



## BITCOIN - FOR SAFETY?

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### SUMMARY

- A consistent question about the price movement of Bitcoin is whether not it is a "risk on" or "risk off" asset. Our analysis attempts to answer that question.
- By looking at stock market drawdowns, a proxy for risk off scenarios, we find Bitcoin has positive price performance on average through those events.
- However, during drawdowns Bitcoin underperforms its normal daily average return, suggesting risk off scenarios negatively affect the price of Bitcoin.
- Looking at 2 standard deviation one day price moves, we find that Bitcoin is positively correlated to the stock market, suggesting is a risk on asset on the daily time frame.
- Anecdotally, beginning in 2019 we noticed intraday price movements associated with global macro events that suggest BTC is increasingly viewed as a risk off asset.

### OVERVIEW

Over the past few years there has been an ongoing debate about Bitcoin's role as a "risk on" asset or a "risk off" asset. That is, does Bitcoin outperform when traditional market investors are fearful and seek protection in safe-haven assets, like US Treasuries, or does Bitcoin outperform when investors are risk seeking and invest in assets like stocks? We think the answer to this question has important implications for Bitcoin's role in multi-asset portfolios and for the broader institutional adoption of digital assets. The challenge with answering this question is the short history of Bitcoin, which neither includes a US recession nor a period of high inflation. To answer the question then, we've taken a deeper inspection on risk off periods, stock market drawdowns, since 2011. Our findings are that Bitcoin still has positive price performance during these drawdown events, but it is much less than its overall average daily returns. Looking at 2 standard deviation 1 day moves in the stock market we find that Bitcoin is positively correlated. However, our observation is that over the past year Bitcoin has increasingly acted like a risk off asset, particularly on a daily or intraday basis in reaction to notable macroeconomic events.

## STUDY OVERVIEW

### HISTORY OF TRADING DATA IS LIMITED

As an asset, Bitcoin is still young, with its genesis block dating back to January 3, 2009. Reliable pricing data goes back even less far - Bitcoin Market, the first online exchange didn't open until over a year later, in March of 2010. However, it wasn't until the end of 2010 that Mt Gox was regularly transacting thousands of dollars of daily volume. Given the spotty record and consistency of trading data throughout 2010, we therefore use the beginning of 2011 as the start of our study.

### BITCOIN HAS NOT BEEN BATTLE TESTED

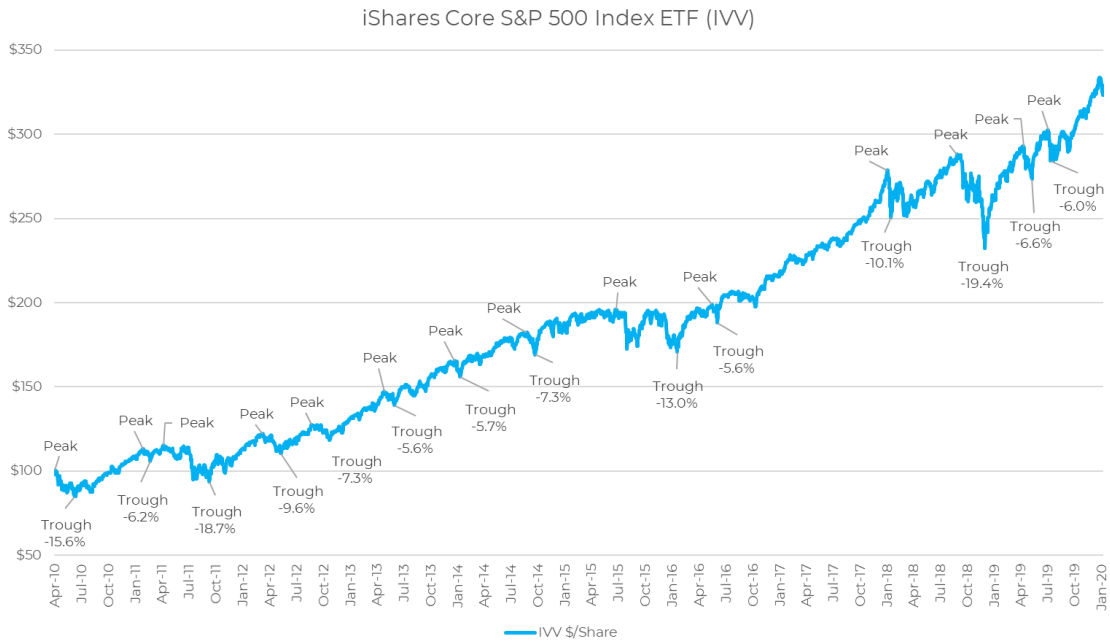
Due to Bitcoin's relatively short life, it has not faced varied economic conditions in the US. The Business Cycle Dating Committee of the National Bureau of Economic Research dates the end of the Great Recession in June 2009 while the S&P 500 reached its intraday low at 666.73 on March 6, 2009 and its low close at 676.53 on March 9, 2009. These events occurred in the earliest days of Bitcoin and well before an online market for Bitcoin was established. The maximum annual inflation rate (monthly Core CPI) since 2009 has been 2.39%, well below the long term average of 3.79% exhibited since the beginning of 1962. Bitcoin has enjoyed the benefit of a growing US economy and low inflation nearly since its inception.

