PULSe Indicator

Quarterly Update

November 2020

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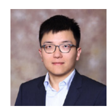

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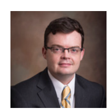

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KEY INSIGHTS

- We constructed a new financial indicator, PULSe, to help navigate turbulent markets based on four factors—Pandemic, Uncertainty, Liquidity, and Sentiment.
- Since mid-March, carry currencies—part of the Sentiment score—appreciated due to a recovery in commodity and energy prices helped by unprecedented stimulus.
- The euro investment-grade financials spread—part of the Liquidity score—continued to trend down before bottoming in early September and has since started to widen.

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

As of September 30, 2020, the PULSe indicator is characterized as Stable.

- The Pandemic factor abated from its recent peak at the end of July as the COVID-19, the disease caused by the coronavirus, outbreaks in the U.S. and China over the summer were contained, while the emergence of a second wave in Europe has yet to derail economic activity.
- The Uncertainty factor has been fluctuating within the Stable zone over the past quarter, driven by macro and earnings data releases.
- The Liquidity factor entered the Elevated zone as investment-grade (IG) and high yield spreads started to widen.
- The Sentiment factor remained largely unchanged in the Stable zone.

PULSe History

During September, the PULSe indicator increased modestly due to the deterioration in the Liquidity and Sentiment factors.

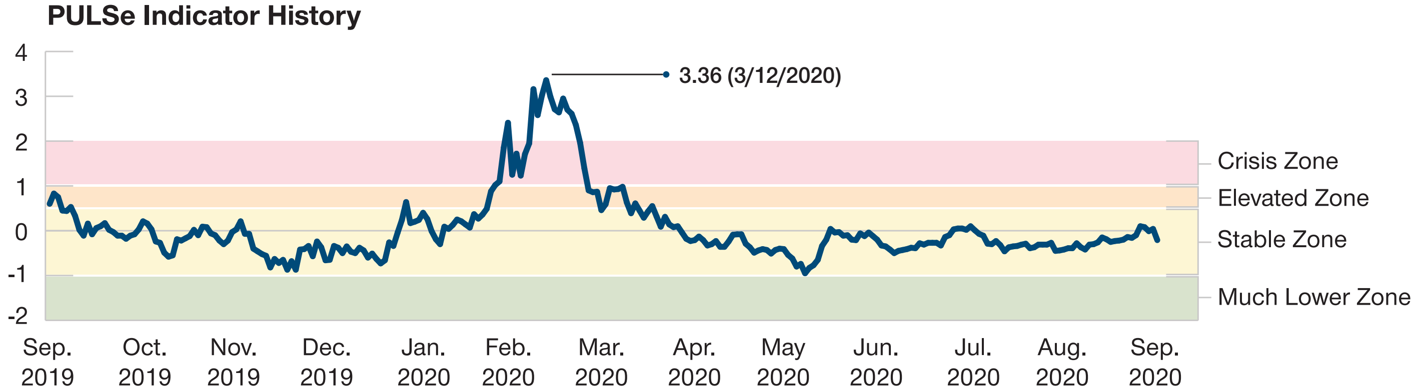
- The Pandemic factor remained largely unchanged over the past month as improvements in Italy and Japan were offset by deterioration in the UK and Germany.
    - In the U.S., as people are getting back to schools and offices, daily new cases showed a moderate

