Memo to: Aenigma Clients **Date:** 2/28/2019

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Subject: Value Investing in a Crypto Recession

Be fearful when others are greedy and greedy only when others are fearful. These wise words were spoken by Warren Buffett, the groundbreaking value investor who revolutionized fundamental analysis with his theory of intrinsic value. His principles are most relevant to investors in periods of extreme market exuberance and despair. Typically, investing during a market run requires a highly defensive stance, while a bear market provides an opportunity for investors with strong stomachs to get more aggressive and pick up high-quality, out-of-favor assets at attractive valuations.

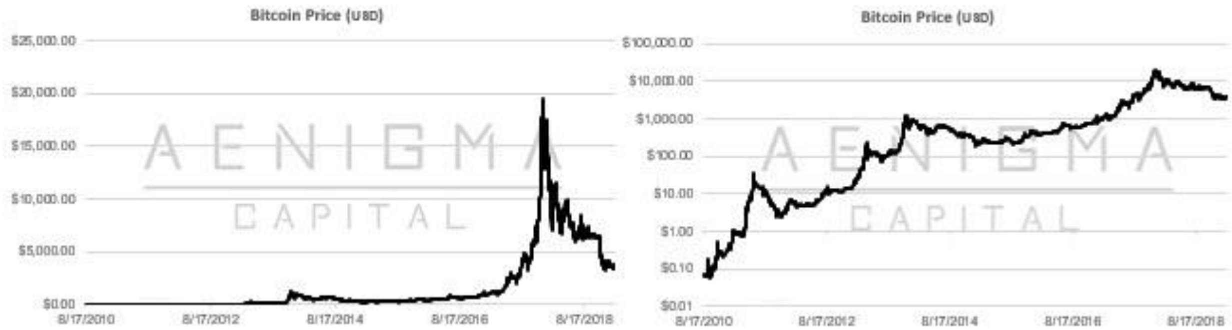
As we ended 2017, crypto prices were riding high at the upper end of market enthusiasm following a year in which Bitcoin appreciated by nearly 1,900%. Only a year later, the markets sit at the opposite extreme, as demonstrated by the selloff at the end of 2018 that saw prices plunge by more than 80% from previous highs. These conditions suggest the markets are ripe for harvesting by vigilant and savvy value investors.

Even a cursory examination of history shows that market environments with widespread undervaluation have yielded significant investment opportunities across. No crash more closely parallels the current state of the crypto economy than that of the housing market during the recent Great Recession. Sparked by the 2008 financial crisis, **the housing bubble collapse was painful for many. Yet it was also highly profitable for those** willing to buy quality foreclosed inventory in the belief that the crash had caused mass undervaluation of assets. Today much of that inventory has rebounded above pre-recession price levels. **Disruptive technology companies experienced the same undervaluation** in the wake of the dotcom bubble. **Many of those companies reemerged to play a dominant role** in the global economy.

With these dynamics in mind, we are value investing during this crypto recession. The key is having the skill to decipher the current market cycle phase, the insight to select the fundamentally undervalued winners that will emerge, and the discipline to make trading decisions according to a strong investment thesis.

Crypto Market Cycles

It's been said that history doesn't repeat itself, but it often rhymes. The crypto markets are no exception. Like all markets, crypto markets move in alternating boom and bust cycles precisely like the ones we've witnessed over the past two years. In linear terms, the most recent BTC cycle appears to be a simple case of rapid market appreciation and depreciation (Figure 1). However, when viewed on a logarithmic scale (Figure 2), significant peaks and valleys emerge throughout its history.



Figures 1 and 2. The price of Bitcoin in linear (left) and logarithmic forms (right).

- Crypto is an emerging digital economy. These market price movements are akin to changes in traditional business cycles as influenced by central bank monetary activity and debt expansion and contraction.
- Compared to the broader traditional economy, cycles in the crypto markets occur at accelerated rates and with a higher degree of volatility. The difference in rate is largely attributable to the small cap, emerging nature of digital assets and market information asymmetry.
- Recessions tend to thin the weak and low-value enterprises from the herd. Those businesses that survive a recession phase are often strengthened by the experience. For this reason, recessions are a help, not a harm, to the traditional economy in the long run. In the crypto economy, these cycles are healthy and do not imply that all cryptocurrencies are destined to go to zero. Instead, they fortify the cyclical crypto 'bubble' that inflates and deflates without ever seeming to pop fully.

