{t}_c$	Scenario Probability [%]
1	Super Short	78.94	-83.54	-96.72	133	95.97	90.15	2021-06-06	88.33
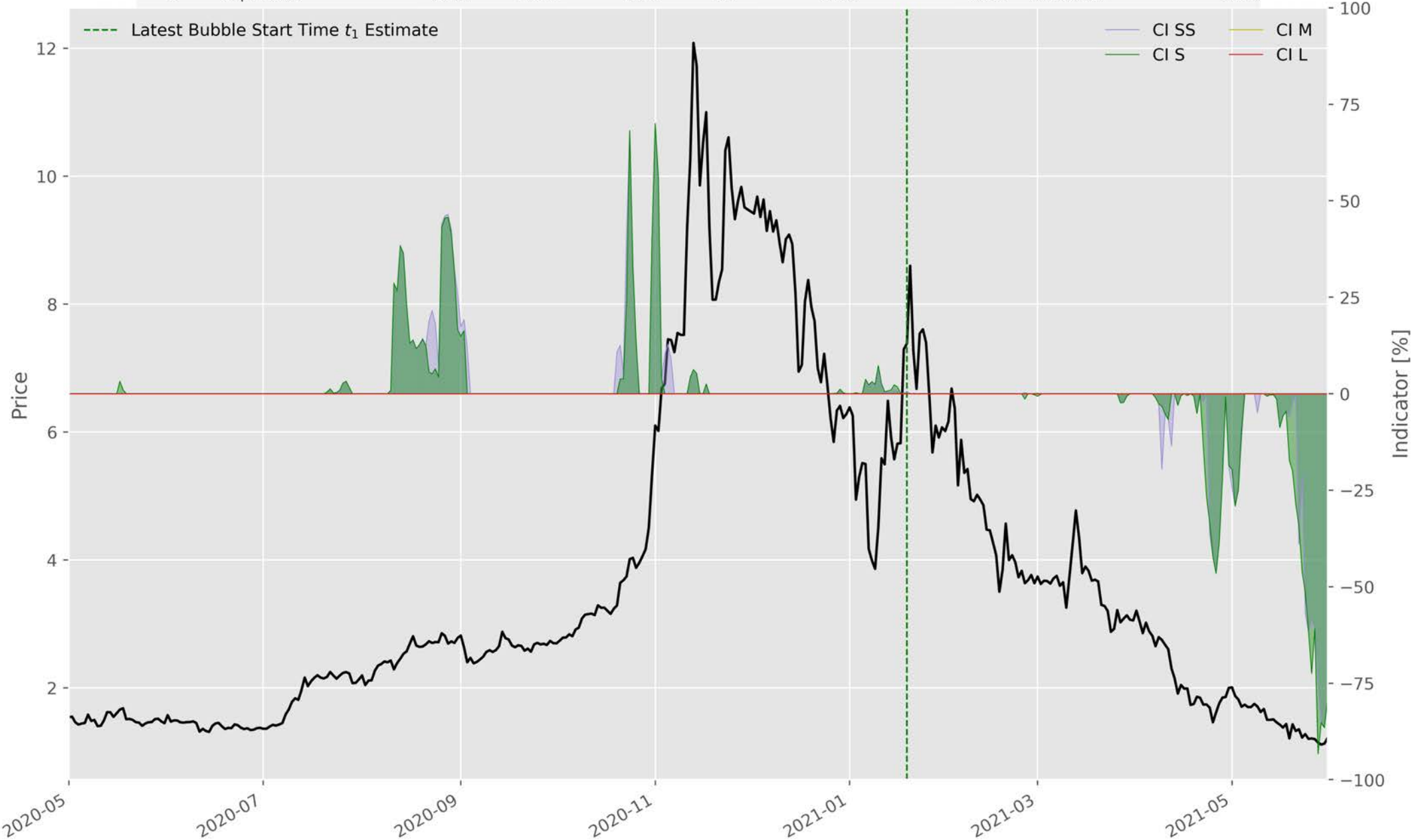
Sectors

GICS Industry Group Name	Yearly Return		Bubble Size		Bubble Score		Value Score		Growth Score	
	Jun 1st	May 1st	Jun 1st	May 1st	Jun 1st	May 1st	Jun 1st	May 1st	Jun 1st	May 1st
Pharmaceuticals, Biotechnology & Life Sciences	13.2%	8.6%	0.0%	0.0%	0.0%	0.0%	65.0%	62.7%	56.5%	56.4%
Consumer Services	39.9%	56.8%	0.0%	30.4%	0.0%	31.7%	21.4%	20.2%	59.8%	59.7%
Retailing	33.5%	50.5%	11.0%	0.0%	4.1%	0.0%	21.2%	20.4%	43.6%	42.7%
Transportation	49.7%	60.8%	33.2%	26.4%	23.2%	28.9%	44.7%	45.1%	56.1%	56.1%
Consumer Durables & Apparel	53.7%	70.3%	0.0%	0.0%	0.0%	0.0%	33.7%	35.8%	52.2%	54.4%
Semiconductors & Semiconductor Equipment	60.7%	70.5%	0.0%	0.0%	0.0%	0.0%	58.4%	59.4%	39.0%	37.6%
Technology Hardware & Equipment	44.5%	62.6%	0.0%	0.0%	0.0%	0.0%	61.9%	61.8%	48.7%	49.1%
Automobiles & Components	93.1%	125.0%	0.0%	0.0%	0.0%	0.0%	64.2%	62.4%	36.1%	35.9%
Telecommunication Services	13.9%	22.0%	0.0%	0.0%	0.0%	0.0%	60.4%	60.3%	42.9%	43.2%
Energy	26.9%	33.8%	0.0%	0.0%	0.0%	0.0%	49.9%	50.3%	70.0%	69.5%
Software & Services	31.0%	41.8%	0.0%	0.0%	0.0%	0.0%	29.2%	29.0%	53.7%	53.0%
Materials	50.3%	60.8%	0.0%	0.0%	0.0%	0.0%	48.0%	48.5%	50.8%	50.4%
Health Care Equipment & Services	34.9%	36.1%	0.0%	0.0%	0.0%	0.0%	48.1%	48.3%	51.3%	52.6%
Capital Goods	48.0%	66.5%	0.0%	0.0%	0.0%	0.0%	48.2%	48.2%	50.2%	49.6%
Media & Entertainment	53.3%	63.2%	0.0%	50.4%	0.0%	15.2%	29.5%	28.0%	30.9%	29.6%
Commercial & Professional Services	29.5%	39.6%	29.5%	0.0%	8.0%	0.0%	28.1%	27.1%	51.3%	51.2%
Food & Staples Retailing	21.8%	21.5%	0.0%	0.0%	0.0%	0.0%	44.6%	41.9%	63.1%	62.9%
Household & Personal Products	15.3%	19.1%	0.0%	0.0%	0.0%	0.0%	30.1%	30.6%	53.2%	52.4%
Food, Beverage & Tobacco	21.2%	21.7%	16.2%	16.5%	38.8%	10.1%	47.8%	47.6%	58.1%	57.4%
Utilities	13.7%	23.2%	0.0%	0.0%	0.0%	0.0%	46.0%	47.2%	53.9%	54.8%
Insurance	39.4%	56.7%	20.8%	22.1%	40.1%	23.8%	-	-	-	-
Real Estate	21.4%	35.6%	22.0%	13.3%	28.5%	96.8%	-	-	-	-
Diversified Financials	53.4%	63.4%	55.1%	0.0%	27.5%	0.0%	-	-	-	-
Banks	59.7%	77.4%	0.0%	0.0%	0.0%	0.0%	-	-	-	-

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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.

▸ There are seven positive bubbles identified in the 24 MSCI World Industry Group Indices (next slide): *Retailing, Transportation, Commercial & Professional Services, Food, Beverage & Tobacco, Insurance, Real Estate, Diversified Financials . The high bubble scores indicate that this industry index may face a high probability of correction in the near future. Apart from those industry groups with a significant bubble score again in this month, we identified last month that the Consumer Services* and *Media & Entertainment* industry groups had a significant bubble. Both of them had a correction of 5-10% in the past month, and then went north again.
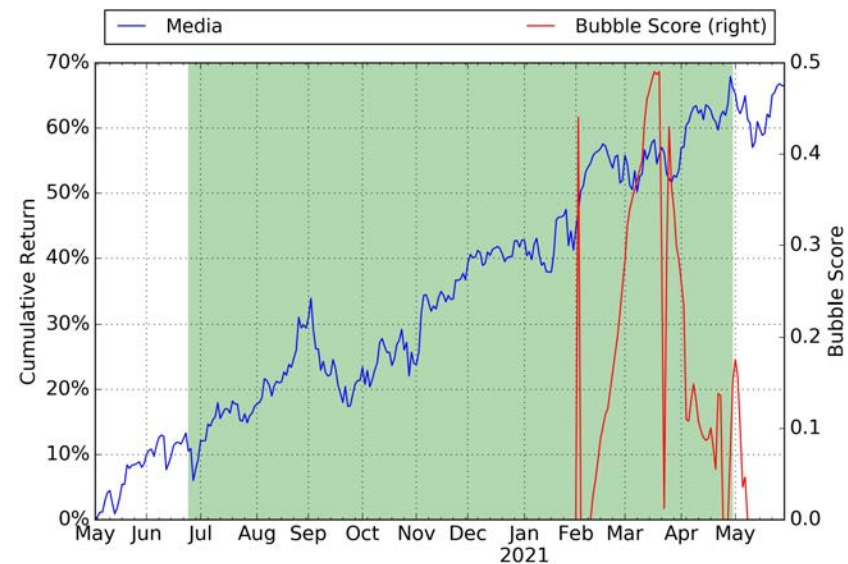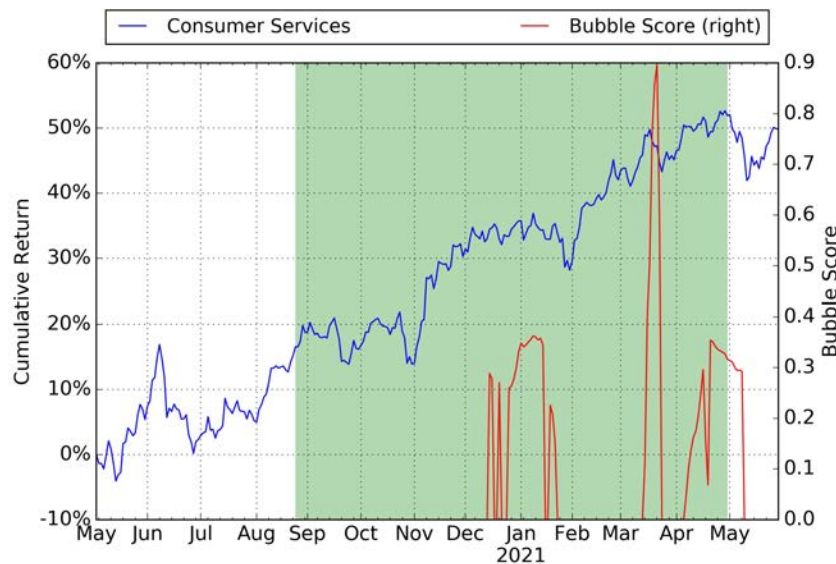
Sectors
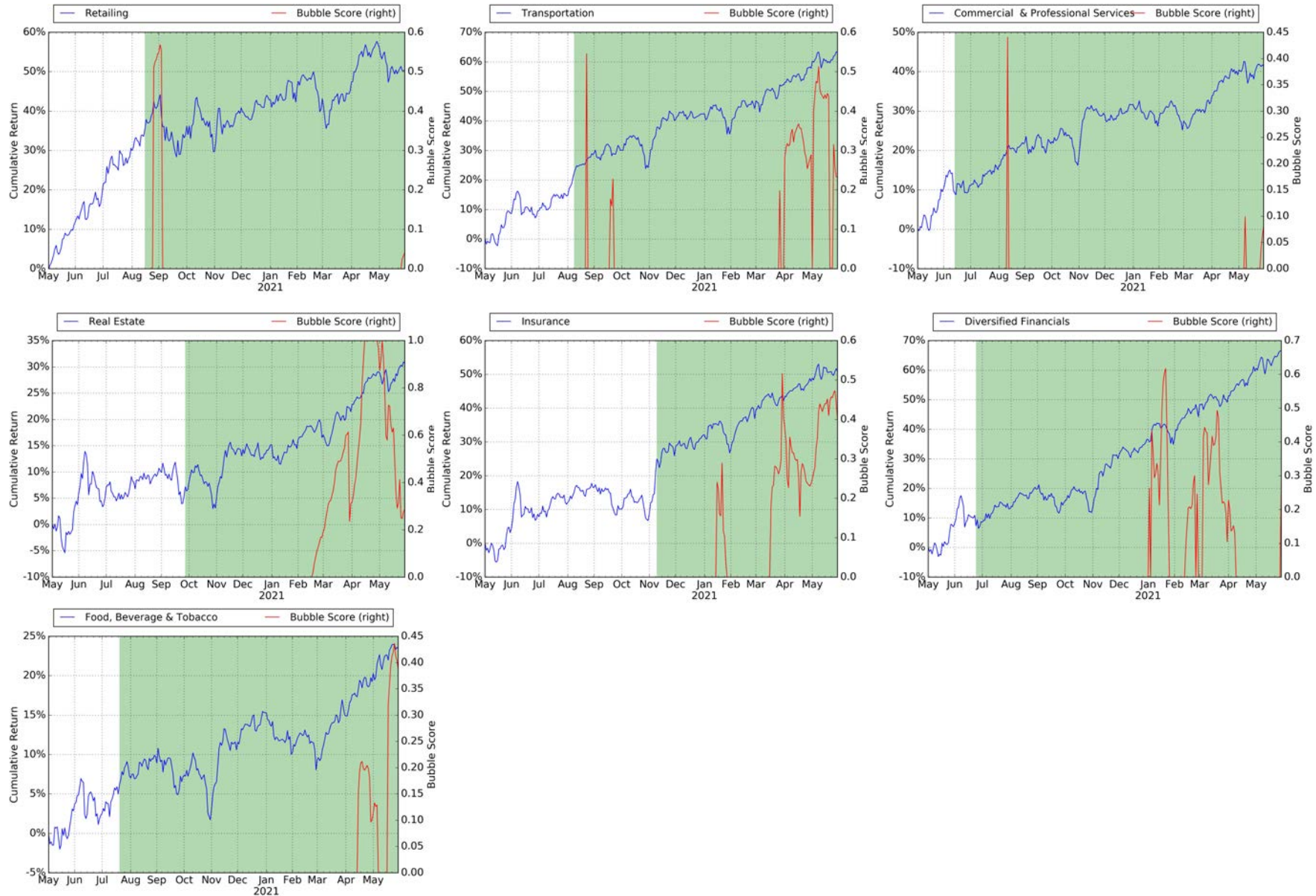
Portfolio Construction & Performance

