



# The Put/Call Ratio as a contrarian market timing indicator

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- The Put/Call ratio shows the volume of Put options relative to the volume of Call options traded.
- The ratio is a popular market timing indicator based on the assumption that elevated levels of hedging activity, is likely to signal that markets may have bottomed.
- We have tested the relation between extreme Put/Call ratios and the subsequent performance of the SP 500 between 2000 and 2022.
- We find that elevated Put/call ratios ('Fear' event) were followed by higher returns, while mean and median returns following low Put/Call ratios ('Greed' event) were negative.

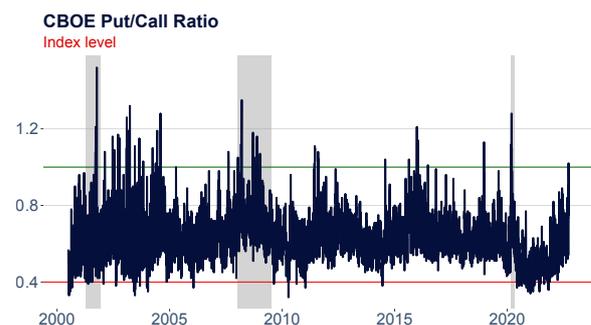
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**W**hen everybody is bullish, chances are, the positive market outlook has already been priced in. On the other hand, when a lot of investors already hold a very negative view, there is a lot of room for positive surprises. This assumption typically underlies contrarian market timing. One indicator widely monitored in this context is the Put/Call ratio which is why we have tested whether it is indeed helpful in predicting market returns.

## 1 The pro-cyclicality of hedging activity

The Put/Call ratio is a popular indicator derived from the volume of Put and Call options bought and sold on a particular underlying. It is calculated by dividing the number of Put options traded by the number of call options traded. Market participants use this ratio to reach conclusions on investor positioning. Relatively elevated trading in Put options indicates that investors are seeking to hedge against a fall in prices, while increased trading in call options signals that a high number of market participants searches for upside exposure.

Not surprisingly, historical data shows that this indicator tends to move procyclically, meaning that the volume of Put options tends to increase during times of financial distress when investors try to reduce risk - either for emotional reasons or even forcibly because of their mandates, for instance, require them not to exceed certain volatility thresholds. This observation has made the Put/Call ratio a popular contrarian market timing indicator. High levels of Put trading are considered to indicate an extremely negative sentiment which may signal that a sell-off has, in fact, reached



**Figure 1:** The CBOE Put/Call Volume Ratio on the S&P 500 is a daily indicator calculated as the number of Put Options traded divided by the number of Call options traded.

the stage of exaggeration. When a high percentage of investors already has a very negative view and is positioned accordingly with hedges in place, so the logic goes, further declines become progressively less likely. We have put the data to the test and tested the relation between the level of the CBOE Put/Call ratio and the subsequent performance of the S&P 500 Index. The CBOE's total put/call ratio includes index options and equity options and is published on a daily basis by the Chicago Board Options Exchange. Over the past two decades, its mean level was slightly above 0.6, indicating that, on average, investors trade roughly 70% more Calls than Puts. However, as Figure 4 shows, during crisis times, the ratio historically spiked up to 1.5 (50% more Puts than Calls) and dropped to a level of around 0.3 during strong bull markets. Not surprisingly, the distribution is negatively skewed, meaning surges in Put volumes reach more extreme levels.

Fear Level	Mean 7 Days	Mean 15 Days	Mean 30 Days	% Pos Ret 7 Days	% Pos Ret 15 Days	% Pos Ret 30 Days	n
Fear	0.67%	1.72%	3.38%	60.66%	67.21%	73.77%	61
Greed	-0.41%	-0.18%	1.21%	47.14%	54.29%	62.86%	70
Neutral	0.22%	0.47%	0.94%	59.11%	62.48%	64.29%	5466

Figure 2

Fear Level	5% VaR 7 Days	5% VaR 15 Days	5% VaR 30 Days	Top 5% Ret 7 D	Top 5% Ret 15 D	Top 5% Ret 30 D	n
Fear	-10.6%	-10.02%	-13.35%	8.89%	9.96%	13.82%	61
Greed	-3.57%	-6%	-8.59%	2.03%	3.75%	7.45%	70
Neutral	-4.36%	-6.6%	-8.86%	4.22%	5.88%	8.54%	5466

Figure 3

Fear Level	Median 7 Days	Median 15 Days	Median 30 Days	Std 7 Days	Std 15 Days	Std 30 Days	n
Fear	1.08%	2.11%	4.41%	5.12%	6.22%	8.32%	61
Greed	-0.16%	0.59%	1.29%	1.71%	3.18%	4.54%	70
Neutral	0.48%	1%	1.67%	2.85%	4.09%	5.62%	5466

Figure 4: Between 2000 and 2022, mean market returns were higher and more frequently positive following days of extreme fear. Median returns following 'Fear' days also exceeded average returns on normal days, while median returns over the 7 days following days of extreme 'Greed' were negative. However, not surprisingly, fat tails were more pronounced following a 'Fear' event. 'Greed' events were followed by more narrowly distributed returns.