Recent Cycle Environment

Investing through market cycles is as much about market psychology as it is about finance and economics. As a result of these market cycles, crypto investors pushed prices toward the fundamental extremes -- a classical price swing that so often signals the formation and disintegration of a bubble.

Anatomy of Price Bubbles

Bubbles occur in all asset classes, and their life cycles are usually marked by a similar sequence of events. The typical market bubble is:

- Marked by organic growth and fundamental demand drivers.
- Propelled by overinvestment of capital seeking to capture a perceived opportunity.
- Fueled by a speculative purchasing frenzy that leads to excessive risk-taking.
- Diagnosed by mainstream media via peaking prices and the euphoric sense that the rally will continue indefinitely.
- Deflated by rapid price deleveraging caused by structural market circumstances.
- Followed by painful corrective movements that spark mass panic selling, including capitulation of investors who are scared or forced out of the market.
- Fodder for the next price rally as asset valuations are depressed to oversold levels. Meanwhile, the market consolidates toward a reset.

What else has fueled past crypto bubbles specifically? We believe that information asymmetry and market irrationality form the root cause. Moreover, the combination has been a driving force behind crypto market movements over past cycles. Markets are not always efficient in their price behavior, especially those exhibiting features characterized as:

- New or innovative asset types. (MBS bubble of 2008)
- Emerging economy opportunities. (South Sea bubble of 1711)
- Attractive mainly to unsophisticated investors. (Tulip mania of 1637)
- Emergent technologies and industries. (Dotcom bubble of 2002)

Crypto markets can be characterized as all of the above. As we've seen over the past two years, the perception of risk creates heightened price volatility but also allows investors to profit from resulting asset mispricing opportunities.

Building a Bubble

Famed investor Howard Marks once wrote, ***All bubbles start with some nugget of truth.*** The crypto market bubble of 2017-2018 had its own fundamental demand drivers, including:

- Purchase by Indian citizens following the demonetization of banknotes. (Q4 2016)
- Facilitating capital flight from China by circumventing currency controls. (Q1 2017)
- Mass adoption following legalization as a nationally recognized currency in Japan. (Q4 2017)
- Usage in hyperinflation-stricken economies of Venezuela, Argentina, and Turkey. (2016-2018)
- Portfolio allocations from early entrant institutions seeking uncorrelated growth assets. (20152018)

From these initial seeds of solid demand and price gains, the crypto market eventually succumbed to extreme investor euphoria. By December 2017, the price of Bitcoin was up 1,900% on the year and touching new all-time highs. **Investors lacked healthy levels of skepticism and risk aversion**, instead preferring to invest as if the bull market would never end. A review of the media coverage from some of the most trusted publications in the world shows just how far investors had fallen down the rabbit hole:

- Bitcoin nears $10,000 mark as hedge funds plough in (The Guardian, Q4 17)
- Merrill survey: Bitcoin is the 'most crowded' investment in the world (CNBC, Q4 17)
- People Are Taking Out Mortgages To Buy Bitcoin, Securities Regulator (CNBC, Q4 17) ● Everyone Is Getting Hilariously Rich and You're Not (The New York Times, Q1 18)
- SEC says cryptocurrency exchanges are an unregulated mess (TechCrunch, Q1 2018)
- A blockchain startup just raised $4 billion without a live product (CNBC, Q2 18)
- What Crypto Downturn? ICO Fundraising Surges in 2018 (WSJ, Q2 18)

What conclusions can we draw about the bull phase of the bubble? While improving fundamentals played a role in the early phases of the rally, prices outran the intrinsic value of the assets, leading to:

- Crypto investors exhibiting unusually strong and irrational head-like speculative behavior.
- Investors taking on excessive risk in late phases of the bull market in search of exponential returns.

- Consumers adding outside leverage to the system, buying crypto using credit cards and mortgages.
- Speculative ICOs with ill-defined token economic models, governance rights, and established usage funded at lofty valuations and with little due diligence.
- Widespread disregard for investor regulatory protections, securities laws, and the potential illegality of "hyped" projects that promised steep returns.
- **Investors forgetting the cardinal rule of value investing, instead growing greedy when caution was the smart play.**

Market Unwinding

A deep market correction has occurred over the course of 2018, one that has left prices across the board down 70% to 90% from their all-time highs.