▶ 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.
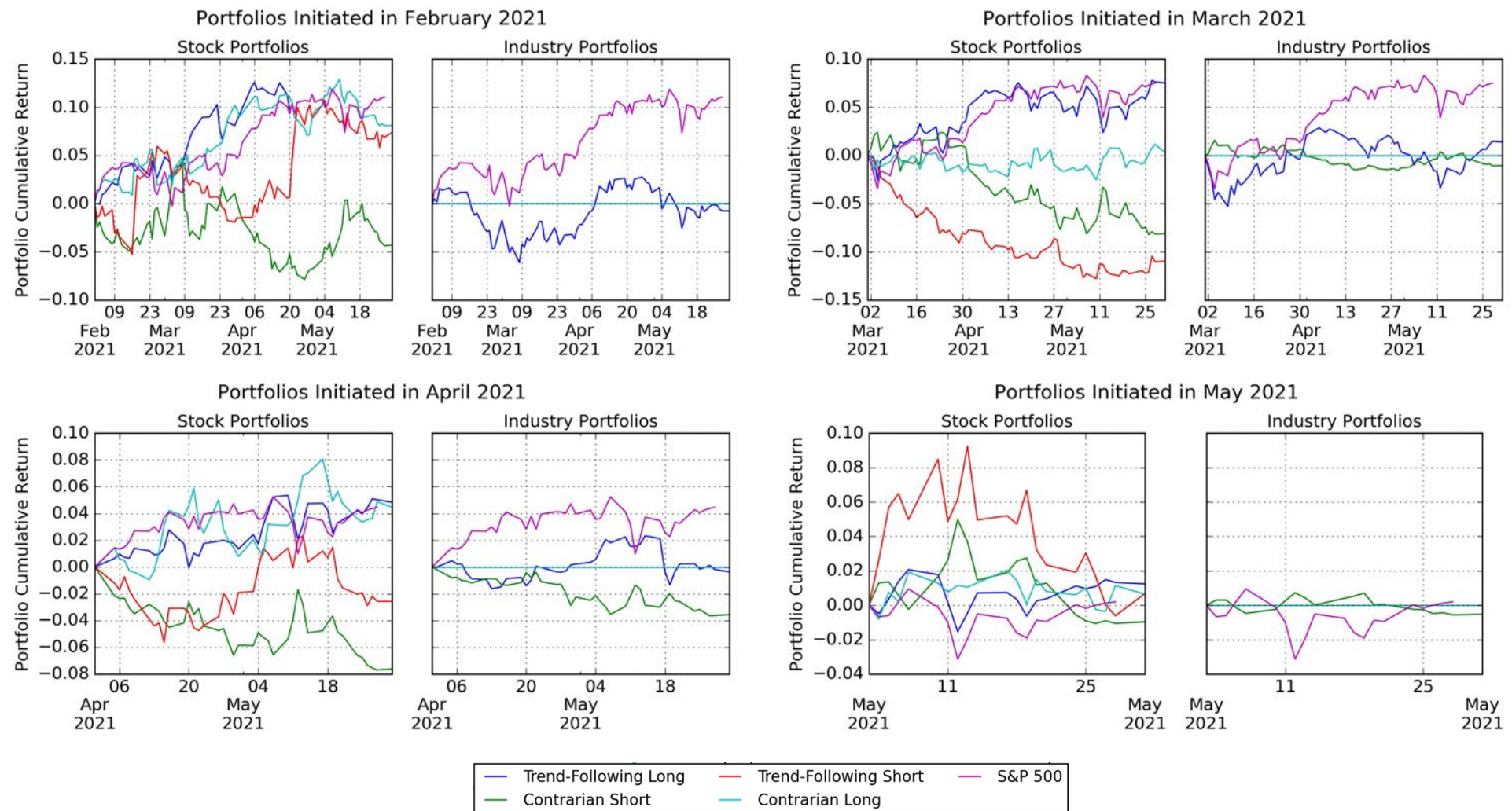
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Portfolio Construction & Performance

▶ 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.
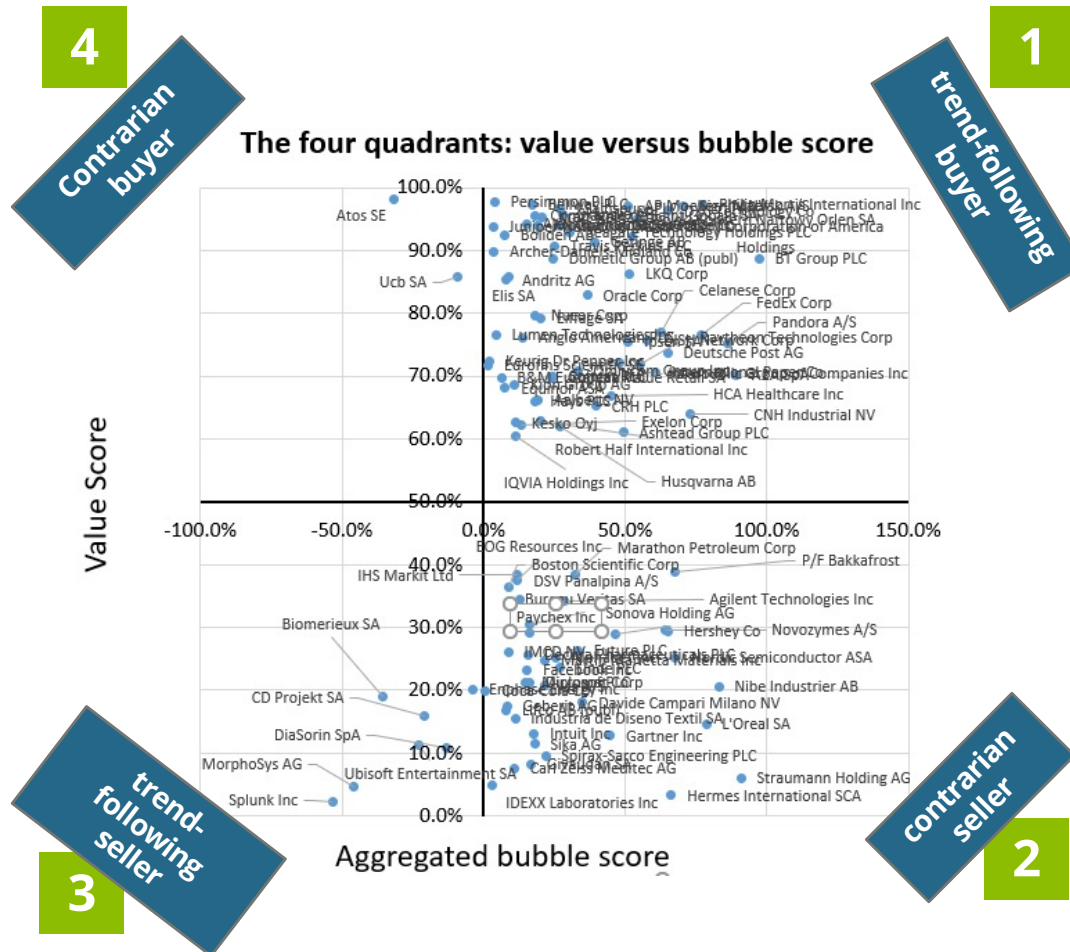
Portfolio Construction & Performance

▸ Similar to the market, Portfolios in this month are relatively flat with low volatility. 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 quadrants[1]

The four quadrants: value versus bubble score

Quadrants labeled: 4 – Contrarian buyer (top left), 1 – trend-following buyer (top right), 3 – trend-following seller (bottom left), 2 – contrarian seller (bottom right)

▸ **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. Oracle Corp.

▸ **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. Gartner 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. Splunk 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. Ucb SA.