This mirrors the fact that bear markets occur more seldom but come with more extreme moves. In our analysis, we focus on the extreme ends of the spectrum, which most likely contain the highest informational value. Historically, the Put/Call ratio reached levels below 0.4 or above 1 on approximately 5 We,

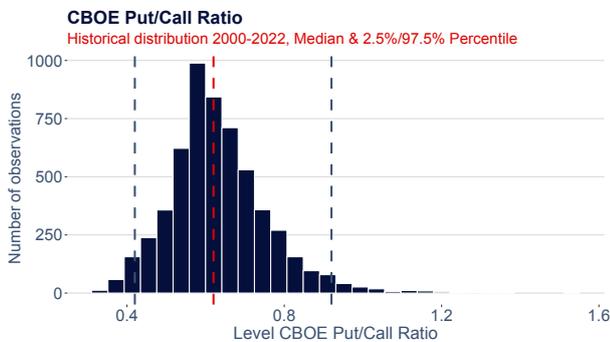


Figure 5: The CBOE Put/Call ratio reaches a level >1 on approximately 2.5% of days. This level can be considered to indicate an extreme level of pessimism or fear.

therefore, defined three variables, namely 'Fear' as the Put/Call ratio exceeding 1, 'Greed' as the Put/Call ratio dropping below 0.4 and 'Neutral' containing all other observations. The following chart illustrates the average behaviour of the S&P 500 around days falling into the different categories. As can easily be seen, 'Fear' days were preceded by strong and accelerating market declines, with the S&P 500 falling on average by 5% over the 7 days before the Put/Call ratio surged above 1. On the contrary, the market, on average, gained roughly 2% over the 7 days preceding a 'Greed' event. After categorizing each day this way, we calculated the

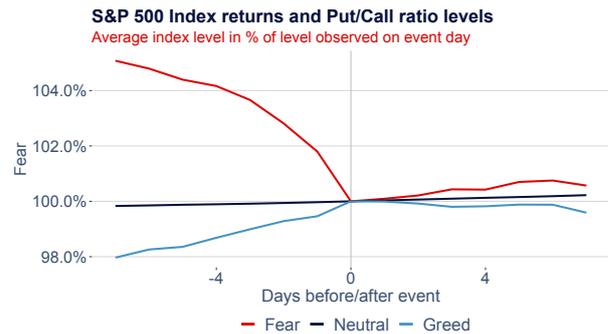


Figure 6: On average, the S&P 500 dropped by 5% during the 7 days before the Put/Call ratio surged above 1.

cumulative return of the S&P 500 over the following 7, 15 and 30 days and derived summary statistics. We find that mean and median returns following the occurrence of a 'Fear' event were indeed elevated over all three periods. On the contrary, 'Greed' events correlated with subsequently negative returns over the 7 and 15 days horizon. Beyond that, we also find that returns are positive more frequently following a 'Fear' event. Unfortunately, these reassuring results also come at a cost.

## 2 Returns on bottom-fishing are no free lunch

As the procyclical nature of the Put/Call ratio already showed, investors who buy into the market when the Put/Call ratio hits extreme levels, by definition, go long during volatile times. While this has paid off on

average, this kind of bottom-fishing can also go wrong pretty badly. We find that the standard deviation of returns generated over 7, 15 and 30 days following a 'Fear' event is considerably higher when compared to the results realized over the same period following 'Neutral' or 'Greed' days. Not surprisingly, we also find that 'Fear' days were followed by more heavily-tailed returns, as indicated by the lowest and highest 5% of returns. These observations suggest that buying on

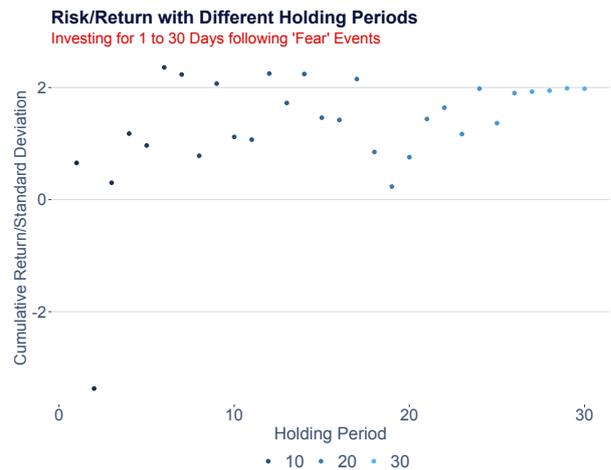


**Figure 7:** We have simulated bottom-fishing strategies holding the market for 1 to 30 days following a 'Fear' event.

'Fear' days may be a proper risk-premia strategy. The contrarian investors are rewarded with positive returns but, in return, also take the risk of getting in at precisely the wrong time. We have backtested such a strategy for the past two decades using different holding periods ranging from 1 to 30 days. Figure 9 and Figure 10 illustrate the returns generated as well as maximum drawdowns for a strategy holding the market for 7, respectively, 30 days after a 'Fear' event and holding cash otherwise.

