Bitcoin – Store of Value in a Fiat Money Supply Framework (FMS-F)

A. Executive Summary

We compared Bitcoin's trading history to those of other generally accepted stores of value, developed preliminary conclusions regarding relationships, and pegged our forecast for where BTC can trade to in the next cycle using a money supply-based valuation framework. A few highlights:

1. Bitcoin's overall value is highly correlated with the fiat money supply (US + EU M1 as a proxy), all measured in USD terms. More specifically, the 6-month change in BTC market value mostly reflects the 6-month change in US and Euro money supply with a 3-month lag. Correlation with gold is lower, possibly reflecting their competition to be viable alternatives to fiat store of value.

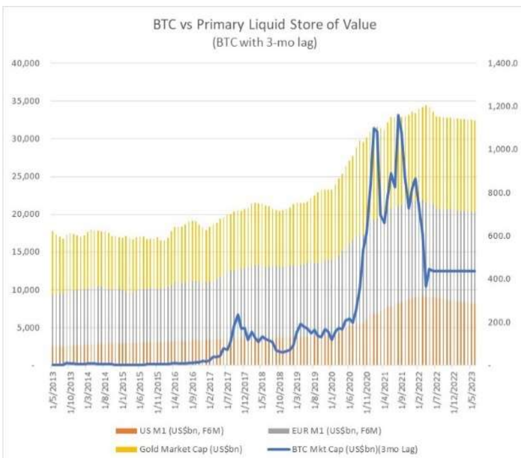


Chart 1

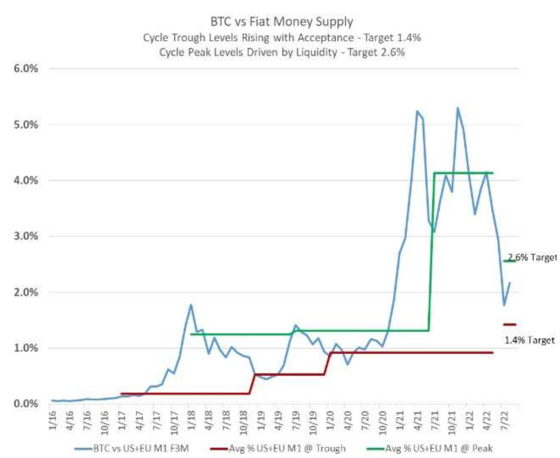


Chart 2

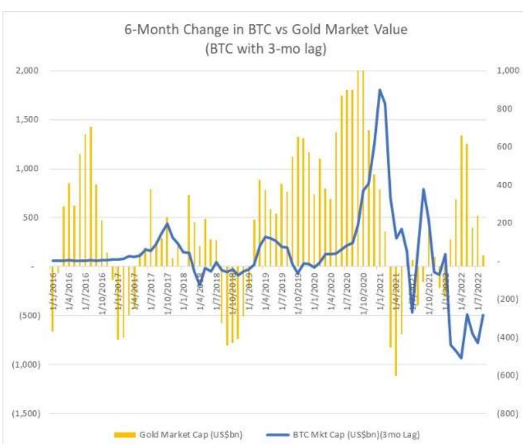


Chart 3

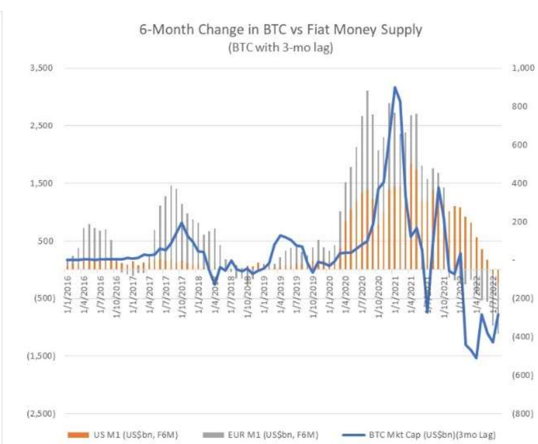


Chart 4

2. While BTC market value as a percentage of fiat money supply has ranged from 0.1% to 5.5% since 2017, we observe a higher floor in each cycle, which reflects improved accessibility and wider acceptance. We believe this trend will continue, and we peg the trough value level for BTC in this cycle at **1.4%** of fiat money supply.
3. There may be some medium-term downside to BTC market value as we forecast fiat money supply to shrink in the next 12 months—mainly due to the US continues quantitative

tightening in addition to raising interest rates. Euro Area money supply may actually increase with ECB's newly introduced program for buying bonds issued by the weakest member countries, but in USD terms, EU M1 has already declined substantially YTD with EURUSD weakness.