[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
Andritz AG	Austria	Capital Goods	34.0%	59.6%	Oct-20	8.0%	85.2%	93.5%
Deutsche Post AG	Germany	Transportation	78.8%	41.5%	Dec-20	64.9%	73.7%	86.7%
Kion Group AG	Germany	Capital Goods	60.3%	26.4%	Oct-20	11.0%	68.7%	3.0%
AP Moeller - Maersk A/S	Denmark	Transportation	112.9%	67.9%	Sep-20	51.2%	97.1%	93.3%
Pandora A/S	Denmark	Consumer Durables & Apparel	133.7%	30.6%	Jan-21	86.0%	75.3%	84.8%
Kesko Oyj	Finland	Food & Staples Retailing	88.5%	30.4%	Nov-20	11.3%	62.5%	61.6%
Compagnie de Saint Gobain SA	France	Capital Goods	71.4%	52.7%	Nov-20	18.0%	95.6%	16.4%
Eiffage SA	France	Capital Goods	6.6%	13.3%	Nov-20	20.1%	79.1%	19.7%
Ipsen SA	France	Pharmaceuticals, Biotechnology & Life Sciences	8.5%	21.4%	Dec-20	51.2%	75.5%	22.8%
Elis SA	France	Commercial & Professional Services	19.7%	19.2%	Nov-20	9.0%	85.7%	74.7%
Eurofins Scientific SE	Luxembourg	Pharmaceuticals, Biotechnology & Life Sciences	49.6%	34.4%	Sep-20	1.6%	71.7%	4.8%
Ashtead Group PLC	United Kingdom	Capital Goods	101.9%	69.1%	Nov-20	49.3%	61.0%	82.8%
Bellway PLC	United Kingdom	Consumer Durables & Apparel	28.3%	34.9%	Jun-20	17.0%	97.2%	32.8%
Hays PLC	United Kingdom	Commercial & Professional Services	33.3%	34.7%	Nov-20	18.0%	65.9%	84.9%
Persimmon PLC	United Kingdom	Consumer Durables & Apparel	31.4%	31.8%	Jul-20	3.9%	97.7%	32.4%
BT Group PLC	United Kingdom	Telecommunication Services	43.3%	43.0%	Nov-20	97.3%	88.6%	88.6%
J Sainsbury PLC	United Kingdom	Food & Staples Retailing	39.8%	41.1%	Sep-20	26.8%	96.5%	92.0%
Anglo American PLC	United Kingdom	Materials	68.1%	53.0%	Nov-20	13.7%	76.1%	9.0%
Travis Perkins PLC	United Kingdom	Capital Goods	48.2%	52.2%	Jun-20	25.1%	90.6%	44.8%
Softcat PLC	United Kingdom	Software & Services	72.1%	47.9%	Sep-20	24.6%	69.9%	41.4%
Glanbia PLC	Ireland; Republic of	Food, Beverage & Tobacco	28.2%	48.1%	Nov-20	24.1%	69.7%	40.0%
CRH PLC	Ireland; Republic of	Materials	30.6%	30.6%	Jun-20	39.6%	65.2%	12.4%
Grafton Group PLC	Ireland; Republic of	Capital Goods	75.5%	30.7%	Dec-20	26.9%	94.0%	9.7%
Seagate Technology Holdings PLC	Ireland; Republic of	Technology Hardware & Equipment	74.6%	56.5%	Dec-20	30.6%	92.8%	72.9%
A2A SpA	Italy	Utilities	29.4%	40.9%	Nov-20	89.0%	70.1%	4.7%
B&M European Value Retail SA	Luxembourg	Retailing	67.1%	23.2%	Sep-20	6.2%	69.6%	13.0%
Aalberts NV	Netherlands	Capital Goods	61.1%	65.9%	Jun-20	19.2%	66.3%	4.1%
CNH Industrial NV	United Kingdom	Capital Goods	99.1%	36.3%	Dec-20	72.9%	63.9%	5.5%
Signify NV	Netherlands	Capital Goods	133.1%	54.7%	Dec-20	70.7%	97.0%	5.0%
Equinor ASA	Norway	Energy	19.3%	31.5%	Jun-20	7.6%	68.1%	95.0%
Polski Koncern Naftowy Orlen SA	Poland	Energy	17.7%	55.7%	Nov-20	54.3%	95.0%	76.7%
Skanska AB	Sweden	Capital Goods	18.2%	18.2%	Jun-20	27.8%	95.7%	16.9%

Single Stocks

Quadrant 1 stocks: strong positive bubble signals with strong fundamentals (cont'd)

Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Getinge AB	Sweden	Health Care Equipment & Services	74.9%	62.1%	Oct-20	39.2%	91.2%	8.5%
Husqvarna AB	Sweden	Consumer Durables & Apparel	61.0%	60.3%	Jun-20	27.1%	62.1%	91.8%
Dometic Group AB (publ)	Sweden	Automobiles & Components	71.0%	57.0%	Aug-20	24.5%	88.7%	95.2%
Boliden AB	Sweden	Materials	58.1%	53.8%	Jul-20	7.4%	92.4%	9.1%
Alexion Pharmaceuticals Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	52.2%	52.2%	Jun-20	15.2%	94.2%	23.5%
Archer-Daniels-Midland Co	United States of America	Food, Beverage & Tobacco	57.0%	37.7%	Oct-20	3.6%	89.8%	30.5%
Celanese Corp	United States of America	Materials	70.6%	70.3%	Jul-20	62.7%	77.1%	31.9%
DXC Technology Co	United States of America	Software & Services	109.0%	114.2%	Sep-20	65.1%	96.3%	13.7%
DISH Network Corp	United States of America	Media & Entertainment	23.4%	38.1%	Dec-20	57.9%	75.8%	6.5%
Exelon Corp	United States of America	Utilities	11.4%	9.9%	Nov-20	13.0%	62.2%	24.1%
FedEx Corp	United States of America	Transportation	117.6%	24.3%	Jan-21	77.0%	76.6%	22.1%
HCA Healthcare Inc	United States of America	Health Care Equipment & Services	85.2%	45.8%	Nov-20	44.9%	66.7%	22.4%
International Paper Co	United States of America	Materials	64.7%	29.7%	Dec-20	60.7%	70.6%	67.2%
Interpublic Group of Companies Inc	United States of America	Media & Entertainment	75.1%	59.7%	Nov-20	47.9%	72.1%	16.3%
IQVIA Holdings Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	63.6%	55.9%	Jul-20	11.3%	60.4%	57.7%
Juniper Networks Inc	United States of America	Technology Hardware & Equipment	5.6%	14.1%	Sep-20	3.4%	93.8%	52.7%
Keurig Dr Pepper Inc	United States of America	Food, Beverage & Tobacco	30.5%	28.1%	Sep-20	2.2%	72.3%	73.3%
Kraft Heinz Co	United States of America	Food, Beverage & Tobacco	31.7%	42.5%	Oct-20	20.7%	95.3%	34.2%
LKQ Corp	United States of America	Retailing	78.8%	48.2%	Nov-20	51.6%	86.2%	31.1%
Laboratory Corporation of America Holdings	United States of America	Health Care Equipment & Services	53.4%	57.5%	Aug-20	52.3%	92.1%	6.8%
Lumen Technologies Inc	United States of America	Telecommunication Services	25.7%	31.1%	Aug-20	4.4%	76.5%	3.1%
Molson Coors Beverage Co	United States of America	Food, Beverage & Tobacco	39.7%	66.6%	Sep-20	19.3%	93.9%	82.1%
Nucor Corp	United States of America	Materials	131.7%	90.1%	Dec-20	18.2%	79.6%	23.8%
Omnicom Group Inc	United States of America	Media & Entertainment	36.3%	52.2%	Jul-20	33.1%	70.8%	27.4%
Oracle Corp	United States of America	Software & Services	45.3%	43.3%	Aug-20	36.6%	82.8%	46.0%
Philip Morris International Inc	United States of America	Food, Beverage & Tobacco	27.5%	17.3%	Dec-20	77.5%	97.4%	56.7%
Raytheon Technologies Corp	United States of America	Capital Goods	25.8%	28.8%	Nov-20	55.1%	71.9%	68.7%
Robert Half International Inc	United States of America	Commercial & Professional Services	53.6%	43.0%	Nov-20	20.2%	62.9%	37.8%
Target Corp	United States of America	Retailing	88.0%	32.2%	Dec-20	80.5%	73.1%	55.8%
Textron Inc	United States of America	Capital Goods	77.8%	114.5%	Jul-20	42.3%	77.8%	23.3%
Trip.com Group Ltd	China	Retailing	44.2%	49.4%	Jun-20	33.9%	76.7%	5.8%
Tyson Foods Inc	United States of America	Food, Beverage & Tobacco	19.1%	28.2%	Sep-20	9.3%	80.9%	7.0%

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Single Stocks

Quadrant 1 Stocks Current Month Example – BT Group PLC.
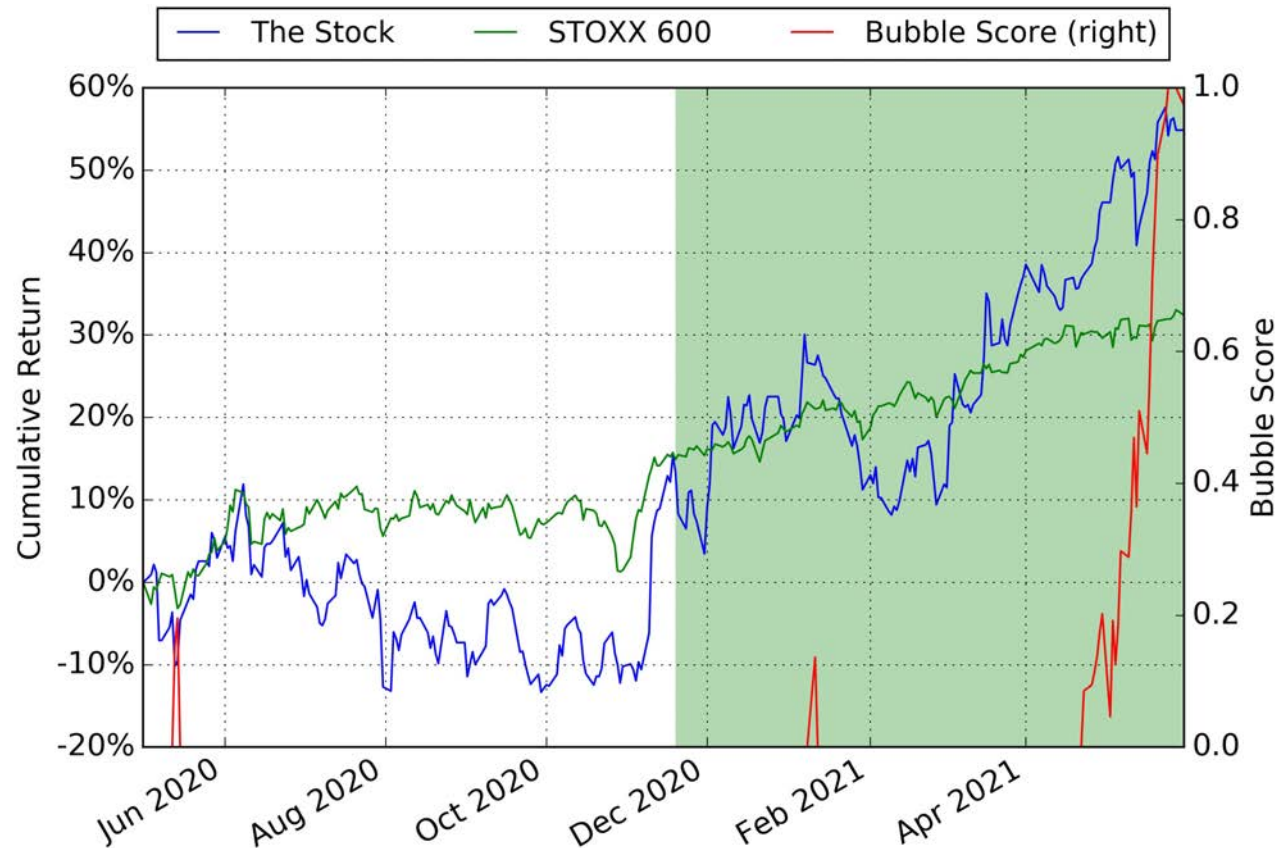
- ▸ The above graph shows the one-year cumulative return of the stock in blue (left hand scale), STOXX 600 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this six-month bubble has reached 97.3% with a bubble size 43%.