### STOCK MARKET DRAWDOWNS AS A PROXY FOR RISK OFF

Because our sample period includes neither periods of inflation, which would likely show outperformance in hard assets like gold, nor a recession, which would show outperformance in safe-haven assets like US Treasuries, we turn to other proxies for risk in our study, chiefly the US stock market. By measuring the price performance of Bitcoin during stock market drawdowns, peak to trough declines, we can get a sense of how Bitcoin performs in risk off scenarios, even though the stock market a whole continues to move up and to the right. Our proxy for the US stock market is the S&P 500 Index, one of the most popular benchmarks for US markets. We use the price of iShares Core S&P 500 ETF (IVV) to represent the benchmark index which we favor over the SPDR S&P 500 Trust ETF (SPY) and Vanguard S&P 500 ETF (VOO) because of its lower tracking error (active risk). We acknowledge minor shortcomings (premiums and discounts to Net Asset Values) associated with the use of ETF prices versus index values but our hope is to replicate more real world experience in portfolio management.

We defined drawdowns as any peak to trough decline of greater than 5%. While a "market correction" is usually loosely defined as a peak to trough decline of greater than 10%, this definition would leave us with few events to analyze. The following graph depicts the peak and trough of the S&P 500

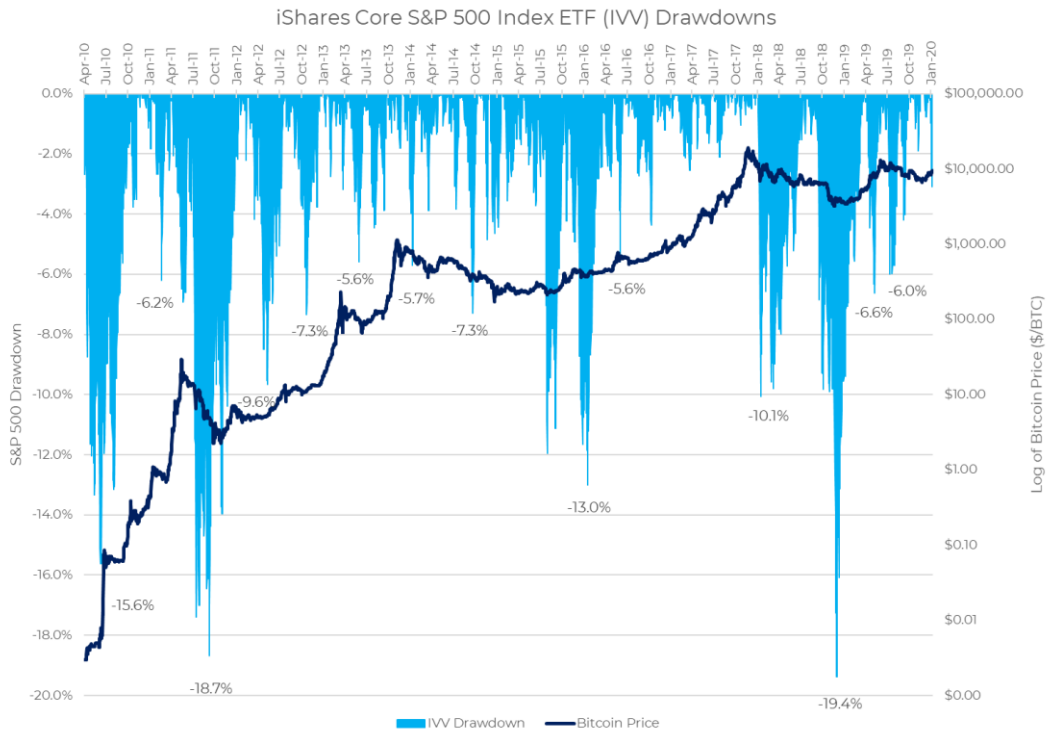
# FIGURE 1 – STOCK MARKET DRAWDOWNS



Source: Digital Asset Research

By plotting the log price of Bitcoin against the cumulative drawdown in the S&P 500, we get a better sense of Bitcoin's price behavior during these events.