[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

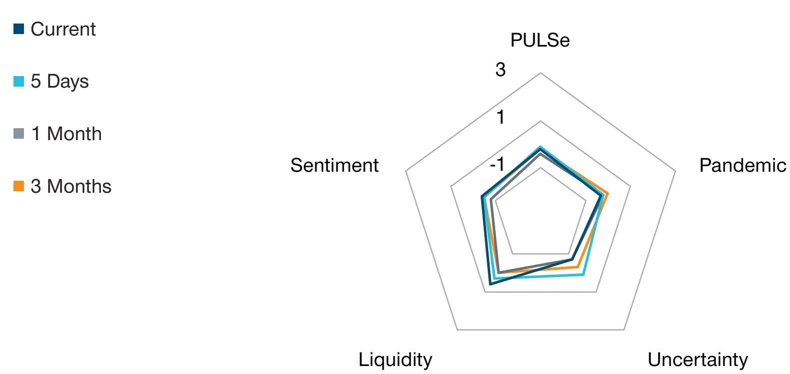
	PULSe	Pandemic	Uncertainty	Liquidity	Sentiment
Current	-0.21	-0.26	-0.73	0.61	-0.45
Zone	Stable	Stable	Stable	Elevated	Stable
5-Day Trend	→ -0.11	→ -0.01	↓ -0.80	→ 0.34	→ 0.03
1-Month Trend	→ 0.21	→ -0.05	→ -0.08	↑ 0.58	→ 0.40
3-Month Trend	→ -0.01	→ -0.25	→ -0.44	↑ 0.63	→ 0.03



As of September 30, 2020.
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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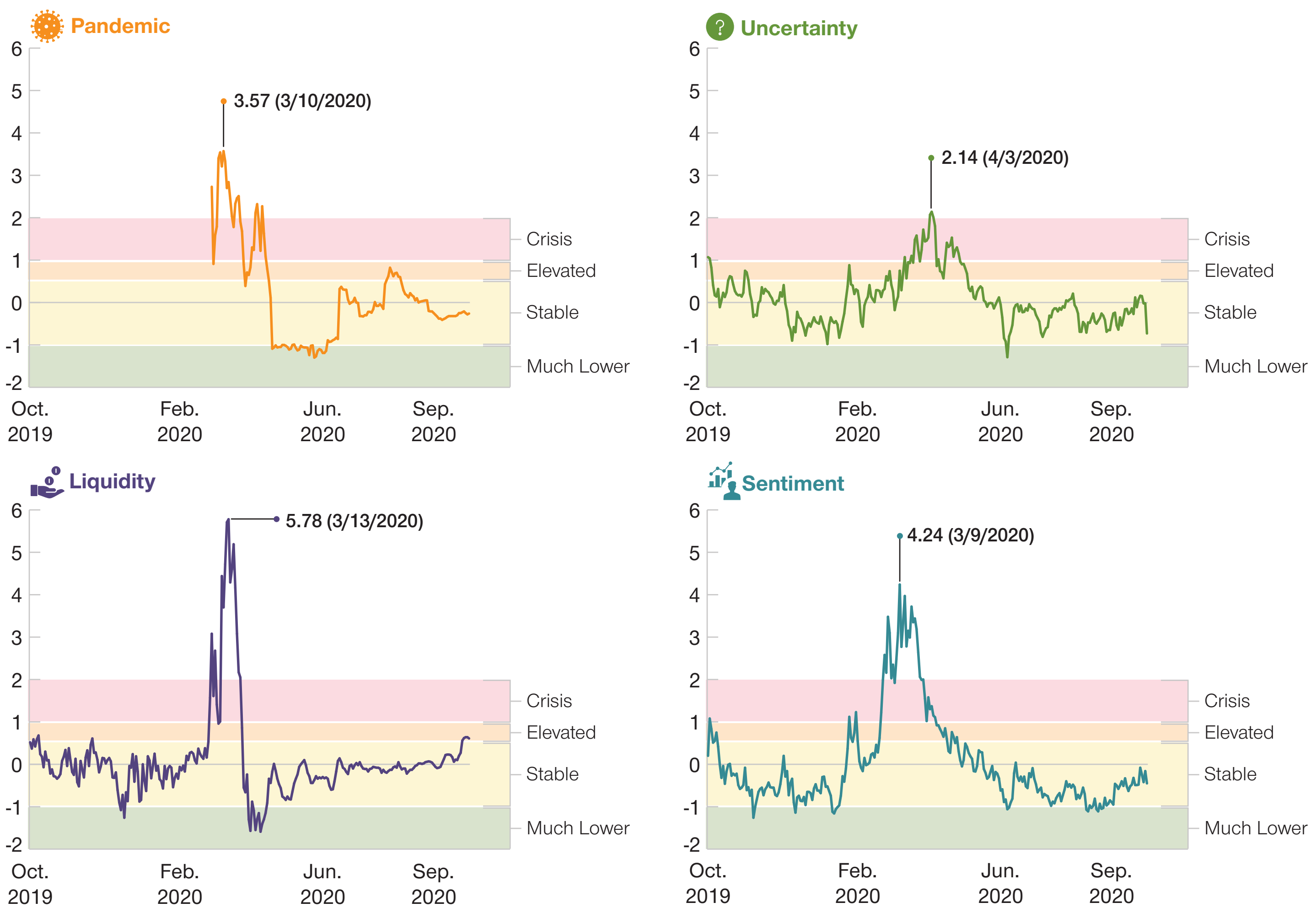
upward trajectory during the month. However, positive test ratios were coming down, reflecting expanding testing capacity and other measures to control the spread. At the end of the month, hospitalization started trending up versus its previous bottom in mid-September, as the U.S. was began to experience the start of a second wave of the coronavirus.[2]