Single Stocks

Quadrant 1 Stocks Last Month Example – Valmet Oyj.
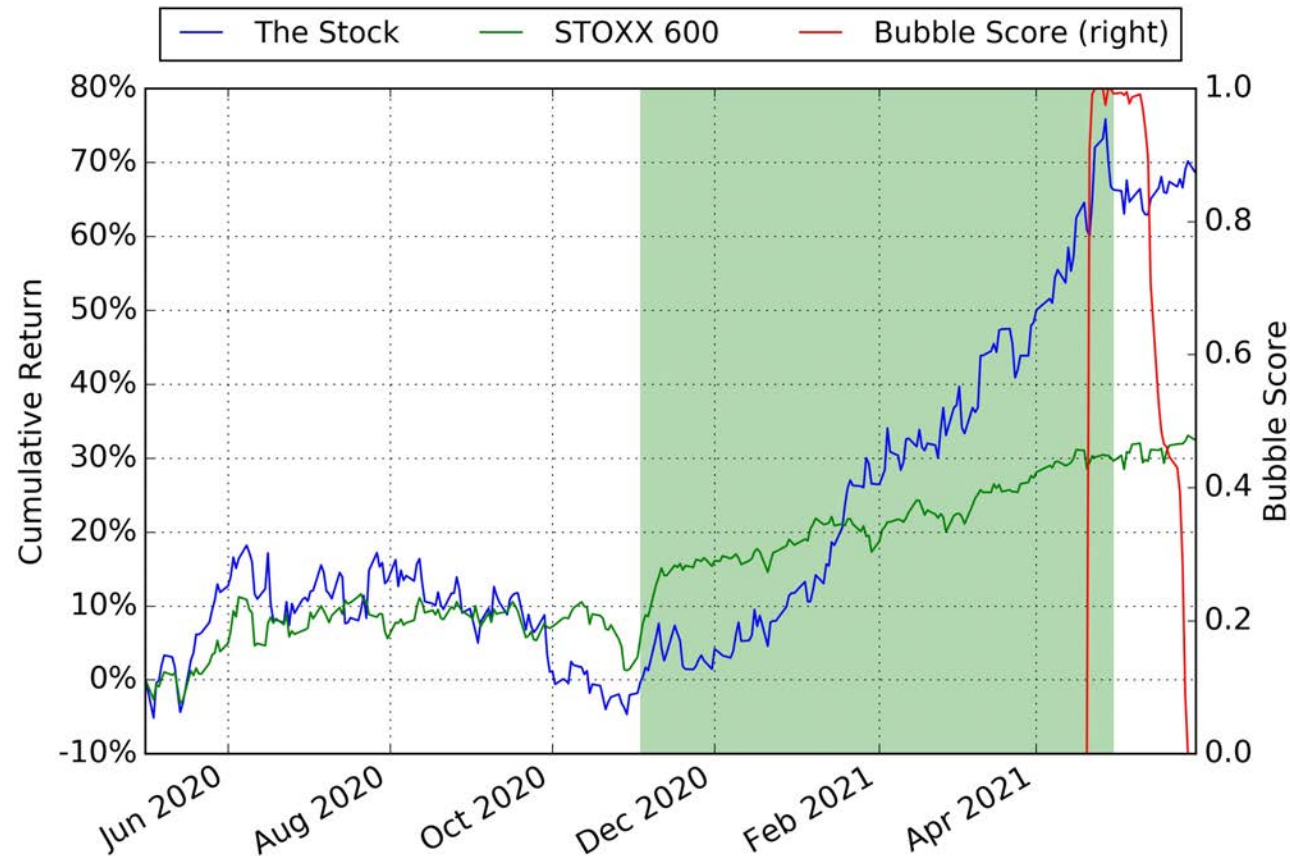
▸ The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (green) and LPPLS Bubble Score (red lines on the right y-axis). The green shaded period delineates the time interval within which a strong positive bubble has been identified and reported last month. The stock price has entered into a plateau in the past month, indicating an end of the previous market regime of a positive bubble. This in line with our strong positive 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
IHS Markit Ltd	United Kingdom	Commercial & Professional Services	44.0%	44.0%	Jun-20	11.9%	38.3%	50.2%
Givaudan SA	Switzerland	Materials	20.2%	10.1%	Nov-20	16.7%	8.2%	80.2%
Straumann Holding AG	Switzerland	Health Care Equipment & Services	77.1%	34.4%	Nov-20	90.9%	6.0%	62.4%
Sonova Holding AG	Switzerland	Health Care Equipment & Services	55.6%	56.7%	Jun-20	46.7%	28.8%	17.3%
Geberit AG	Switzerland	Capital Goods	37.8%	37.8%	Jun-20	8.2%	17.5%	77.1%
Sika AG	Switzerland	Materials	67.9%	23.1%	Nov-20	18.0%	11.4%	83.8%
Carl Zeiss Meditec AG	Germany	Health Care Equipment & Services	69.8%	63.4%	Jul-20	10.8%	7.6%	79.8%
DSV Panalpina A/S	Denmark	Transportation	98.7%	46.7%	Jan-21	12.7%	34.3%	83.4%
Novozymes A/S	Denmark	Materials	18.6%	22.3%	Nov-20	64.2%	29.7%	70.6%
Iss A/S	Denmark	Commercial & Professional Services	5.9%	20.7%	Nov-20	21.5%	20.6%	81.2%
Industria de Diseno Textil SA	Spain	Retailing	23.4%	33.5%	Aug-20	11.1%	15.5%	89.4%
P/F Bakkafrost	Faroe Islands	Food, Beverage & Tobacco	18.3%	24.6%	Dec-20	67.6%	38.8%	89.7%
Hermes International SCA	France	Consumer Durables & Apparel	50.7%	53.9%	Oct-20	66.3%	3.2%	32.1%
L'Oreal SA	France	Household & Personal Products	38.5%	20.2%	Jan-21	78.6%	14.5%	59.4%
Bureau Veritas SA	France	Commercial & Professional Services	25.6%	29.1%	Jun-20	16.1%	30.4%	65.3%
Diploma PLC	United Kingdom	Capital Goods	56.5%	30.8%	Nov-20	16.2%	21.1%	63.7%
Dechra Pharmaceuticals PLC	United Kingdom	Pharmaceuticals, Biotechnology & Life Sciences	47.2%	27.7%	Dec-20	15.8%	25.6%	59.1%
Spirax-Sarco Engineering PLC	United Kingdom	Capital Goods	28.0%	17.8%	Sep-20	21.9%	9.6%	46.9%
Future PLC	United Kingdom	Media & Entertainment	121.7%	62.4%	Dec-20	33.3%	26.3%	19.9%
Linde PLC	United Kingdom	Materials	40.3%	28.9%	Jul-20	27.1%	23.5%	54.0%
IMCD NV	Netherlands	Capital Goods	63.0%	30.6%	Sep-20	8.8%	26.1%	24.6%

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Single Stocks

Quadrant 2 stocks: strong positive bubble signals with weak fundamentals (cont'd)

| Company Name	Country of Headquarters	GICS Industry Group Name	Yearly Return	Bubble Size	Bubble Start	Bubble Score	Value Score	Growth Score
Davide Campari Milano NV	Italy	Food, Beverage & Tobacco	43.2%	19.0%	Jan-21	35.0%	18.0%	82.2%
Nordic Semiconductor ASA	Norway	Semiconductors & Semiconductor Equipment	241.1%	91.3%	Nov-20	67.6%	25.2%	56.1%
Lifco AB (publ)	Sweden	Capital Goods	58.1%	17.9%	Dec-20	8.0%	16.8%	76.2%
Nibe Industrier AB	Sweden	Capital Goods	78.2%	53.6%	Nov-20	83.0%	20.5%	73.7%
Agilent Technologies Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	53.9%	45.1%	Jul-20	28.5%	34.1%	54.4%
Alphabet Inc	United States of America	Media & Entertainment	65.6%	37.9%	Nov-20	25.4%	25.1%	20.3%
Boston Scientific Corp	United States of America	Health Care Equipment & Services	11.2%	15.4%	Oct-20	8.7%	36.5%	82.0%
Coca-Cola Co	United States of America	Food, Beverage & Tobacco	12.8%	14.7%	Sep-20	0.8%	19.9%	48.3%
EOG Resources Inc	United States of America	Energy	35.1%	69.4%	Jul-20	11.9%	37.6%	15.1%
Facebook Inc	United States of America	Media & Entertainment	37.7%	29.6%	Jul-20	15.4%	23.2%	30.9%
Gartner Inc	United States of America	Software & Services	76.7%	100.4%	Jun-20	44.7%	12.7%	17.8%
Hershey Co	United States of America	Food, Beverage & Tobacco	29.8%	15.8%	Nov-20	65.1%	29.3%	59.2%
IDEXX Laboratories Inc	United States of America	Health Care Equipment & Services	84.2%	33.1%	Oct-20	2.9%	4.9%	43.0%
Intuit Inc	United States of America	Software & Services	50.8%	31.1%	Oct-20	17.9%	13.0%	37.1%
Marathon Petroleum Corp	United States of America	Energy	52.9%	51.7%	Nov-20	32.5%	38.4%	2.9%
Martin Marietta Materials Inc	United States of America	Materials	74.1%	20.2%	Jan-21	21.6%	24.7%	40.6%
Microsoft Corp	United States of America	Software & Services	31.5%	15.4%	Nov-20	14.9%	21.2%	48.7%
Paychex Inc	United States of America	Software & Services	29.9%	31.8%	Sep-20	16.4%	29.2%	72.0%
Vulcan Materials Co	United States of America	Materials	55.3%	25.6%	Oct-20	17.2%	16.3%	61.3%
Waters Corp	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	63.3%	45.2%	Oct-20	64.6%	25.3%	25.2%
Williams Companies Inc	United States of America	Energy	28.3%	27.0%	Sep-20	3.6%	31.0%	96.8%
Zoetis Inc	United States of America	Pharmaceuticals, Biotechnology & Life Sciences	27.3%	9.7%	Nov-20	38.4%	10.4%	61.7%

