PULSe Indicator: Stability on the Surface, Currents Underneath

Vaccination rollout/lockdowns lower pandemic risk.
Liquidity is becoming a concern.

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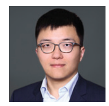

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KEY INSIGHTS

- In the March quarter the Pulse indicator decreased thanks to a meaningful drop in the Pandemic factor from the crisis zone to the stable zone.
- The Liquidity factor rose to the elevated zone, a sign of concern in credit markets. Uncertainty fell into the complacency zone, ending Q1 in the stable zone.
- Despite improving over the quarter, March saw a reversal. PULSe rose moderately due to a deterioration in the Pandemic, Uncertainty, and Liquidity factors.

PULSe is a composite indicator that is designed to monitor the state of global financial markets since the coronavirus crisis. It stands for Pandemic, Uncertainty, Liquidity, and Sentiment — four factors that we believe encompass much of the market's dynamics. High positive values of PULSe are typically a negative sign for market stability.[1]

As of March 31st, the PULSe indicator is characterized as Stable.

- The Pandemic (P) factor abated from the Crisis zone to the Stable zone over the first quarter.
- The Uncertainty (U) factor entered the Complacency zone twice and ended the quarter in the Stable zone.
- The Liquidity (L) factor rose to the Elevated zone.
- The Sentiment (Se) factor stayed in the Stable zone.

During March, the PULSe indicator increased due to the deterioration of the Pandemic (P), the Uncertainty (U), and the Liquidity (L) factor.

- The Pandemic factor climbed over the past month as the increase in daily new cases in the U.S., Germany and Japan outweighed the recovery of retail mobility in these regions.
- The Uncertainty factor rose as copper prices dropped, the pace of increases in long-term government yields decelerated, and improvements in earnings forecasts slowed down. Economic Uncertainty may be flirting with complacency.
- The Liquidity factor also shot up as the U.S. 3-month commercial paper spread

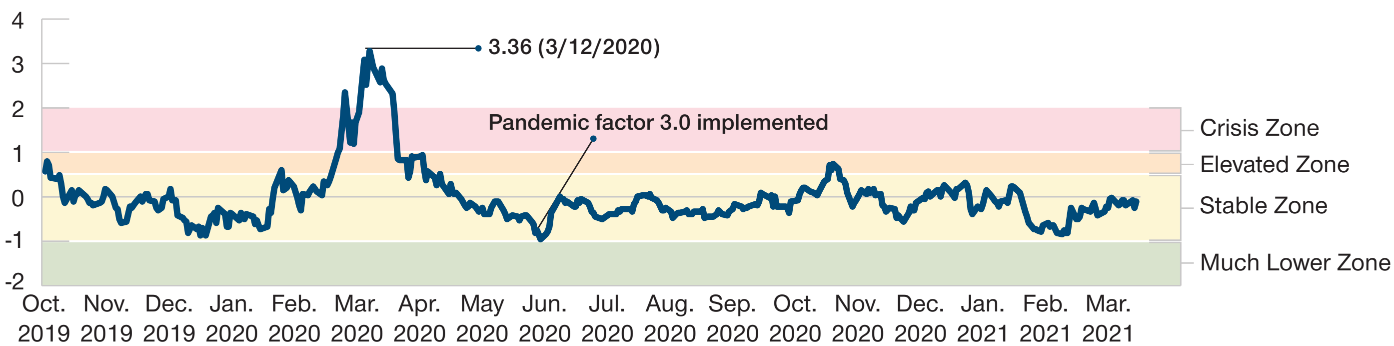
[1] For full details, please see our white paper "Taking the Market's PULSe in the Coronavirus Era" and additional information at the end of this paper.

Visualizing the PULSe Indicator

(Fig. 1) Expressed as an average of the four component indicators

	PULSe	Pandemic	Uncertainty	Liquidity	Sentiment
Current	-0.09	-0.21	-0.65	0.85	-0.37
Zone	Stable	Stable	Stable	Elevated	Stable
5-Day Trend	→ -0.03	→ 0.00	→ -0.19	↑ 0.57	→ -0.50
1-Month Trend	→ 0.13	→ 0.29	→ 0.28	→ 0.43	→ -0.48
3-Month Trend	→ -0.31	↓ -1.63	↓ -0.50	↑ 1.04	→ -0.12