# FIGURE 2 – STOCK MARKET DRAWDOWNS VS BITCOIN



Source: Digital Asset Research

# RESULTS

## NARROWED DOWN TO 13 RISK OFF EVENTS

Since the beginning of 2011 through the end of January 2020, the S&P 500 has exhibited 13 drawdowns over 5% and 4 over 10%. We consider these events the population of our study (we exclude the first event in 2010 but show the data here). These drawdowns measure 58 days on average and result in average peak to trough losses of 9.3%. The worst drawdown in terms of severity was -19.4% and the longest was 206 days.

We then measured the price return of Bitcoin from the day stock market peaked to the day the market troughed. We translated those total price gains into daily returns and compared them against the average daily return for Bitcoin to compute an excess daily return. Our goal, and this is an important subtlety, is to **see how Bitcoin price performance compares against an average day for Bitcoin**. Since the beginning of 2011, Bitcoin has exhibited a positive daily gain of 0.31%.

**FIGURE 3 – STOCK MARKET DRAWDOWNS VS BITCOIN**

Event	S&P 500 (IVV)				Bitcoin			US Treasuries (TLT)		Gold (IAU)	
	Peak	Trough	Drawdown	Length (D)	Return	Daily Return	Excess Daily Return	Return	Daily Return	Return	Daily Return
0	4/25/2010	7/2/2010	-15.62%	68	83.33%	0.90%	0.48%	12.97%	0.18%	4.65%	0.07%
1	2/21/2011	3/16/2011	-6.20%	23	3.06%	0.13%	-0.18%	5.30%	0.22%	0.66%	0.03%
2	5/1/2011	10/3/2011	-18.66%	155	60.56%	0.31%	-0.01%	34.56%	0.19%	5.63%	0.04%
3	4/2/2012	6/4/2012	-9.64%	63	3.57%	0.06%	-0.26%	15.45%	0.23%	-3.43%	-0.06%
4	9/16/2012	11/15/2012	-7.34%	60	-5.96%	-0.10%	-0.41%	7.14%	0.11%	-3.36%	-0.06%
5	5/21/2013	6/24/2013	-5.60%	34	-15.34%	-0.49%	-0.80%	-7.41%	-0.23%	-6.74%	-0.21%
6	1/15/2014	2/3/2014	-5.71%	19	-3.88%	-0.21%	-0.52%	5.04%	0.26%	1.41%	0.07%
7	9/18/2014	10/16/2014	-7.29%	28	-9.66%	-0.36%	-0.67%	7.86%	0.27%	1.18%	0.04%
8	7/20/2015	2/11/2016	-12.99%	206	35.50%	0.15%	-0.16%	14.79%	0.07%	12.96%	0.06%
9	6/8/2016	6/27/2016	-5.56%	19	12.77%	0.63%	0.32%	4.43%	0.23%	5.09%	0.26%
10	1/28/2018	2/8/2018	-10.06%	11	-29.32%	-3.10%	-3.42%	-3.76%	-0.35%	-2.47%	-0.23%
11	9/20/2018	12/24/2018	-19.38%	95	-37.18%	-0.49%	-0.80%	4.53%	0.05%	5.01%	0.05%
12	5/5/2019	6/3/2019	-6.63%	29	41.64%	1.21%	0.90%	7.32%	0.24%	3.68%	0.12%
13	7/28/2019	8/5/2019	-5.99%	8	23.58%	2.68%	2.37%	5.84%	0.71%	3.17%	0.39%
	Average		-9.31%	58	6.10%	0.03%	-0.28%	7.77%	0.15%	1.75%	0.04%
	Median		-7.29%	29	3.06%	0.06%	-0.26%	5.84%	0.22%	1.41%	0.04%
	Std Dev		4.83%	61	28.20%	1.27%	1.27%	10.12%	0.25%	5.10%	0.17%
	Min		-19.38%	8	-37.18%	-3.10%	-3.42%	-7.41%	-0.35%	-6.74%	-0.23%
	Max		-5.56%	206	60.56%	2.68%	2.37%	34.56%	0.71%	12.96%	0.39%
	Win Rate				53.85%			84.62%		69.23%	