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Single Stocks

Quadrant 2 Stocks Current Month Example – Straumann Holding AG.
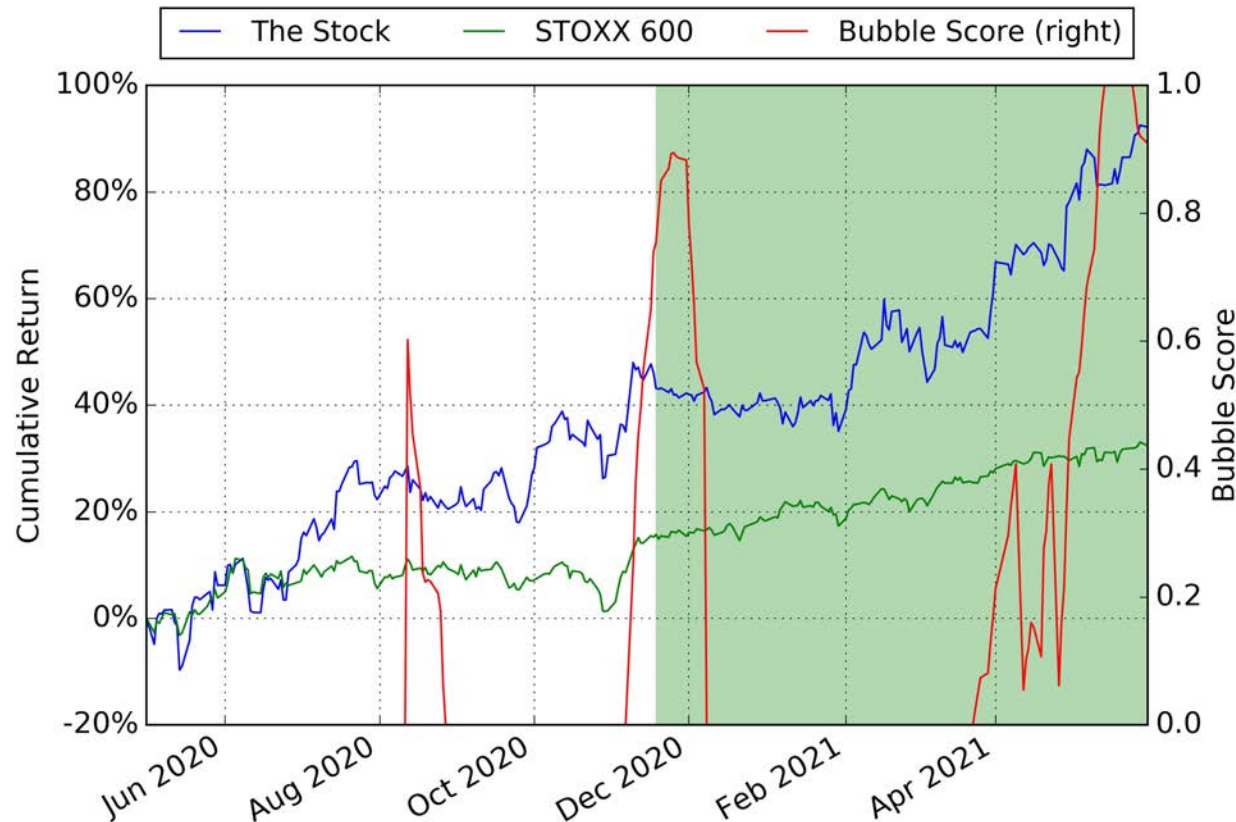
▸ The above graph shows the one-year cumulative return of the stock in blue (left hand scale), STOXX 600 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The green shaded period delineates the time interval within which the positive bubble is identified. The Bubble Score of this six-month bubble has reached 90.9% with a bubble size 34.4%. 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 – Sonova Holding AG.
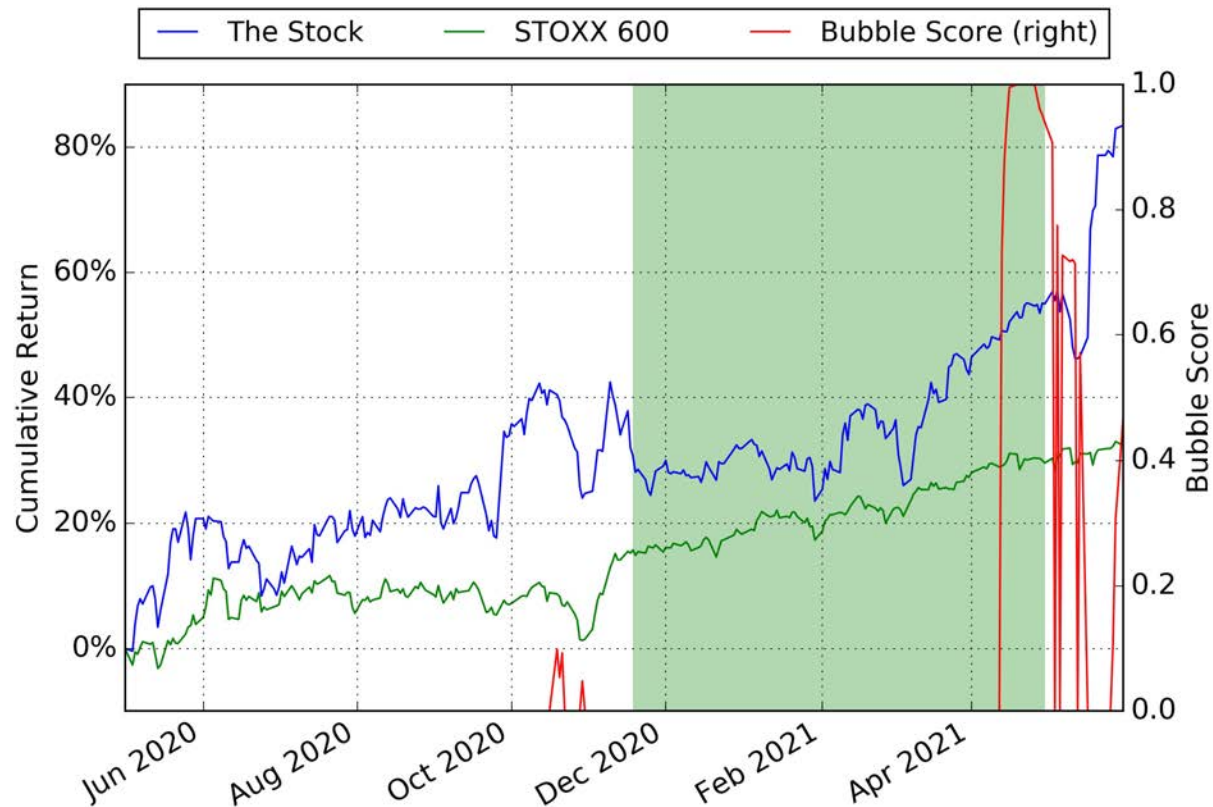
The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (green) and LPPLS Bubble Score (red lines on the right y-axis). The green shaded period delineates the time interval within which a strong positive bubble has been identified and reported last month. The stock price exhibited a sharp drawdown following our prediction, but rebounded strongly with a 20% appreciation until the end of May 2021. This may be a false positive or a transition to a high volatility regime that may followed by a crash. It also possible that the positive signal leading to a warning came too early last month and the positive bubble identified last month has not yet run its course.

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
MorphoSys AG	Germany	Pharmaceuticals, Biotechnology & Life Sciences	-32.4%	-34.9%	Jun-20	-45.7%	4.7%	1.4%
Ubisoft Entertainment SA	France	Media & Entertainment	-10.6%	-26.8%	Oct-20	-22.9%	11.2%	88.0%
Biomerieux SA	France	Health Care Equipment & Services	-17.5%	-28.6%	Jul-20	-35.7%	19.1%	68.5%
DiaSorin SpA	Italy	Health Care Equipment & Services	-10.4%	-24.4%	Oct-20	-13.0%	10.8%	38.4%
CD Projekt SA	Poland	Media & Entertainment	-56.3%	-57.1%	Jul-20	-21.0%	15.8%	90.5%
Enphase Energy Inc	United States of America	Semiconductors & Semiconductor Equipment	177.3%	-12.4%	Dec-20	-3.7%	20.0%	47.1%
Splunk Inc	United States of America	Software & Services	-34.1%	-37.1%	Oct-20	-53.2%	2.2%	20.6%

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Single Stocks

Quadrant 3 Stocks Current Month Example – Splunk Inc.
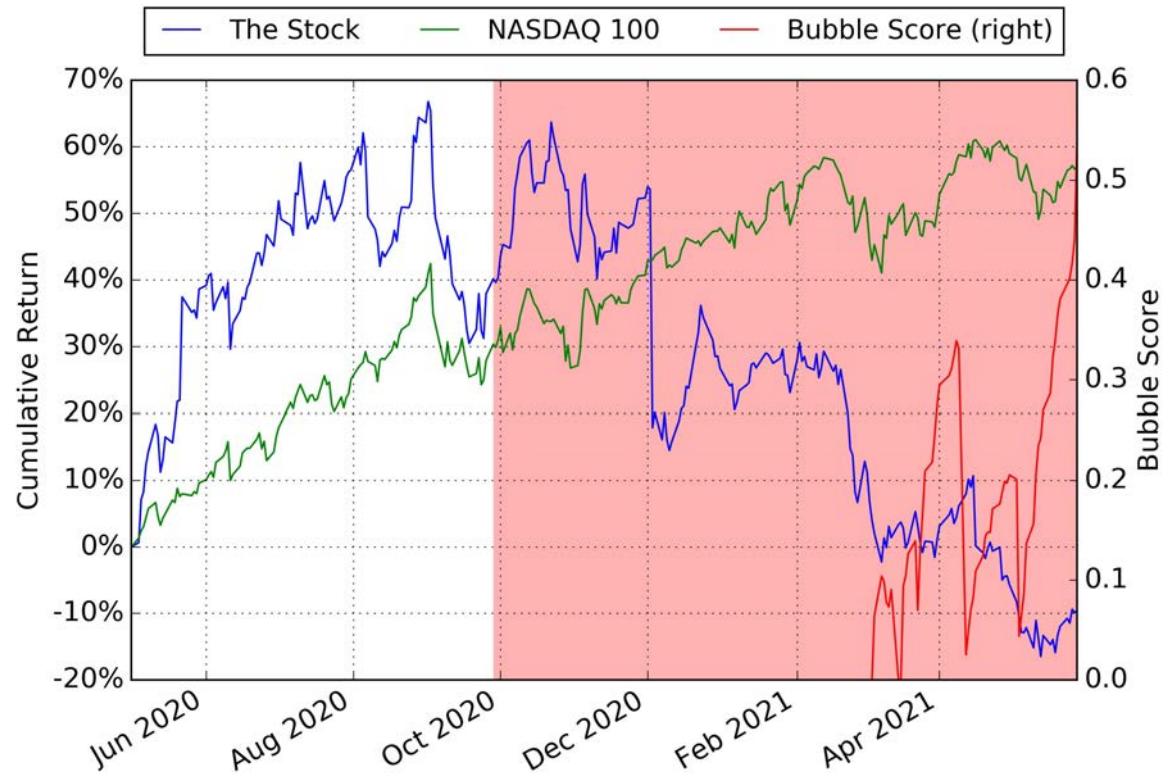
▸ The above graph shows the one-year cumulative return of the stock in blue (left hand scale), NASDAQ 100 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The red shaded period delineates the time interval within which the negative bubble is identified. The Bubble Score of this eight-month bubble has reached 53.2% with a bubble size -37.1%.