4. Upside for BTC market value is dependent on a) continued improvements in accessibility and acceptance as a digital store of value, b) development of use cases for BTC as a transaction currency, and c) looser monetary conditions. We peg the peak value level at **2.6%** of fiat money supply, assuming a repeat of the 1.1% expansion above the trough value level that was observed in 2017-18 in the second half of the previous US Fed rate hike cycle.

Based on our current projections for US M1 (adjusted for May 2020 inclusion of savings deposits) and Euro Area M1, BTC at our peak and trough target levels would be worth US$27,250 versus $15,150.

Below we will discuss in greater detail our methodology.

B. FMS-F Methodology

Consideration #1 – Defining Money Supply

Bitcoin is a global asset, traded and held by an increasing number of investors and speculators around the world. As we examine its relationship to money supply, we also looked at defining the best proxy for "money supply". We analyzed:

- M1 versus M2:
- US-only versus US+EU

M1 vs M2 is particularly applicable to USD money supply as there has been consistently a US$11-12 trillion gap due primarily to savings deposits… until a change of definition by the US Federal Reserve in May 2020 added this component into M1. The St. Louis Fed provides data on the gap between the new and old M1 definitions for April 2021 to January 2022, with the gap averaging US$11.5 trillion +/- 1.6%. We have assumed this gap to remain steady in other time periods.

Excluding this addition of savings deposits, US M1 grew at 18.0% annualized since 2016, more than double the M2 growth rate of 7.4%. M2 was 4.0x the size of M1 in 2016, but is now only 2.2x. We decided to use the original (pre-2020) version of M1 as our proxy for the US money supply that is applicable to cryptocurrencies store of value because:

1) deposits traditionally have lower velocity than cash and demand deposits when it comes to investments and/or speculation, and
2) the growth in adoption and valuation of bitcoin corresponds better with the faster increase in M1 in the past 5-6 years.

In term of regions, we have actually found BTC market value in USD to be most highly correlated with Euro Area M1 measured in USD (correlation of monthly data since 2018 0.88 with R^2 of 0.78), whereas BTC correlation with US M1 is slightly higher (0.92) but the monthly data do not fit the regression line as tightly (R^2 of 0.33). We suspect that BTC value is influenced by both i) the supply of money as well as ii) the price of the USD by which these stores of value are priced. In our analysis, we use the USD sum of US and Euro Area M1 as a proxy for fiat money supply.

Consideration #2 – Other Stores of Value

We also looked at bitcoin's market value versus other generally accepted stores of value such as gold, real estate and art. Real estate and art were deemed to be unsuitable comparisons because of a lack of fungibility, low turnover velocity, high transaction friction and lack of transparent pricing.

Gold is a liquid and widely available store of value that is also correlated with fiat money supply. It also has history and credibility, with its $12 trillion market value on par with both US and Euro Area M1 money supply. We did observe lower correlation and lower coefficient of determination (R^2) between gold and bitcoin, and suspect that this is partially explained by competition between these two assets, and partially explained by bitcoin's rapid increase in accessibility and acceptance. As can be noted in Chart 3, when we compare rolling 6-month changes in market value for bitcoin and gold, the relationship is quite messy. There are period of positive correlation, period of negative correlation, and fluctuating time dependency. Therefore, we decided not to include gold in the money supply-based valuation framework.

