Quantcha US Equity Option Analytics (QOA)

Equity derivatives, such as options, provide unique insight as to the sentiment and pricing behavior the market has towards an underlying asset. This data set provides three useful types of option analytics: put/call ratios, forward prices, and option breakevens.

Put/Call Ratios

A put/call ratio (PCR) is a quantity of puts divided by a quantity of calls. It is commonly used to measure market sentiment based on the relative interest in puts vs. calls.

This data set includes PCRs measured for two different option quantities:

- **Volume** ("PcrVol", such as PcrVol10, etc) is calculated by dividing the sum of all puts transacted during that trading day by the sum of all calls. For example, if a total volume of 10 puts were transacted and a total volume of 20 calls were transacted during that day, the PcrVolAll would be 10 / 20 = 0.5.
- **Open interest** ("PcrOi", such as PcrOi10, etc) is calculated by dividing the sum of all puts outstanding at the end of that trading day by the sum of all calls outstanding. For example, if the total open interest at the end of a given day were 10 puts and 5 calls (regardless of when they were opened), the PcrVolAll would be 10 / 5 = 2.

Calls typically outnumber puts, although different stocks have their own personalities based on the way traders view them under ordinary circumstances. Deviations from these typical ranges indicate a change in sentiment.

Inferring Sentiment from Ratios

Historically traders have expected stocks to hover around a 0.8 PCR (4 puts to every 5 calls). As a result, a ratio around 0.6 (3 puts to every 5 calls) is considered to indicate a bullish sentiment as the concentration of calls has increased. On the other hand, a ratio around 1 (1 put per call) would reflect a bearish sentiment. However, when the ratio pushes the extremes, it's seen as a sign that the options market is approaching saturation and the sentiment is topping or bottoming.

While PCRs provide hard measurements of the rate of puts to calls, the measurements alone do not indicate whether these options are being predominantly bought or sold by the market. But since the market has a bias for buying options, a ratio increase during an otherwise ordinary period of volatility is usually a bearish sentiment because it hints that the market is buying puts. However, there are some circumstances when more accurate insights can be extracted.

For example, during periods of higher volatility the PCR as measured by open interest may stay high as the market holds puts for a longer period. When the PCR as measured by volume increases during these times, it is often a sign that the market is unclenching and selling off the puts being held as insurance.

Pairing Ratios with Implied Volatility

PCRs may also be paired with implied volatility (IV) measurements to determine both sentiment and direction as increased interest in buying options drives IV up and vice versa. For example, when the PCR by volume and IV are both up in today's trading, it's a sign that the market is bearish and buying calls. On the other hand, if IV was up today and the PCR by open interest fell, it's a sign that the market is bullish and accumulating calls.

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By Volume/Open Interest	Increasing IV	Decreasing IV
Increasing PCR	Bearish (buying/accumulating puts)	Bullish (selling/liquidating puts)
Decreasing PCR	Bullish (buying/accumulating calls)	Bearish (selling/liquidating calls)

Ratios For Equities with Poor Option Liquidity

Note that when there are no calls available for a given term, the value is null. If there are calls but no puts, the value is 0. It's extremely rare for a stock with reasonable option liquidity to end the day with either no puts or calls traded or held, so PCR may not be a good measure of sentiment for them. Filtering with the Quantcha Option Liquidity Rating can help identify the highest quality signals.

Forward prices

A forward price represents the price an equity is expected to trade at on a future date. The most common method to calculate it is to assume that the current price of the equity will appreciate by the risk-free rate (such as the Treasury rate) and then discount by the value of dividends distributed along the way. Given that this method is mathematically sound it should be the universal solution that all other arbitrage-free methods produce. However, that's not always the case.

Option-Implied Forward Price

The option-implied forward prices provided in this data set are calculated by determining where a synthetic long option position would break even. A synthetic long is a combination of a long at-the-money (ATM) call and a short ATM put. This option strategy replicates a long stock position in that its payoff diagram matches a long stock diagram. As a result, it should consistently produce a terminal price that matches the method described above. In practice this rarely happens.

Instead, the forces of option traders have subtle impacts on the supply and demand of puts and calls throughout the surface. At extremes, the demand for buying or selling calls or puts can outpace all other option trades so much that it defies the law of put/call parity.