Single Stocks

Quadrant 3 Stocks Last Month Example – CD Projekt SA.
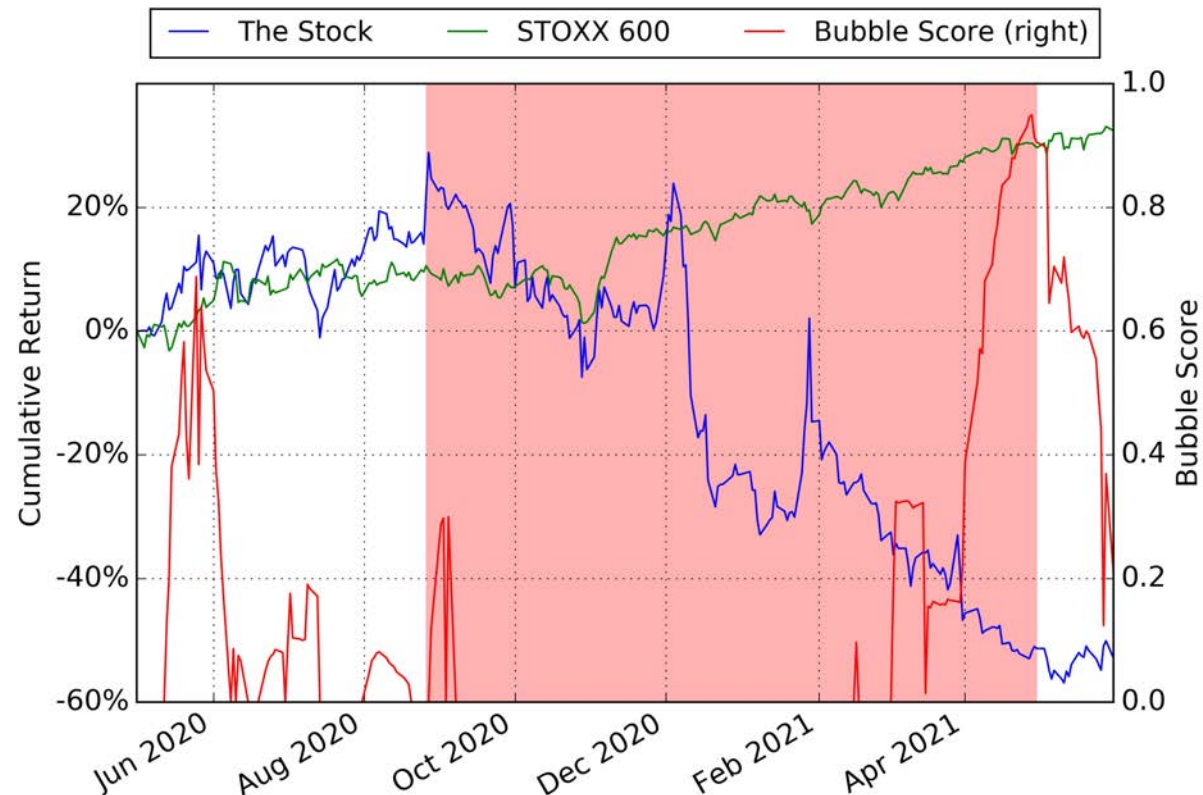
▶ The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock price has lost its downward momentum in the past month with the bubble signal remaining significant. One should remain cautious as the negative bubble may continue to develop into a larger bubble.

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
Ucb SA	Belgium	Pharmaceuticals, Biotechnology & Life Sciences	-14.4%	-20.2%	Nov-20	-9.2%	85.8%	6.2%
Atos SE	France	Software & Services	-23.1%	-20.5%	Nov-20	-31.5%	98.1%	92.4%