We also think it is awkward to compare a commodity with a steady state demand with one with rapidly increasing acceptance and possible use cases. Based on data from the World Gold Council, gold has seen declining demand versus steady supply over the past decade. In the same time frame, bitcoin has gone from niche novelty invented in 2008 to now ~1M active on-chain addresses and ~250k transactions per day (see Charts 10-11), while many more have BTC exposure through exchanges, ETFs, etc.

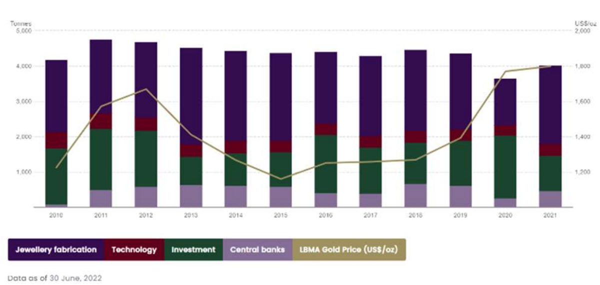


Chart 5 – annual gold demand

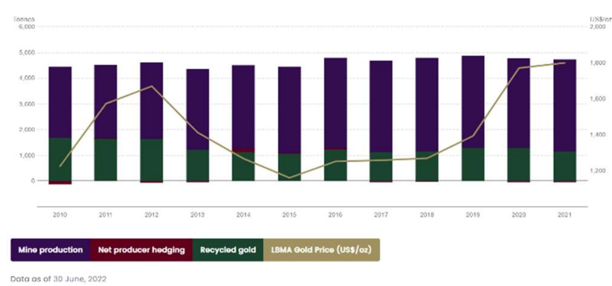


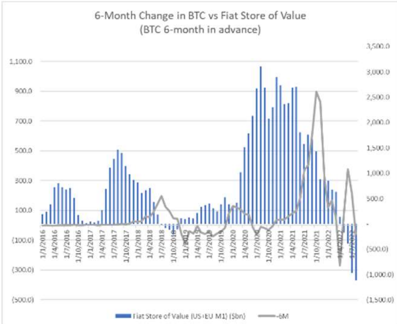
Chart 6 – annual gold production

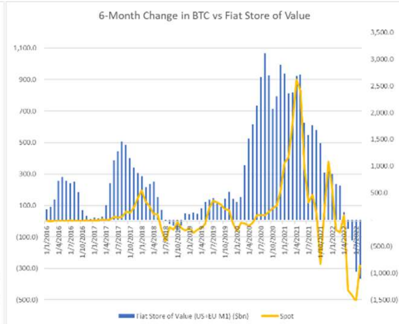
Lastly, we considered comparing the stock-to-flow (S2F) for gold versus bitcoin, but quickly decided that this is not particularly useful. Stock-to-flow measures the speed of increase in the supply ("stock") of a sought-after commodity, it does not actually measure the scarcity of this commodity. Scarcity is a comparison of overall supply versus overall demand, so S2F at best measures the marginal change in scarcity—yet will not differentiate between "scarce getting scarcer" versus "loose becoming less loose". In any event, the demand side contrast between gold and bitcoin is much more significant (as discussed above).

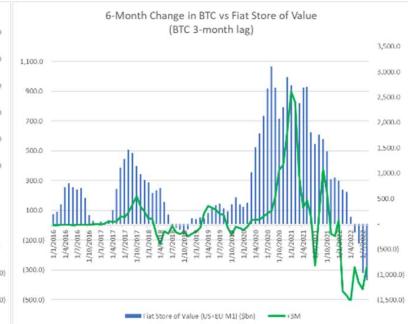
Consideration #3 – Time Dependency

Instead of merely looking at the aggregate market value, we also look at the rate of change to determine patterns. Comparing trailing 6-month changes in value for bitcoin versus fiat money supply, we find the correlation and R2 highest (0.66 / 0.43) when lagging bitcoin by 3 months, although this improvement versus concurrent measures is very small (0.02 / 0.02). But we chose to go with the 3-month lag measurement because it passes our subjective eye test better.