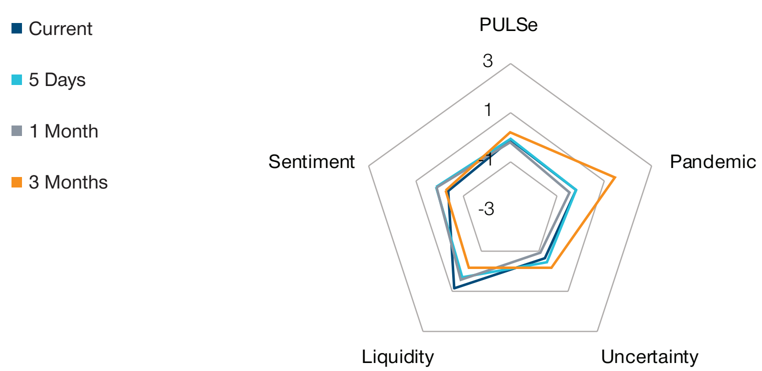
PULSe Indicator History



As of March 31, 2021.
Source: Haver Analytics/Bloomberg Finance L.P. Analysis by T. Rowe Price.
For illustrative purposes only. Subject to change. The PULSe indicator has been developed by T. Rowe Price. Using different underlying indicators and data could yield different results. Future outcomes may differ significantly. Note positive indicator values are typically a negative sign for market stability. A higher number indicates the division of PULSe into zones is subjective, based on historical data and statistical assumptions. "Trends" represent the change in the given indicator over the stated period. Please see additional disclosures on the PULSe indicator at the end of this paper.

Radar Chart Showing the PULSe Indicator and Its Components

(Fig. 2) Radial axes expressed as z-scores (number of standard deviations from the mean)



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widened, and the U.S. high yield energy spread contracted less than the U.S. high yield ex-energy spread.

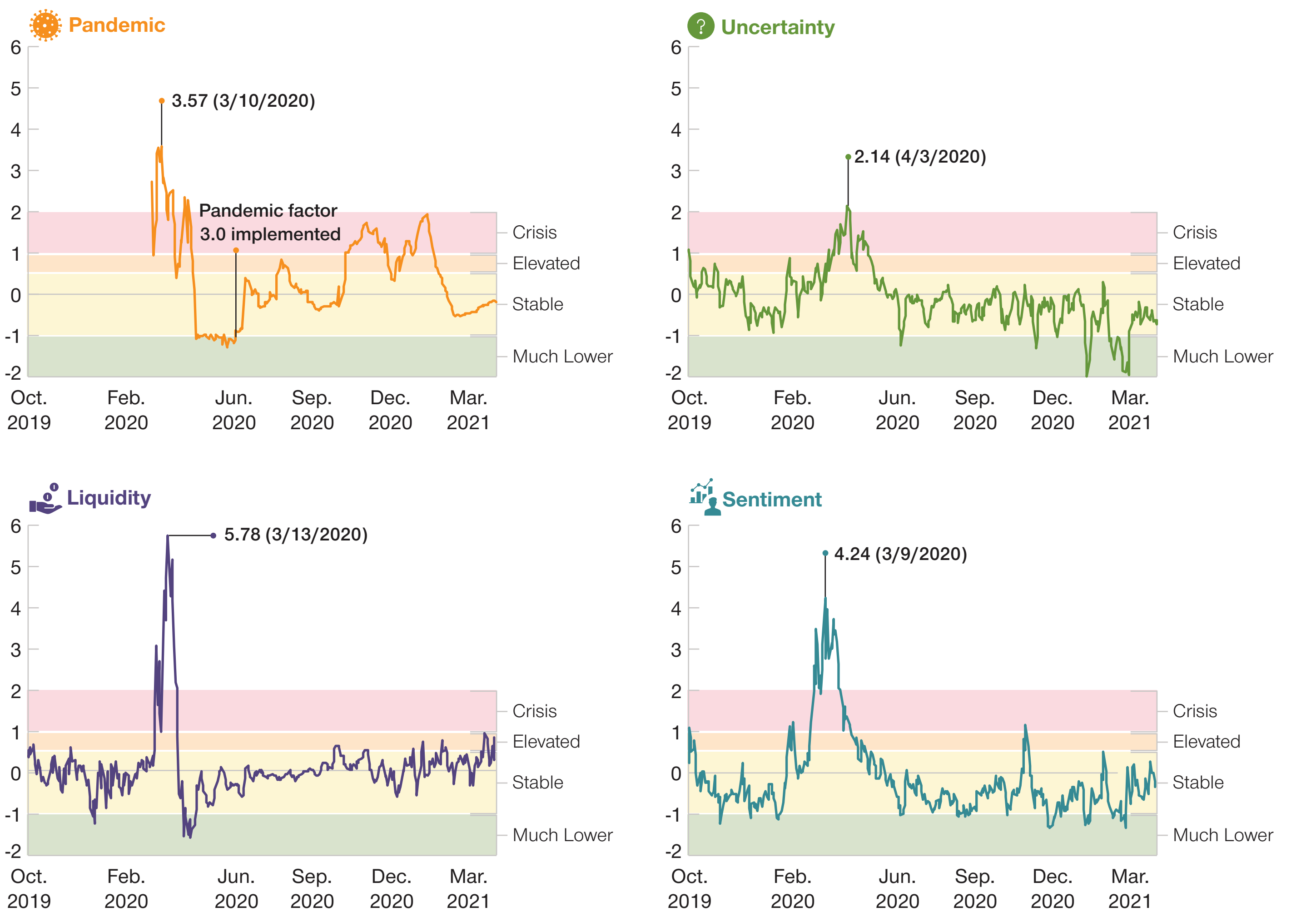
- The Sentiment factor declined as the equity put/call ratio fell and the market-implied volatility factors such as VIX abated.