The main drivers of the correction:

- As prices outran the intrinsic value of the assets, an unprecedented amount of unrealized profit accrued in the crypto economic system. Unable to withstand temptation, early adopters and investors decided to cash in their gains, driving down prices.
- The initial profit-taking initiated a virtuous cycle of price declines, causing further decreases as long positions unlevered. Meanwhile, investors seeking to hold onto gains or avoid further losses rushed for the exits.
- During the bull run, trading infrastructure was sorely underdeveloped. As on-ramps and other auxiliary services came onto the market, hedge funds found themselves with the enhanced ability to borrow and short crypto, putting further downward pressure on market prices.
- Large opportunistic holders with substantial influence on the market were able to capitalize on investor fear and hysteria. They contributed to further prices declines, pushing markets toward a mini-death spiral of capitulation by many who would have otherwise been long-term participants in the space.
- Casualties of the bear market included crypto projects forced to sell their treasury reserves to fund operations, unprofitable miners, and shuttered hedge funds selling their crypto holdings at a loss. Crypto businesses across the industry laid off workers, while investors living off significantly reduced crypto wealth panicked, selling their depressed savings.

A sample of headlines from 2H 2018 paints a much more somber and risk-averse picture of investor sentiment:

- This Crypto Mining IPO Looks as Risky as Crypto Trading (WSJ, Q3 18)
- Bitcoin is down more than 80% from highs, nearing its worst-ever bear market (CNBC, Q4 18)
- SEC.gov | Statement on Cryptocurrencies and Initial Coin Offerings (SEC, Q4 18)
- Wall Street Quietly Shelves Its Bitcoin Dreams (Bloomberg, Q4 18)
- Is Bitcoin Going To Zero? (Forbes, Q4 18)
- Lenders Are Thriving on Bitcoin's Bust by Aiding Both Frantics and Shorts (Bloomberg, Q1 19)
- Bitcoin Space Growing on Almost All Metrics — Except Price (Yahoo Finance, Q1 2019)

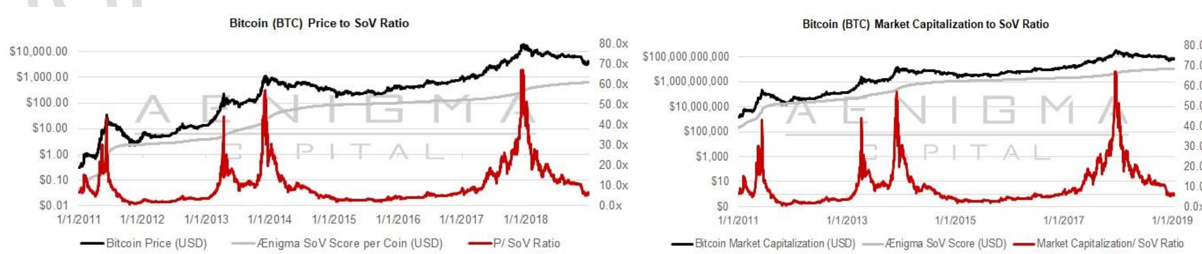
What conclusions can we draw about the bear phase of the bubble? After outpacing their fundamental drivers of valuation in 2017, prices have now sharply contracted, leading to:

- Investors again exhibiting an unusually strong head-like behavior, swinging the pendulum toward widespread pessimism and extreme risk aversion.
- Hedge funds putting further pressure on prices by taking out loans to short crypto.
- The loss of retail investors and weaker crypto-related companies who were unable to weather the 85% correction.
- Regulated traditional equity IPO financing rounds being offered by some of the most established and highest-quality infrastructure companies.
- Low mass institutional interest despite increased regulatory guidance, institutional grade exchange infrastructure, and improved market oversight.
- An increasing detachment of improving fundamentals from declining prices.
- **Investors again struggling with the basic tenet of value investing, instead hesitating when aggressive investment may be the smart move.**

Deciphering Value

The notion of value investing in cryptocurrencies will seem inconceivable to many analysts. Most view these assets as a black box of fundamentally irrational price movements. Yet Bitcoin and similar **cryptocurrencies (more accurately termed "digital commodities") do have valuation fundamentals that can be used to assess the attractiveness of the asset.** These fundamentals are not yet broadly recognized among the investing public, and broad information asymmetry has caused asset mispricing opportunities during boom and bust cycles.