Charts 7-9: BTC leads by 6 months ***BTC concurrent with fiat*** ***BTC lags by 3 months***





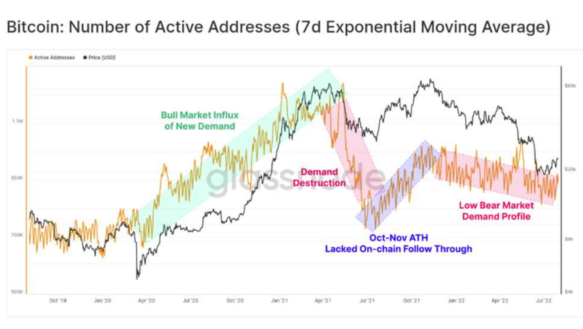


C. Longer Term Implications

Increasing Adoption of Bitcoin…

Bitcoin has quickly gained acceptance as a viable store of value. It had to first secure a place in the mainstream psyche as something that is "not going away". We believe that acceptance and persistency are co-dependent, and their virtuous cycle is driven, among other factors, by price momentum and media attention. Each time bitcoin makes a bull run in 2017, 2019 and 2021, it attracts increasingly more attention and believers. An analogy we have often joked about—if you are your only follower, you are crazy; if you have 100 followers, you are a cult; but if you have 10k followers, you are a sect; and when you have 1M followers, you are a religion. Such is the network effect of faith.

For bitcoin to then also be deemed an asset worthy of capital allocation, it needed to be institutionalized with better infrastructure for access, custody and trading; this draws in the more conservative institutions. In many ways, bitcoin has benefitted from the growth of the entire blockchain ecosystem, both in the use of blockchain and the rise of other tokens. Key developments that brought users to blockchain include, among many others, Ethereum smart contracts in 2016, Defi in 2020 and NFTs in 2021. Despite the downturn so far in 2022, bitcoin remains robust with ~1M active on-chain addresses and ~250k transactions per day.



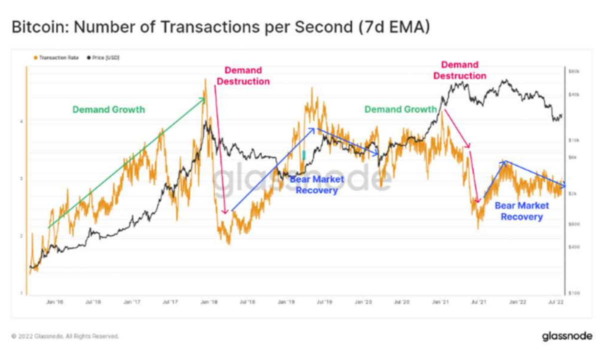


Chart 10 ***Chart 11***

…Increasing "Fair" Trough Value

As both users and providers join the blockchain ecosystem, we have seen faith in bitcoin as a store of value expressed through a rise in BTC market value as a % of fiat money supply. As can be seen in Chart 12, this ratio has averaged within 0.5% to 1.3% in 2018-19, before exploding upwards during the 2020-21 bull run that coincides with unprecedented fiat money supply growth in response to the COVID pandemic. Instead of picking a single-month peak/trough, we opted for 3-6 month averages to assess cyclical levels.

		BTC as % US+EU M1	Chg from last Cycle	Chg from Cycle Trough
Trough	1H2017	0.2%		
	1H2019	0.5%	0.3%	
	1H2020	0.9%	0.4%	
	2022-23 Target	1.4%	0.5%	
Peak	1H2018	1.2%		1.1%
	3Q2019	1.3%	0.1%	0.8%
	2021	4.1%	2.8%	3.2%
	2022-23 Target	2.6%	-1.6%	1.1%