Obviously, this results in long periods during which the investor stays out of the market, which is why return and risk figures can not be directly compared to a long-only strategy. In line with our previous results, bottom-fishing generated positive returns over the period analyzed but came with more pronounced drawdowns, especially when a more extended holding period is chosen, making risk-adjusted returns more attractive when the indicator is treated as a short-term signal. The post-Covid period stands out as it generated high positive returns following the 'Greed' days, a function of the unusual strength and duration of the bull market.

As Figure 7 and Figure 8 confirm, generally, a holding period between 7 and 15 days following a 'Fear' event seems to mark a sweet spot. Longer holding periods failed to generate higher returns but came at increased risk.



**Figure 8:** The ratio between returns generated and risk taken indicates that the signal works best with a one to two weeks investment horizon.

### 3 Generating profits with contrarianism

Two years ago, Amadeus launched a managed account on a proprietary algorithmic trading strategy investing in mean reversion in major equity indices. The system combines various technical indicators that signal extreme fear or greed to derive an aggregate signal based on which it takes both long and short positions in the underlying indices. We consider contrarian market timing a promising constituent of the liquid alternative space and an effective extension of our investment universe with favourable risk/return and diversification characteristics.

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## Appendix

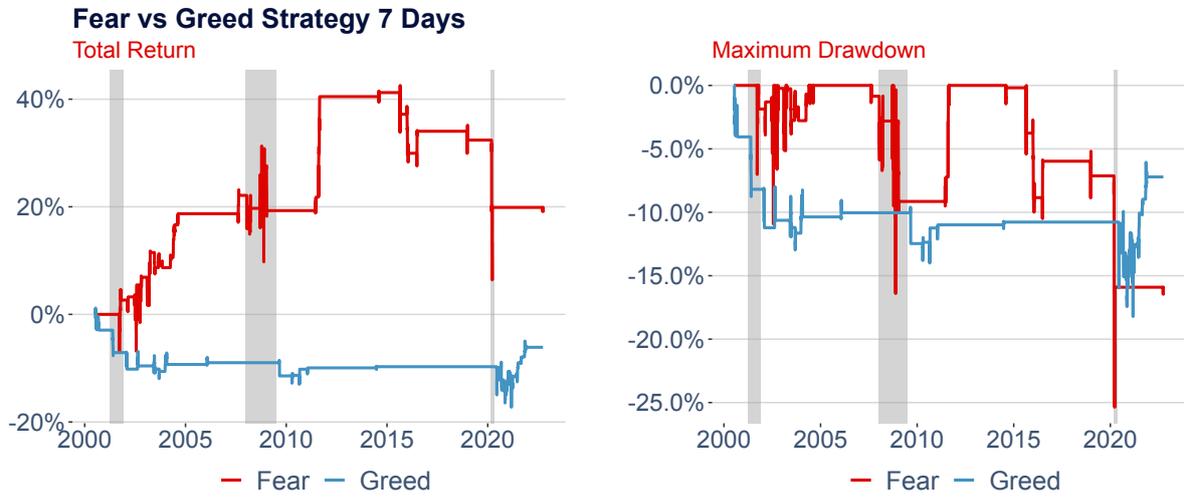


Figure 9

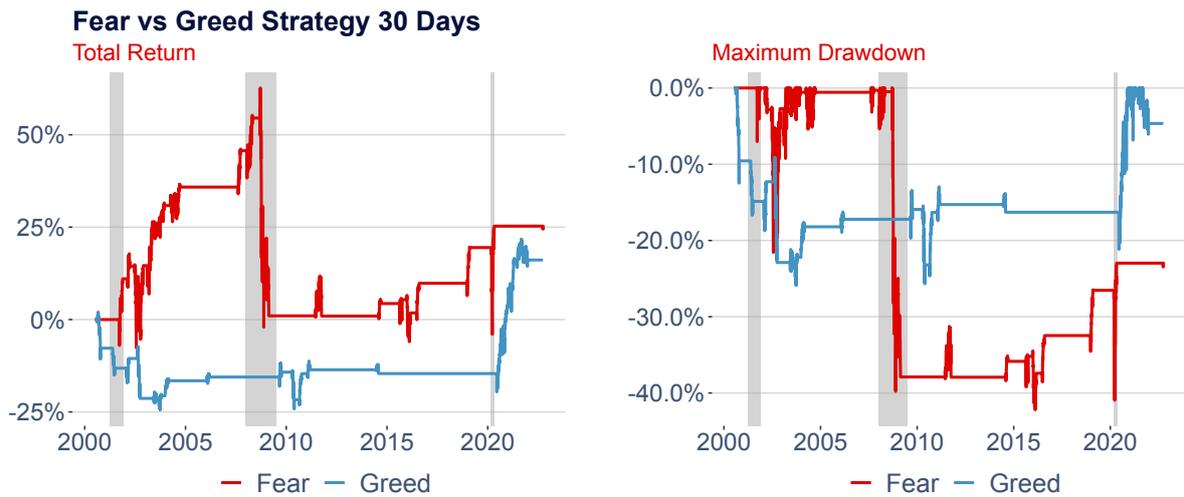


Figure 10