- In the latest Ænigma research report, **Store of Value**, we provided an in-depth explanation of the **Price-to-Store of Value (P/SoV) ratio** that we developed in January 2018. The ratio applies to **proof-of-work (PoW) mineable** cryptocurrencies that we classify as "**monetary commodities**."
- **The P/SoV ratio functions similarly to traditional Price/Book, EV/EBITDA, and P/E ratios.**
- We calculate P/SoV on an overall network value basis as the ratio of: 1) aggregate market capitalization, and 2) total store of value, approximated using cumulative mining rewards (CMR).
- **The price is assumed to be relatively cheap (expensive) when the P/SoV ratio is low (high), making the asset more likely to appreciate (decline).** We leverage this approach to examine individual cryptocurrency prices and the current stage of the macro market cycle at large.
- The full research report describing this approach can be found **here**. The latest P/SoV ratio for Bitcoin as of the end of Q4 2018 is presented below:



Figures 4 and 5. Graph of Bitcoin logarithmic price and the P/SoV ratio and market cap vs. the P/SoV ratio.

In the simplest sense, the P/SoV methodology works as follows:

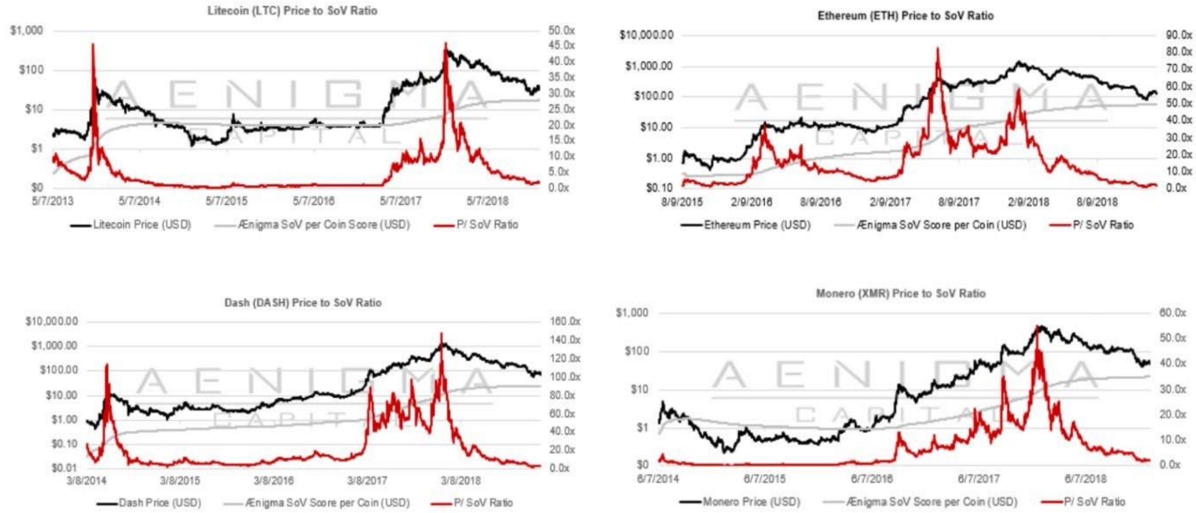
- Blockchain technology requires some method to validate the transactions being added to the chain (i.e., its "blocks"). One method is PoW mining, in which miners verify transactions by completing encrypted algorithms solvable only through brute force computation. As a result, PoW mining incurs high costs of power, hardware, mining facility overhead, labor, and other inputs.
- The SoV score per coin is the **total amount of dollars that have been invested, or "ripped up," per coin through the mining process** since inception. These costs act as semi-permanent commitments of value that influence behavioral psychology and market price through user incentives. This forms the economic moat around the network that helps the coin maintain value.
- The difference between P and SoV represents the estimated maximum amount of unrealized profit in the system; i.e., the maximum net value that all holders could receive if they sold their coins at current market prices. **In other words, the ratio helps us quantify the probability that investors will sell coins in order to realize profits or hold them to await better valuations.**

Why is the approach highly significant for macro market valuations and contextualizing the overall crypto investment climate?