For example, consider a stock trading at $100. The risk-free rate and dividend schedule indicate that this stock should be trading at $105 exactly one year from today. However, the sentiment is extremely bearish and the shares have been shorted so heavily that they are now hard to borrow. To express negative views, traders have instead turned to buying puts and selling calls.

The high demand to buy puts has driven the IV of puts higher. At the same time, the high demand to sell calls has driven the IV of calls lower. The result is so severe that their skews no longer align and the fundamentals of option pricing are breaking down.

Ordinarily, the 1-year 105 call could be bought for $10 while the 105 put could be sold for $10. This trade would have a net cost of $0 to enter (setting aside margin requirements) and would break even at $105, which aligns with the expected forward price.

However, under these stressful conditions the 105 call can be bought for $4 while the 105 put can be sold for $16. These extreme prices reflect the pressure on market makers to find counterparties to offload their lopsided risk to.

An investor willing to take on this synthetic long position would accept a $12 credit to do so, bringing the breakeven price down to just $105 - $12 = $93. On the other hand, they might see the discrepancy between the traditional and option-implied forward prices and recognize the massive risk in holding a long stake.

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While these extreme scenarios are uncommon, they're always out there. The option-implied forward prices provide the most straightforward way to identify them before it's too late.

Option Breakevens

An option breakeven is the price where a given option breaks even at expiration based on its most recent bid/ask mean. For example, a 100 call option with a bid/ask mean of $10 would break even at $110. The option breakeven is a useful metric because it provides insight as to the pricing tension between the buyer and the seller.

The option breakevens in this data set are weighted by their relative open interests at the end of the day. This is based on the premise that an investor would generally stay long a given option because they expect its value to increase, whereas the short investor would generally expect it to decline. There are three kinds of breakevens provided in this data set:

- **All** ("OptionBreakeven", such as OptionBreakeven10, etc) is calculated using both calls and puts.
- **Call** ("CallBreakeven", such as CallBreakeven10, etc) is calculated using only calls.
- **Put** ("PutBreakeven", such as PutBreakeven10, etc) is calculated using only puts.

For example, suppose the option chain looks like this for a given expiration:

Option	Bid/Ask Mean	Breakeven	Open Interest	Weighted Sum
90 Call	17	107	10	1070
100 Call	11	111	7	777
110 Call	3	113	0	0
90 Put	2	88	1	88
100 Put	8	92	2	184
110 Put	15	95	2	190

The **All Breakeven** for this expiration would be (1070 + 777 + 0 + 88 + 184 + 190) / (10 + 7 + 0 + 1 + 2 + 2) = 104.95.

The **Call Breakeven** for this expiration would be (1070 + 777 + 0) / (10 + 7 + 0) = 108.65.

The **Put Breakeven** for this expiration would be (88 + 184 + 190) / (1 + 2 + 2) = 92.4.

Data Details

This database covers over 11,000 optionable US equities with history to 2002. There are over 5,000 optionable stocks currently trading. Data is updated by 5:30PM ET on market days.

Terms

Each of the types of analytics are provided for 10, 20, 30, 60, 90, 120, 150, 180, 270, 360, 720, and 1080 calendar day future terms. The values for these terms are linearly interpolated from the nearest straddling option expirations. For example, the 30-day put/call ratio would be the linear interpolation of the put/call ratios for the data at the 27-day and 34-day expirations (assuming those are the closest straddling expirations). If the term does not have a pair of straddling expirations, the values from the closest expiration are used. For an example illustrating how these terms are calculated, please see the VOL methodology.

For put/call ratios, an "All" term is provided that includes all available data and is not normalized.

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Data Dictionary

Field	Description	Other terms
PcrVolAll	The put-call ratio for all options weighted by volume.	
PcrVol10	The 10-day put-call ratio weighted by volume.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080
PcrOiAll	The put-call ratio for all options weighted by open interest.	
PcrOi10	The 10-day put-call ratio weighted by open interest.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080
ForwardPrice10	The 10-day forward price based on the breakeven of a synthetic long position.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080
CallBreakeven10	The 10-day breakeven of straddling call options weighted by open interest.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080
PutBreakeven10	The 10-day breakeven of straddling put options weighted by open interest.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080
OptionBreakeven10	The 10-day breakeven of straddling all options weighted by open interest.	20, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080

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