Single Stocks

Quadrant 4 Stocks Current Month Example – Ucb SA.
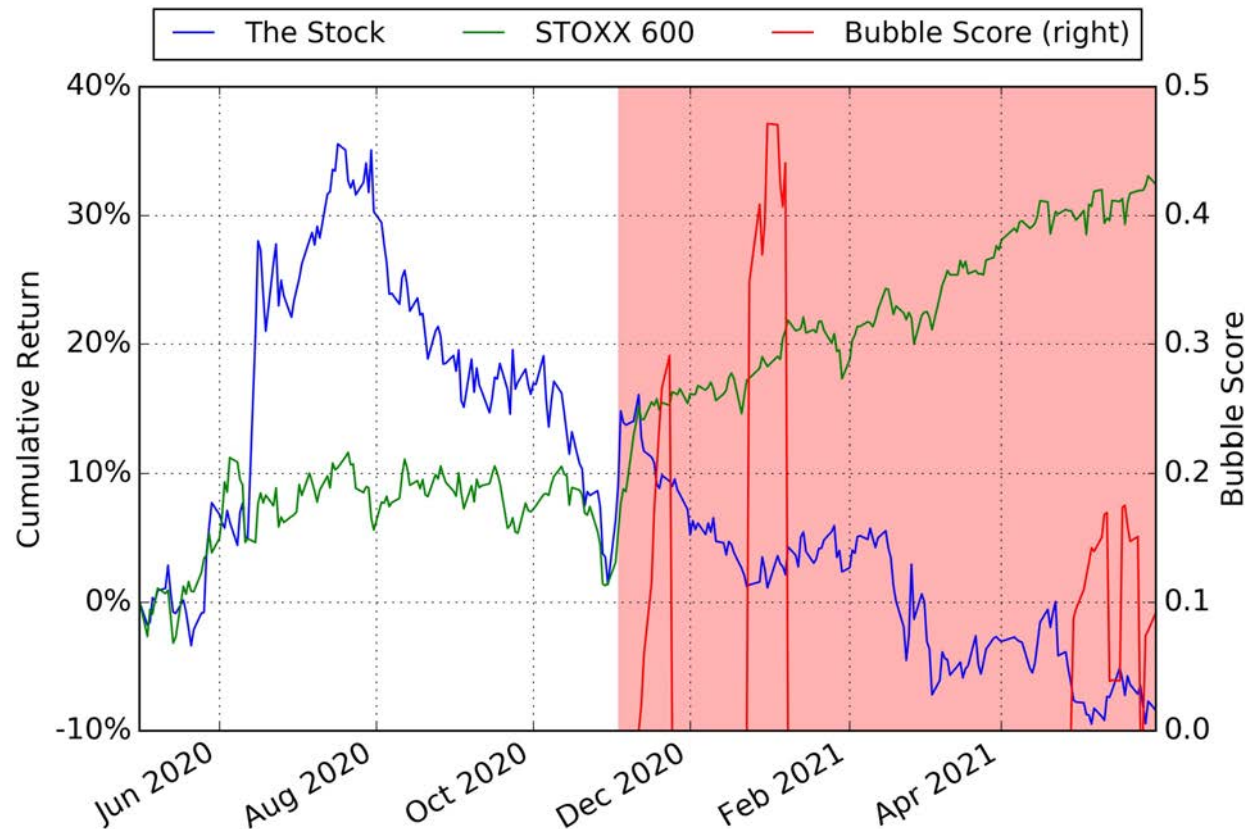
▸ The above graph shows the one-year cumulative return of the stock in blue (left hand scale), STOXX 600 in green (left hand scale) and the calculated DS LPPLS Bubble Score in red (right hand scale). The red shaded period delineates the time interval within which the strong negative bubble is identified. The Bubble Score of this seven-month bubble has reached 9.2% with a negative bubble size -20.2%. 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 – Atos SE.
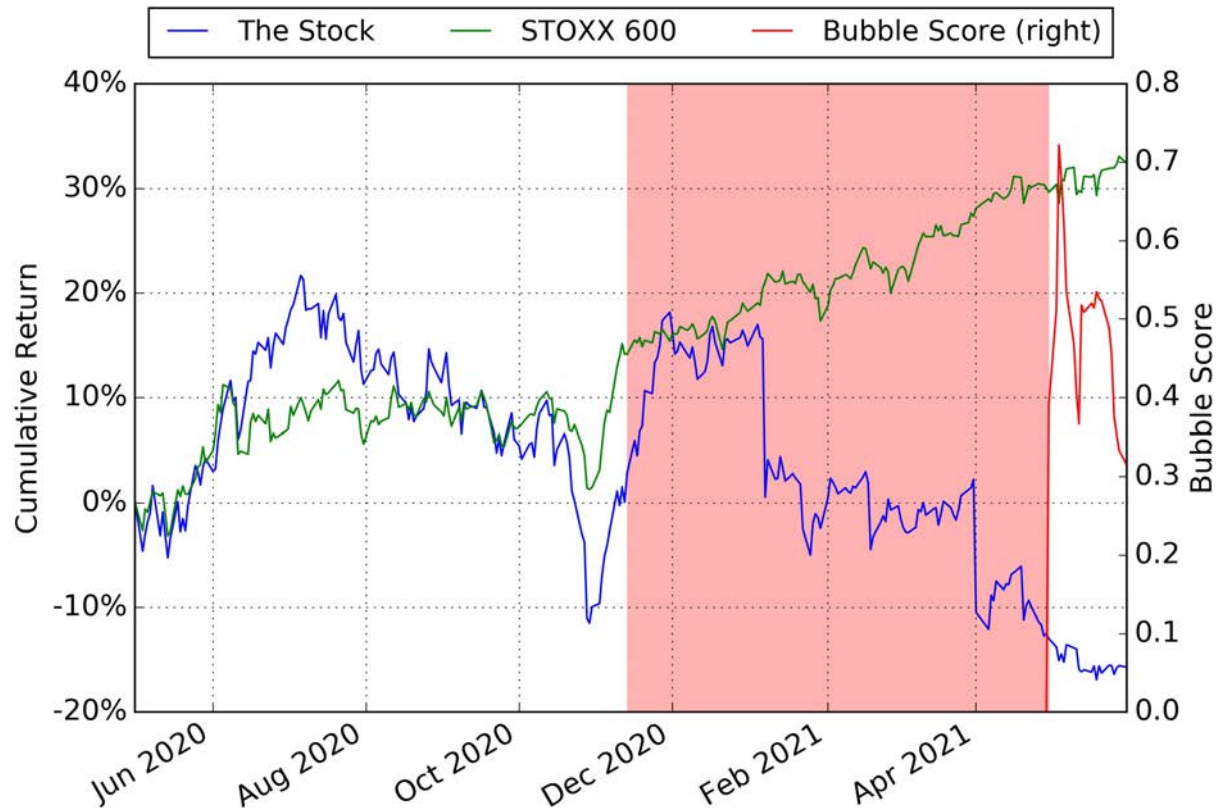
The figure above plots the one-year cumulative return of the stock (blue), STOXX 600 (green) and LPPLS Bubble Score (red line on the right y-axis). The red shaded period delineates the time interval within which the strong negative bubble was identified and reported last month. The stock has been in the current plateau for more than two months, ending the previous detected negative bubble.
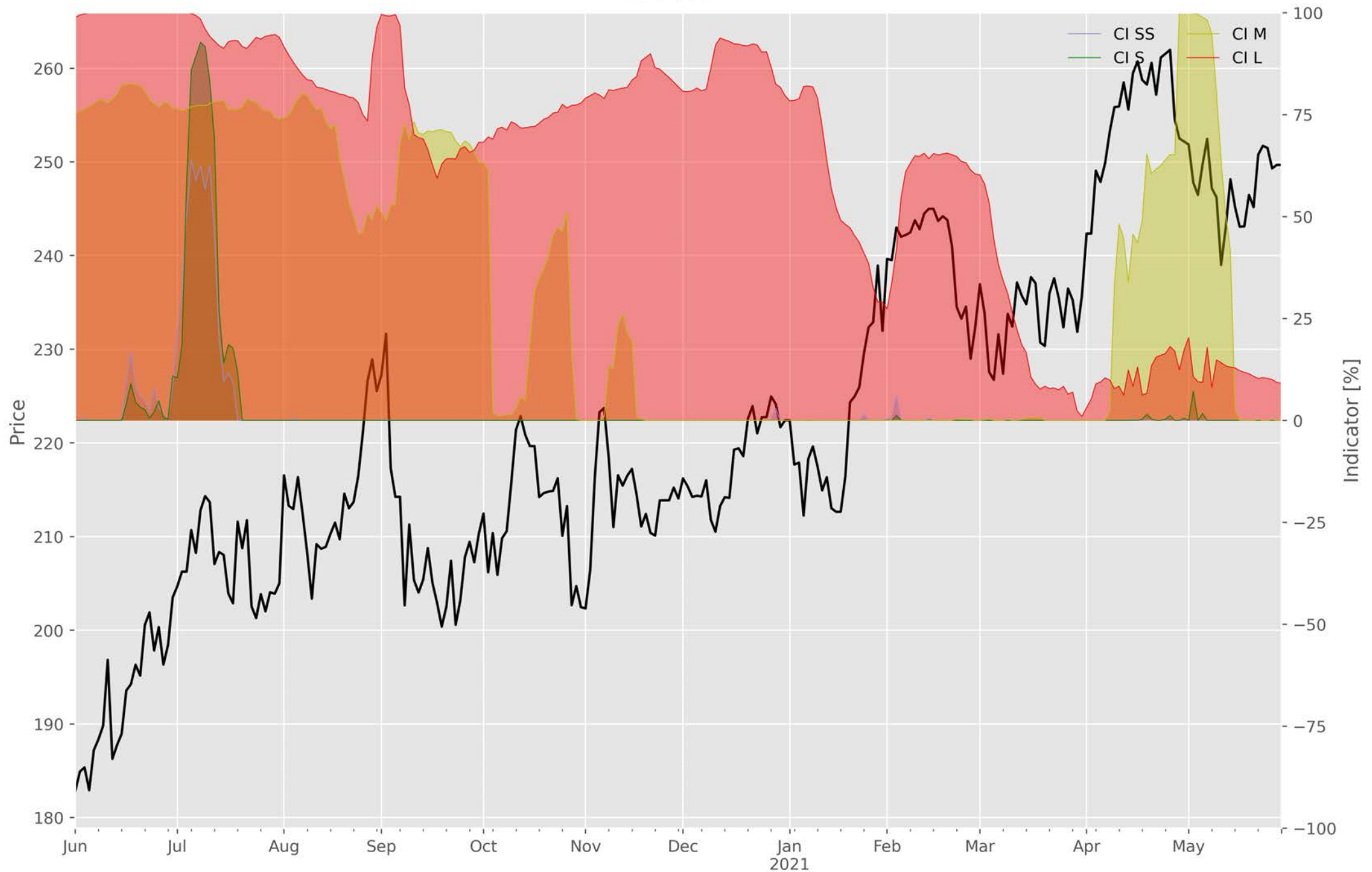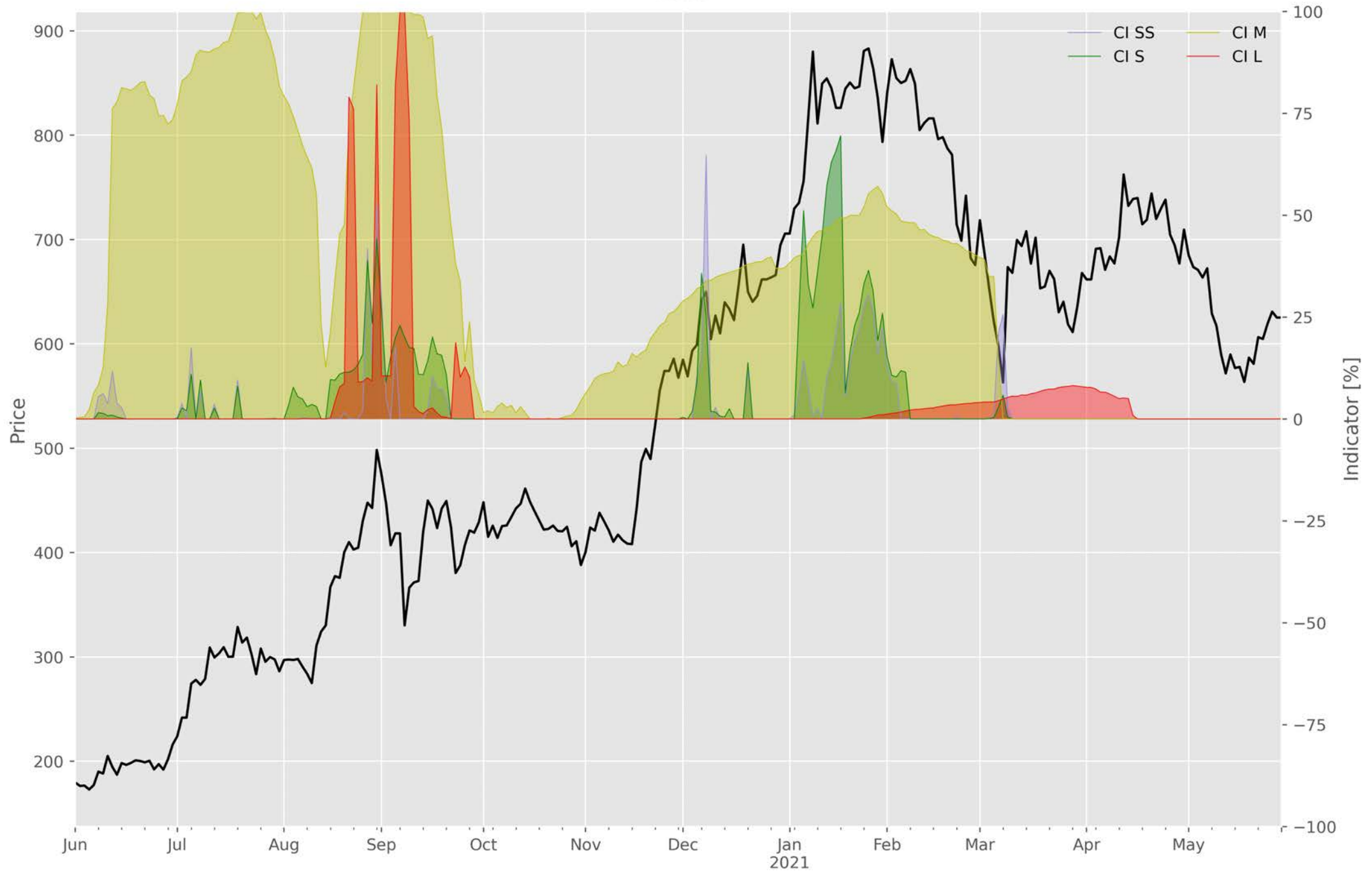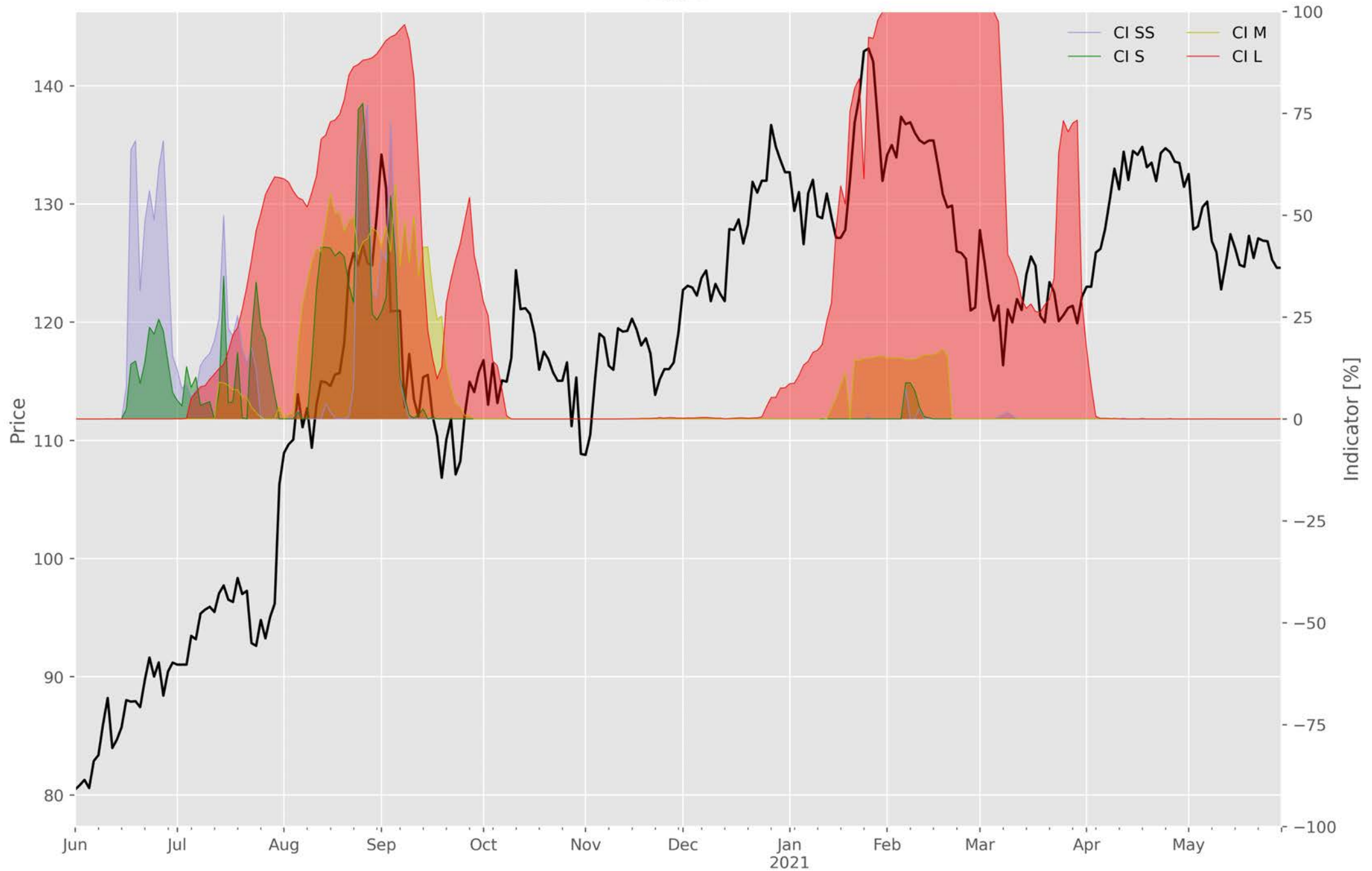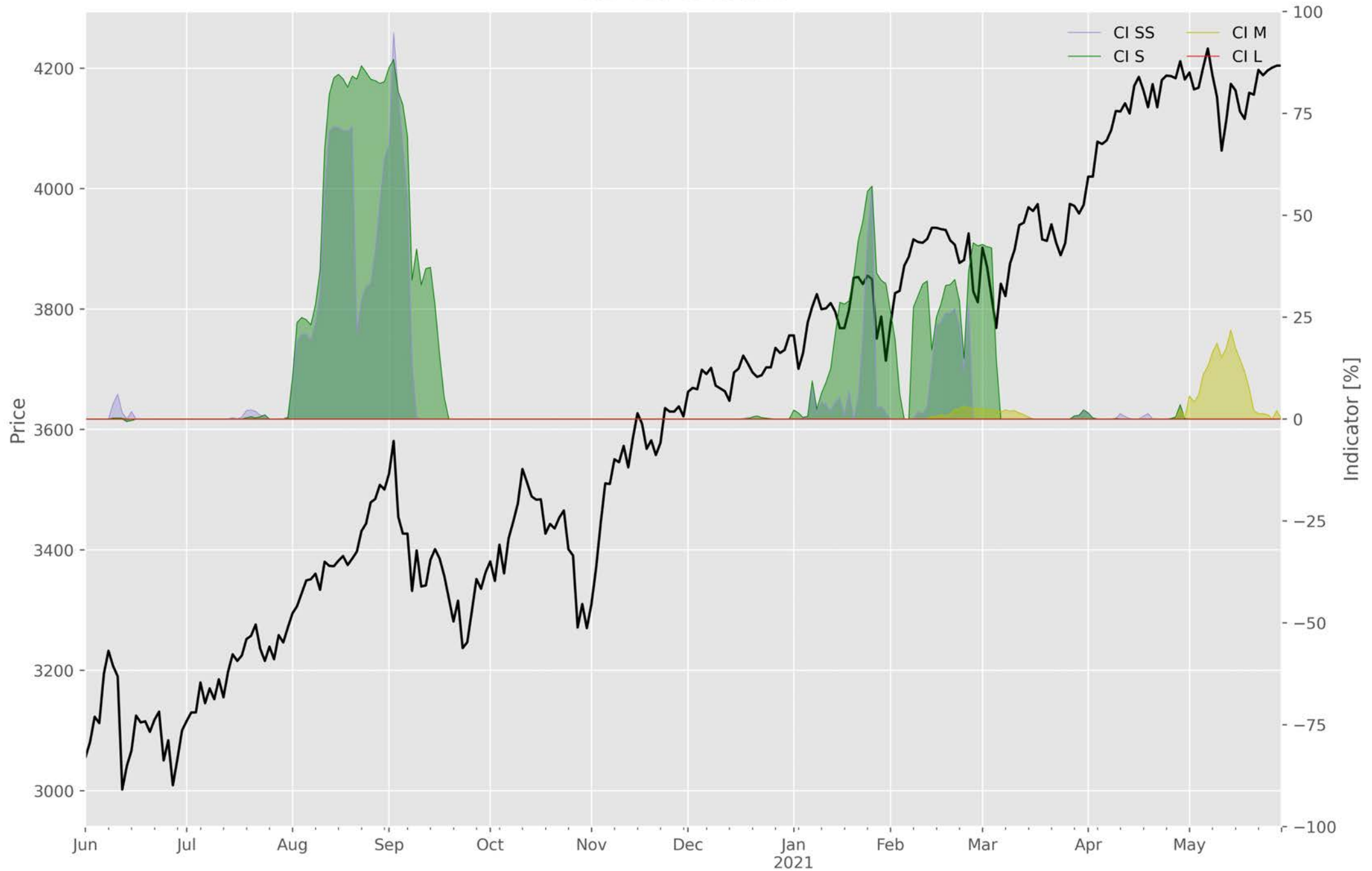
Appendix