- In the UK and Germany, the growth rate of daily new cases continued to accelerate, and positive test ratios also ticked up over the past month. In Italy, although daily new cases continued to increase, the growth rate started to decelerate. The positive test ratio in Italy remained high relative to its own history. Daily new cases in Europe have now

The Four Components of PULSe

(Fig. 3) Currently only liquidity is elevated



As of September 30, 2020.
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.
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[2] As of November 2020, the U.S. is experiencing a second coronavirus wave, with daily new cases rising to record levels.

reached around 165% of previous peaks, while death numbers are about 10% of previous peaks (as of September 30, 2020). Unfortunately, based on the trend of the case growth rate, we haven't seen the peak of this new wave yet.

  - In Japan, daily new cases showed early signs of peaking, and the positive test ratio also stabilized.

  - The situation in China is gradually getting back to normal, putting the coronavirus pandemic in the rearview mirror.

- The Uncertainty factor barely moved as the increase in the Economic Surprise Index and U.S. Oil Rig Counts offset the deterioration in other factors.

- The Liquidity factor surged due to the spread widening of U.S. Commercial Paper, Euro IG Financials, and U.S. High Yield.

- The Sentiment factor rose as safer currencies outperformed the carry currencies over the past month.

Note that earlier this quarter, we made significant enhancements to the calculation of the Pandemic factor as more data (positive test ratio, Google retail mobility data) became available. These enhancements better reflect how markets react to the virus news: While the markets focused on new cases in the early stage, market participants are now looking at testing and recovery in mobility data to assess how the virus impacts the economy.

Background Note

In this note, we highlight two factors that contributed meaningfully to the PULSe indicator over the past month:

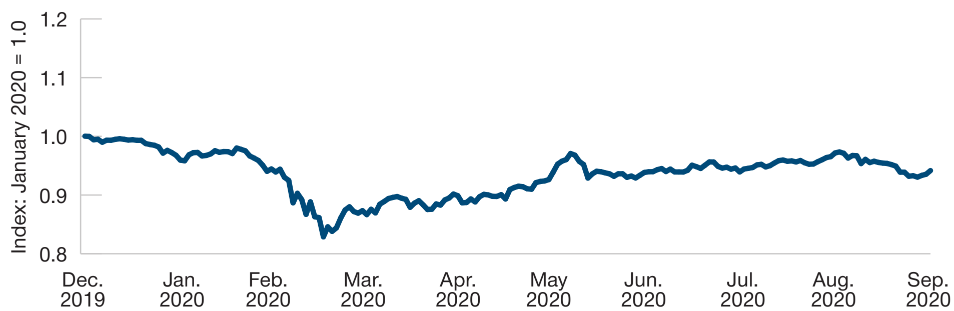
1. Safer currencies outperformed the carry currencies