Daily Since Beginning of 2011

0.31%

Source: Digital Asset Research

## A LOOK AT 2 STANDARD DEV MOVES

We also look at the price movement of Bitcoin on days where the stock market had big moves in either direction, greater than (less than) 2 standard deviation moves up (down). Our measure of the average daily move of Bitcoin (geometric mean of 0.42%) changes slightly from the preceding example because we eliminate weekends here. But the data is clear on days with big risk on/off moves - Bitcoin is positively correlated during these events. When the stock market up a lot (risk on), Bitcoin outperforms compared to its average. When the stock market is down a lot (risk off), Bitcoin outperforms compared to its average.

**FIGURE 4 – LARGE ONE DAY RISK ON/OFF MOVES AND BTC PRICE**

		Bitcoin Daily Price Return		
		Avg	Geo Avg	Median
Stock Market	+2 Std Dev	1.52%	1.27%	0.36%
	-2 Std Dev	-0.34%	-0.55%	0.00%
Daily		0.59%	0.42%	0.22%

Source: Digital Asset Research

## SUMMARIZING STUDY DATA

There are a couple of conclusions we can draw from our analysis. The first is during risk off events defined by drawdowns in the stock market, Bitcoin has positive price performance. It's average return during those drawdown events was 6.10% and the median was 3.06%.

However, if we look at daily price gains (these events vary in length), the results become much more muddled. During those risk off events, Bitcoin produced average and median daily returns of 0.03% and 0.06%. These are both well below Bitcoin's geometric average daily return of 0.31% since 2011. **It is our conclusion that in risk off scenarios, Bitcoin still produces positive returns, but these are significantly lower than average daily returns for Bitcoin.**

We also think it's important to look at the win rate for these events - the percentage of times that Bitcoin has positive gains during stock market drawdowns. The win rate for these types of trades is 53.85%, slightly better than half the time. Our read is that Bitcoin can be a risk off hedge, but very often it's not.

Finally, looking at a large one-day price moves in the stock market shows that Bitcoin is positively correlated with this risk factor.

## A CLOSER, ANECDOTAL INSPECTION

While the preceding analysis focused on our statistical measurements of multiday stock market drawdowns, anecdotally we've noticed increasing intraday inverse correlations with Bitcoin and the stock markets - a measure that suggests Bitcoin is increasingly being used as a macro risk off instrument. In the following charts we isolate news that drove downward movement in the stock market, but that also appears to cause price fluctuations in the price of Bitcoin. This is by no means a statistical study, but something we've noticed by carefully studying price movements. The first example, the Apple earnings warning, is an example of how the stock market and Bitcoin were positively correlated, but that gradually changes as we go throughout the year. Blue is the price of IVV (RHS axis), orange is the price of Bitcoin (LHS axis).

**FIGURE 5 – JAN 3, 2019: APPLE EARNINGS WARNING**



Source: Digital Asset Research

**FIGURE 6 – MAR 23, 2019: YIELD CURVE INVERSION**



Source: Digital Asset Research

**FIGURE 7 – AUG 3, 2019: US CHINA TRADE WAR HEATS UP**



Source: Digital Asset Research



**FIGURE 8 – AUG 23, 2019: CNHUSD (YUAN) BREAKS 7.0**



Source: Digital Asset Research

**FIGURE 9 – JAN 3, 2020: US DRONE STRIKE IN IRAQ**



Source: Digital Asset Research



## CONCLUSION

The analysis of our study of multiday drawdowns shows that Bitcoin still produces positive returns on average during risk off events, but they are significantly below the daily average gains that Bitcoin typically exhibits. Furthermore, the hedge is not consistently reliable, working slightly more than half the time. On single days where there are big price movements in either direction, we also see large bitcoin price movements in the same direction, which implies positive price correlation, not the negative correlation associated with a hedge. Anecdotally, however, over the past year we've noticed an increasing reliance of Bitcoin as a risk off hedge, particularly on a daily or intraday basis. Perhaps the increasing popularity of regulated futures from CME or Bakkt have made this tool accessible to traditional macro investors or perhaps Bitcoin traders have been more cognizant of the macro events around them. We still think that Bitcoin's price movements continue to be largely determined by asset and industry specific events, and that's a good thing for multi asset portfolios.

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