Background Note

In this note, we highlight two factors that contributed meaningfully to the PULSe indicator over the last month of the first quarter: the new virus wave continued to spread in Japan, and the equity put/call ratio declined since late-February, indicating improving market sentiment.

The Four Components of PULSe

(Fig. 3) Currently only liquidity is elevated



As of March 31, 2021.
Sources: Haver Analytics/Bloomberg Finance L.P. Analysis by T. Rowe Price.
Indicator level on left-hand side expressed as a z-score and subjective stability zone on right-hand side of each chart.
For illustrative purposes only. Subject to change. The PULSe indicator has been developed by T. Rowe Price. Using different underlying indicators and data could yield different results. Future outcomes may differ significantly. Note positive indicator values are typically a negative sign for market stability. The division of PULSe into zones is subjective, based on historical data and statistical assumptions. Please see additional disclosures on the PULSe indicator at the end of this paper.

1. **The new virus wave continued to spread in Japan**

At the beginning of the Covid-19 outbreak, we used daily new cases as the sole input data to construct the Pandemic factor. In early July, we made significant enhancements to the calculation of the Pandemic factor as more high frequency data (positive test ratio, Google retail mobility data) became available. We believe that these enhancements better reflect how financial markets react to the virus news. In the current Pandemic factor model, we look at three key metrics: 1) Daily new cases to track the spread of the Covid-19 virus; 2) Positive testing ratios to confirm the trend of the diffusion curves; and 3) Google retail mobility data to assess the ongoing impact of the pandemic on consumer behavior.

In early March, the Japanese government extended the state of emergency, which had been due to end on March 7, for two more weeks to combat the virus spread in Tokyo and three neighboring prefectures. On March 21, after the central government and public health experts noted that infections had declined from the peak and hospital bed occupancy rates had fallen sufficiently, Prime Minister Suga formally decided to end the restrictions. Since then, we have observed a pick-up in daily new cases. The pace of Japan's vaccination rollout has significantly lagged behind other G7 countries due to insufficient imported vaccines. Currently, only about 1% of the population has been vaccinated, concentrating on medical workers. Shots for the elderly population over the age of 65 are only due to start in April.

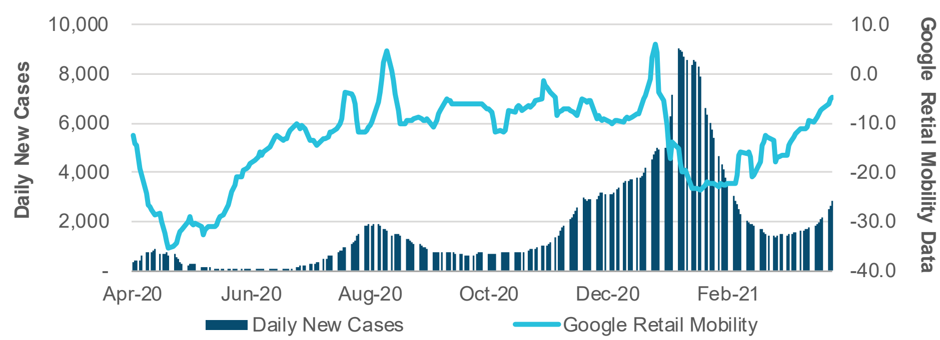
Since late 2020, we have observed a pattern that whenever the Japanese government has loosened social restrictions, Google mobility data has improved while daily new cases have risen, forcing the government to declare a state of emergency once again. We think it will take a material speed-up of the vaccination rollout campaign to break this pattern.

2. **The equity put/call ratio has declined**

Since the initial spike following the first wave of Covid-19 outbreaks in 2020, the Equity Put/Call Ratio has continued to abate, reflecting the drop in demand for hedging and the recovery of investor confidence. Since December, it has trended sideways in a broad channel with considerable short-term volatility.