The difference in the market demand for carry currencies and safe-haven currencies reflects investors' risk appetite. In our composite indicator, we included the Australian dollar, Canadian dollar, and Norwegian krone as carry currencies due to their sensitivity to commodity and energy prices, and we included the Japanese yen and Swiss franc as safe currencies in consideration of their low inflation, political and financial stability, and high liquidity. Our Sentiment factor interprets the outperformance of carry currencies versus safer currencies as optimistic (or risk on) and vice versa.

When the COVID-19 outbreak hit the global economy in February, the value of carry currencies plunged as investors panicked and rushed to the safe havens.

Carry Currency vs. Safe-Haven Currency

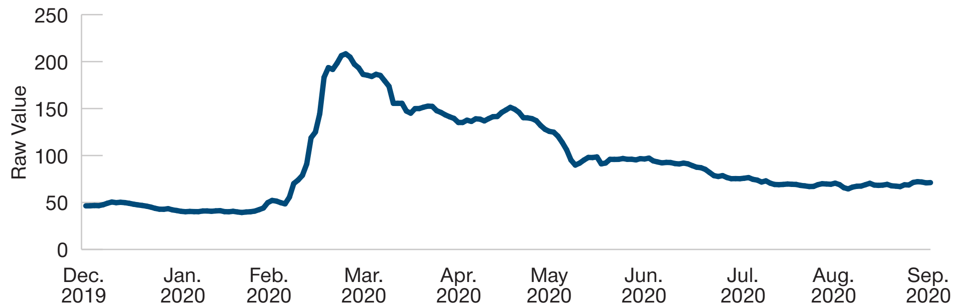
(Fig. 4) Relative currency basket return indexed to January 2020 = 1.0



Past performance is not a reliable indicator of future performance.
As of September 30, 2020.
Sources: Haver Analytics/Bloomberg Finance L.P. Analysis by T. Rowe Price.

Euro IG Financials Spread Has Widened

(Fig. 5) Spread in basis points



Past performance is not a reliable indicator of future performance.

As of September 30, 2020.

Sources: Haver Analytics/Bloomberg Finance L.P. (Bloomberg Euro Area IG Financial OAS Index.) Analysis by T. Rowe Price.

Since mid-March, carry currencies have been gradually appreciating relative to the safer currencies on the back of a commodity and energy prices recovery, helped by unprecedented monetary and fiscal stimulus as global central banks and governments moved in concert. However, during September, the upward sloping trend of the carry currencies reversed, driven by headline news on U.S.-China frictions, the delay of U.S. stimulus talks, and the second virus wave in Europe, etc. This translated into a deterioration in market sentiment.

2. Euro IG financials spread widened

Shortly after the evaporation of liquidity at the outset of the COVID-19 outbreak, the European Central Bank initiated the EUR 1,350 billion pandemic emergency purchase program (PEPP) aiming to lower borrowing costs and increase lending in the euro area. Since then, the euro IG financials OAS spread has continued to trend down, reflecting improving market liquidity. However, the spread bottomed in early September and started to widen after some European banks came under the spotlight for suspected money laundering.

While the weekly increase in the spread was not that high in absolute terms, it was a big increase relative to the past six months. Our methodology compares the current weekly spread change with the past six months. We note that the liquidity crunch that occurred in March is being progressively dropped from the sample. So the same increase in spreads matters more now than it may have done a month ago. This is a key tenet of our PULSe design where we believe that markets are quite effective at digesting new information and progressively forgetting older events to focus on the most recent past.

We expect the Liquidity score to continue to increase over the coming weeks as the March data drop from the sample. This doesn't necessarily mean that Liquidity is getting meaningfully worse though.

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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