Amazon.Com

The FCO Cockpit - Global Bubble Status Report

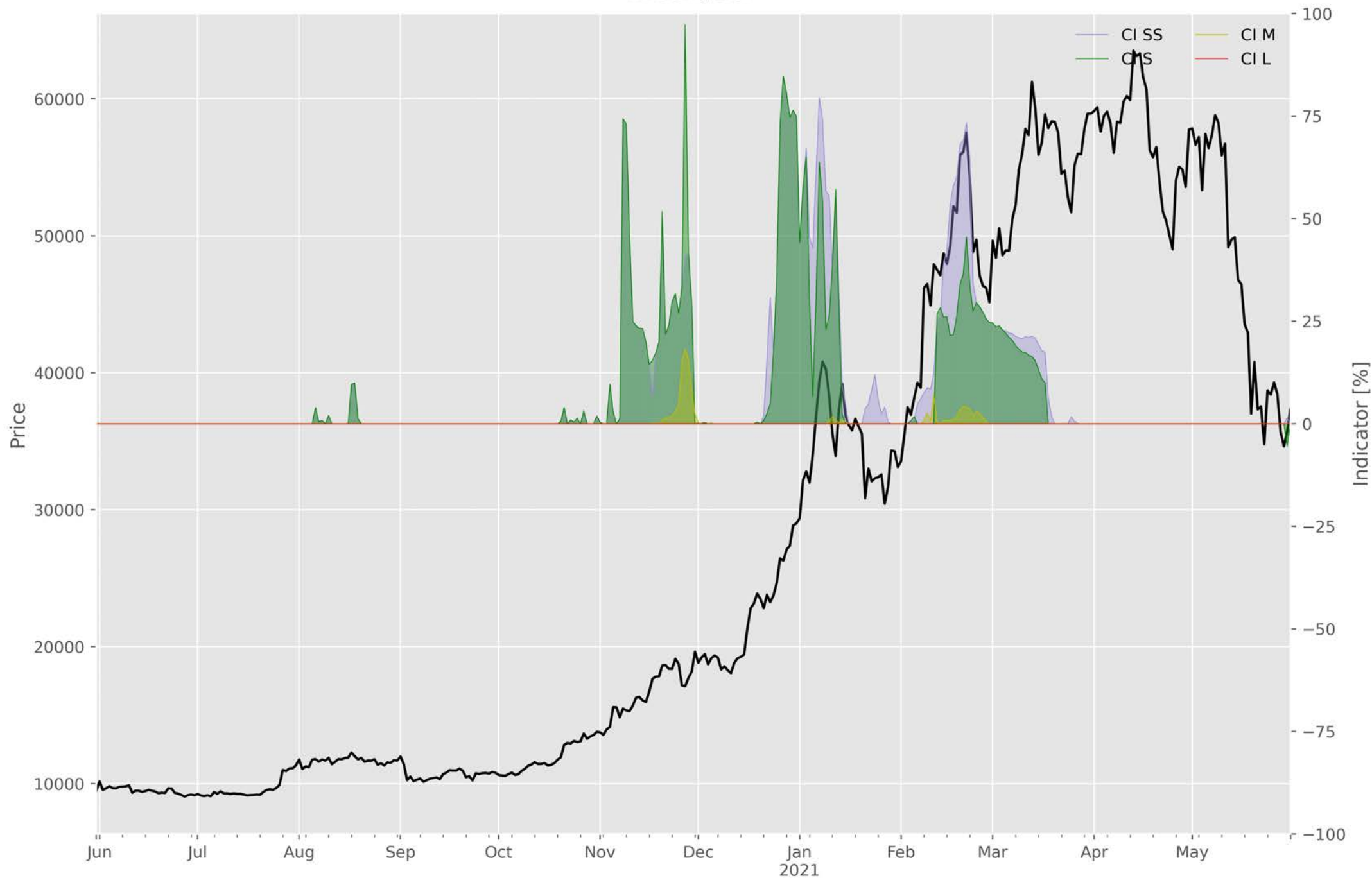# Microsoft

Tesla

Apple

The FCO Cockpit - Global Bubble Status Report
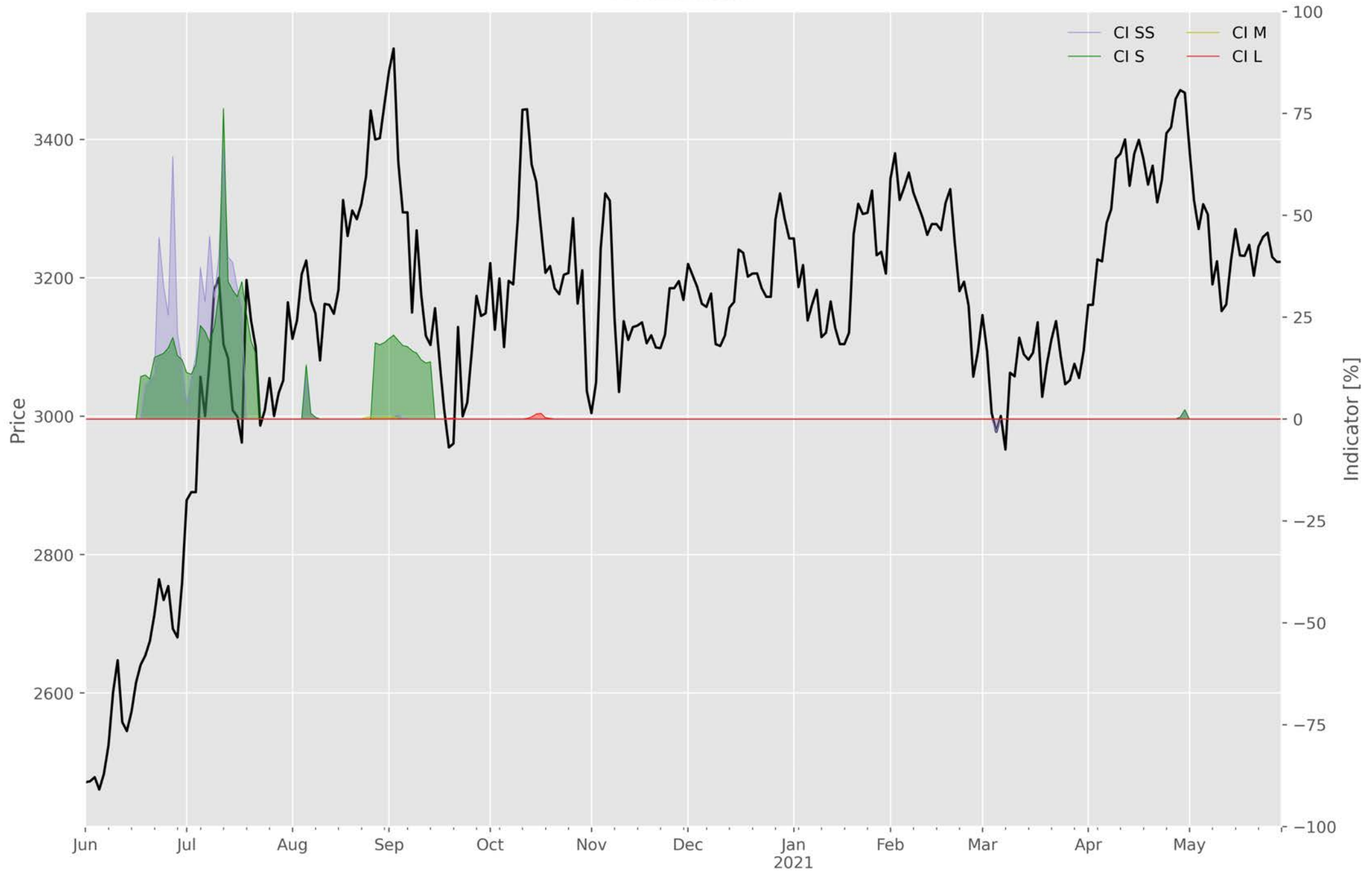
S&P 500 Composite

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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