- Bitcoin represents more than 50% of the total crypto market cap, while similar PoW coins cumulatively represent more than 70%. As a class, PoW coins have been the leading driver of public market crypto prices because of their sheer size and strong price correlations with other crypto assets.
- The "wealth effect" caused by their price movements influences the valuations of other crypto assets, the venture funding environment of private market deals in the blockchain space, and largely drives the business activity of the infrastructure companies that support the ecosystem.
- **The approach is incredibly simple, and most importantly of all: The data tell us that it works.**

Alternative Cryptocurrency Cycles

Why not just buy Bitcoin? Bitcoin tends to behave as a blue chip defensive asset in relative crypto terms, declining less during recessions. But Bitcoin suffers from the same downside as blue chip stocks in periods of growth, as **other high quality altcoins tend to offer significantly greater alpha during market up cycles *as long as you know how to pick them*.** The historical market cycle P/SoV and price performance for four of the larger and older PoW cryptocurrencies are shown below:



Figures 6, 7, 8 and 9. Graphs of logarithmic price and the P/SoV ratio for BTC, ETH, LTC, and XMR as of 12/31/2018.

Market Cycle Valuations

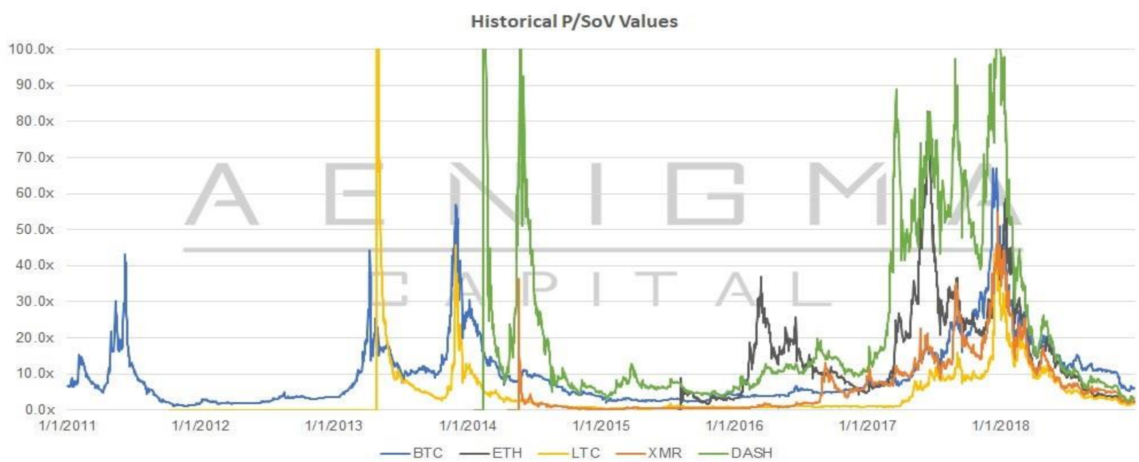


Figure 10. Graph of the P/SoV ratio for BTC, ETH, LTC, and XMR as of 12/31/2018.

The chart above shows the historical cycle data for some of the leading monetary crypto commodity assets at the end of 2018. Some noteworthy observations:

- These market price cycle movements have historically come in two medium-term waves that form one longer-term macro market price cycle, which can be seen in the historical P/SoV charts.
- Initial bull runs in the market cycle have historically been preceded by long phases of suppressed P/SoV ratio valuations, which we believe act as the accumulation period for long-term holders.
- After a correction, P/SoV values trough at more sustainable levels for the shorter mid-cycle recession period before the second subcycle initiates.
- Second waves have generally experienced higher P/SoV values than the preceding first waves. The proceeding selloff ends the macro cycle by pushing the market into a more severe crypto depression, one marked by another multi-year long accumulation phase.