Rising New Cases in Japan Threaten Retail Mobility

(Fig. 4) Japan Google retail mobility data and daily new cases



As of March 31, 2020.
Sources: Haver Analytics/Bloomberg Finance L.P.

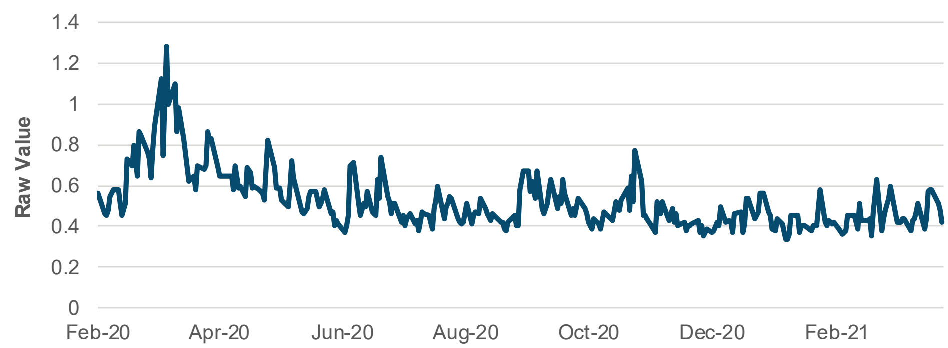
From mid-February, we continued to notice the selling of high-multiple growth stocks and momentum stocks across regions as a result of higher inflation expectations and long-term government bond yield hikes. At the start of the month, the U.S. Senate approved the Biden Administration's USD1.9 trillion American Rescue Package on a party-line vote. Critics of the bill pointed to the danger of reigniting inflation by overheating the economy with too much fiscal stimulus, which resulted in increased demand for downside protection.

The equity put/call ratio surged again as it approached the end of the month. On March 26, we observed the unprecedented selling of USD20 billion in block trades as Archegos, Tiger Cub Bill Hwang's family office, was forced by banks including Goldman and Morgan Stanley to sell shares after some ADR positions moved sharply against him. Two major global banks – Credit Suisse and Nomura – that had participated in so-called swap trades with Archegos warned investors that they might suffer significant losses, which was soon confirmed. This event was another accelerated deleveraging story after the GameStop (GME) short squeeze by retail investors just two months ago.

Concerns over the Archegos episode quickly diminished as investors switched their focus to Joe Biden's USD2.25 trillion infrastructure plan, which could greatly increase government spending on internet and transportation infrastructure. Subsequently, the equity put/call ratio abated as a result of hopes for faster long-run economic growth. A drop in the equity put/call ratio indicated improving market sentiment. According to data compiled by Goldman Sachs, overall book ex-options leverage remains at a high level, which leaves markets vulnerable to short-term volatility.

A Drop in the Put/call Ratio Indicates Improving Market Sentiment

(Fig. 5) Equity Put/Call Ratio (5-day moving average)



As of March 31, 2020.
Sources: Haver Analytics/Bloomberg Finance L.P.

Additional Information Regarding the PULSe Indicator:

We stress that the PULSe indicator is directional only, meant to show whether the key factors underlying the market turbulence are strengthening or weakening over time. It is not meant to be the basis for making market or asset allocation decisions and is not designed to be a market timing indicator.

A high number for PULSe Indicator is a sign of market stresses and, thus, potential turbulence.

Z-Score- We focus on how the latest market data are different from the recent past using a z-score, where each data point is expressed in terms of the number of standard deviations above or below the mean, or average, of the series.

The Pandemic factor or score differs slightly from the other three factors in terms of its underlying principles and, thus, the manner of its construction. Our Pandemic series is measured focusing on the largest economies such as the G-7. We calculate the rate of increase in the number of COVID-19 cases for each country in our sample, and we take the maximum number to account for the ability of the global trade activity to resume. We overlay this with a penalty score if one of the major countries is also showing an alarming growth rate of new cases. Our Uncertainty factor focuses on economic data and how they differ from market expectations. Examples of underlying data include the Bloomberg economic surprise indices, changes in oil supply and demand, yield curves, and earnings per share growth forecasts. The Liquidity indicator aims to identify any stresses in the credit market. Spreads on credit typically widen when liquidity dries up. Our Liquidity gauge uses commercial paper spread, the financial sector spread, the high-yield energy and ex-energy spreads, and ratio. Finally, our gauge of market Sentiment looks at risk appetite from market participants. This includes put/call ratio, implied volatility, a measure of extremes in daily returns, currency sentiment, and some commodity prices.

Our aggregate PULSe indicator is composed of the four components or factors that are themselves composite indices. A simple average is taken across the four components.

For full details, please see our white paper "Taking the Market's PULSe in the Coronavirus Era."

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