Predicting Bitcoin:
Volatility Metrics

Summary

For any given strategy variant, TradeBot's standard deviation is less than that of Bitcoin's price; it's max drawdown is less; and its relative performance is disproportionate to its relative volatility.

Methodology

To compare Bitcoin's price with the value of a trading strategy, we first value them both from a starting point of 100. Then we consider the value of each at every interval moving forward. For example, if Bitcoin's price rises 10 percent by the next interval, its value would be 110. For a trading strategy that has not bought Bitcoin, that value will be flat (it would remain 100); for one that has bought Bitcoin, it would fluctuate identically to price. Standard deviation, etc., is calculated by taking the standard deviation of this data set.

Results: Production

The following shows different volatility and performance measurements for TradeBot's strategy variants, by category, in production since February 11.

Stat	Raw	Normal	Raw Optimized	Normal Optimizec	All
Sharpe Ratio:	-2.46	-2.15	-2.37	-2.28	-2.31
Max Drawdown (%):	31.36	30.85	32.24	32.99	31.86
Relative Max Drawdown:	0.92	0.91	0.95	0.97	0.94
Standard Deviation:	46.54	47.77	63.3	62.04	54.91
Relative Standard Deviation:	0.58	0.59	0.78	0.77	0.68
Relative Performance / Relative Deviatior	1.18	1.19	1.06	1.06	1.11
Beta:	-0.44	-0.43	-0.22	-0.24	-0.33

Across the board, our trading strategies are less volatile than Bitcoin. The raw and normal optimized categories are more so because they make fewer trades, and as a result spend more time simply holding Bitcoin, which gives them (for those

periods when they are holding) the same volatility. The more frequently trading categories don't have the same attribute.

The relative performance, which has lagged Bitcoin's performance in our data set, looks better now that our volatility has come to light. If we divide relative performance by relative standard deviation, we find that we are on average 11% more profitable per volatility than Bitcoin.

When calculating beta, we have a negative number, likely because excess return becomes higher when Bitcoin's price goes down and a strategy is flat, so there is a negative correlation. Hence, when you divide the negative value by the market variance, you get a negative beta.

When calculating the Sharpe Ratio, we use Bitcoin's market performance as the "risk free rate". Since the average return of the strategy variants is less than Bitcoin's average return, we end up with a negative value for the numerator in the formula, "excess return". This means the Sharpe Ratio is not that useful, but we include it here in order to be thorough.