- The timing and cadence of price moves in leading mineable cryptocurrencies will differ based on certain fundamental factors that can be interpreted by a skilled manager. With certain exceptions, overall valuations tend to move in tandem with the larger Bitcoin cycle.
- **How should we understand the most recent wave of 2017? As the first medium-term wave in Bitcoin's third longer-term money cycle.**
- **Where are we now? The tail end of the Great Crypto Recession of 2018.**

	2011									2011-2012		
	Wave 1 Peak			Trough			Wave 2 Peak			Trough		
Ticker	P/SoV	Price	Return %	P/SoV	Price	Return %	P/SoV	Price	Return %	P/SoV	Price	Return %
BTC	15.4x	$0.95	---	4.9x	$0.71	-25%	43.0x	$32	4393%	1.0x	$2	-93%
	2013-2014									2015-2016		
	Wave 1 Peak			Trough			Wave 2 Peak			Trough		
Ticker	P/SoV	Price	Return %	P/SoV	Price	Return %	P/SoV	Price	Return %	P/SoV	Price	Return %
BTC	44.2x	$238	10293%	7.7x	$69	-71%	57.0x	$1,129	1536%	2.1x	$176	-84%
LTC	80.0x	$4	---	2.6x	$2	-50%	45.8x	$44	2100%	0.3x	$1	-97%
XMR	---	---	---	---	---	---	---	---	---	0.2x	$0.22	---
DASH	---	---	---	---	---	---	---	---	---	2.8x	$1	---
	2017-Present											
	Wave 1 Peak			Trough			Current					
Ticker	P/SoV	Price	Return %	P/SoV	Price	Return %	P/SoV	Price	Return %			
BTC	67.1x	$19,476	10966%	5.2x	$3,236	-83%	5.8x	$3,659	13%			
ETH	58.5x	$1,397	---	1.5x	$84	-94%	2.3x	$126	50%			
BCH	97.9x	$3,909	---	1.0x	$77	-98%	1.8x	$135	75%			
LTC	46.2x	$359	31117%	1.4x	$23	-94%	1.9x	$32	39%			
XMR	55.0x	$470	213536%	1.8x	$39	-92%	2.1x	$45	15%			
DASH	148.4x	$1,556	155500%	2.4x	$60	-96%	3.0x	$74	23%			

Figure 11. Table of historical cycle valuations and performance of BTC, ETH, LTC, BCH, and XMR as of 12/31/2018.

The P/SoV model indicates that valuation levels for Bitcoin, our barometer for the overall market, are nearing a 6x multiple. While not an absolutely rock bottom floor, this multiple is well below the 7.7x and 4.9x multiples of previous troughs in 2013 and 2011, respectively. Comparable PoW assets paint a similar picture. Based on this historical precedent, current cycle valuations appear attractive when viewed through the lens of a patient long-term fundamental investor.

Closing Thoughts

Cryptocurrencies have been a technologically disruptive growth asset since their inception. As a result, classifying crypto assets as value-oriented may seem like an oxymoron to many. A combination of investor behavior, structural market factors, and the general market's misunderstanding of fundamental crypto valuation principles has caused current prices to diverge from their improving fundamentals. **These market conditions may present an opportunity where growth and value investing principles converge.** With this in mind, I'd like to remind you of a few sound investment principles with special salience in this market environment:

- The first goal of investing is to buy low and sell high.

- Outperforming the market requires a contrarian viewpoint that has not yet been priced in by others.
- Inefficient markets exist for emerging economies, within new asset classes, for smaller value assets, and when a dearth of professional investors exists. Each of these offers mispricing opportunities.
- Financial markets are auction houses where marginal buyers and sellers with different degrees of information compete against each other and set the price of an asset -- but not its intrinsic value.
- Asset prices follow sentiment and technicals in the short term and fundamentals in the long term.
- If the market believes an asset is risky, investor unwillingness to buy reduces the price to a point where the asset is no longer risky.
- ***The intelligent investor gets interested in big growth stocks not when they are at their most popular – but when something goes wrong. - Benjamin Graham***

We can't be certain that crypto markets have absolutely found a near-term bottom where short-term price volatility is impossible. But we're confident that the returns from 2018 represent the tail-end of a prolonged market correction. This market environment presents a critical value investing opportunity for contrarians with the skill to sift through the wreckage and uncover assets that will survive the downturn and thrive in the long run.

As Mark Twain once said, “Whenever you find yourself on the side of the majority, it is time to pause and reflect.” **And the majority in crypto today is sitting on the sidelines.**

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