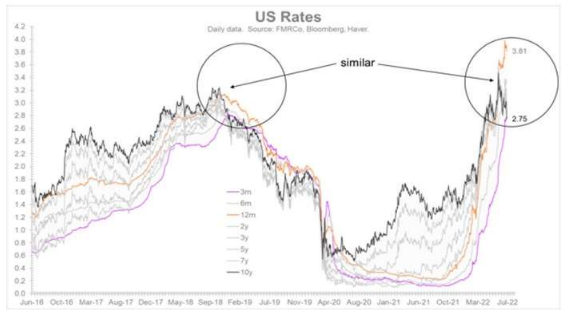


Chart 12 ***Chart 13***

Trough valuation levels have steadily increased, and we think this "rising floor" will accelerate as fiat money supply shrinks in response to quantitative tightening and slowing economic momentum, while blockchain adoption accelerates. In the midst of the 2022 crypto winter, we are seeing the adoption of blockchain technology by corporations offering tokenized reward / loyalty programs, consumer brands leveraging NFTs for brand extension towards younger audiences, social media companies integrating Web3 contents into their distribution channels, and increasing number of mainstream corporates accepting cryptocurrency as payment. In the midst of the many cryptocurrency tokens, BTC stands out as the bluest of blue chips in terms of security (POW network), history (since 2008), token supply clarity, and highest market value. Our best guess is that BTC's floor valuation rises 50bps from the last cyclical trough—**at our trough target of 1.4% of fiat money supply, BTC market value would be US$289bn, or US$15,150 per token**.

Value Upside from Cyclical Expansion

Pegging a target for the peak valuation in this upcoming cycle is admittedly more difficult because the last cycle saw unprecedented fiat money supply growth (US+EU M1 increased 57% from US$14.0 trillion in 2/2020 to US$21.9 trillion in 2/2022), and helped pushed BTC market value from US$169bn (1.2% of fiat) to US$728bn (3.3% of fiat) in these 2 years, with a single-month peak of US$1.16 trillion (5.4% of fiat) in 11/2021. We do not think these macro conditions will repeat itself, so the target level will fall substantially short of the last peak average of 4.1%. However, we do think the previous cyclical ranges are informative:

- 1.1% trough to peak expansion in 2017-18
- 0.8% expansion in 2019
- 2.8% expansion in 2020-21

In pegging this upcoming cycle's peak BTC market value target at 2.6% of fiat money supply, we are effectively assuming a repeat of the 2017-18 1.1% expansion from this this cycle's trough levels (1.4%). The 2017-18 cycle occurred during the latter stages of a US Fed tightening cycle (Chart 13), and as can also be seen from Chart 4, BTC market value increase corresponded mostly with an increased in Euro Area M1. In reality, Euro Area M1 increased by only 8% during 2017, while most of the 22% increase captured in our analysis was due to the Euro's 12% appreciation against the USD.

While we cannot predict how the two regional economies will perform on a relative basis over the medium term given potentially divergent approaches to tackling inflation, we do think that any recession will result in *expectations* for looser monetary policy eventually. This expectation was on full display in July 2022 as equity and cryptocurrency markets rallied from June lows on the narrative of "dovish pivot" by the Fed given peaking inflation (June 2022 US CPI 9.1%) and weakening economy (Atlanta Fed GDPnow forecast for 2Q22 of -2.1%). **At our peak target of 2.6% of fiat money supply, BTC market value would be US$520bn, or US$27,250 per token**.

D. Near Term Outlook

The GSG fiat money supply-based valuation framework (FSM-F) informs us of the upper and lower bounds for a fair value range for BTC. But near-term token price movements are typically more sensitive to expectations of economic developments, monetary policies and bitcoin adoption trends. As we write this in early August 2022, the last driver seems to be less effective (Blackrock partnering with Coinbase to offer bitcoin trading to institutional clients did not move BTC prices much). Given mixed data from weak GDP forecasts and surprisingly strong US jobs data, traders seem to be more focused on the next US CPI report to gauge the intensity of tighter monetary policy. While market expectation is for July US CPI YoY to be lower than June CPI, we note that Bank of England is now forecasting peak CPI of 13.3% YoY in October 2022, up from 9.4% in June.

Among all these shifting in expectations, what we do know that the US Fed should be hitting their peak level of $95bn per month of quantitative tightening this month (announcement in May, assuming 3-month ramp up). And we do think BTC is more sensitive to changes in the **supply** of money than in the **cost** of money (interest rate). So, while technical analysis would indicate that BTC is fairly well supported at US$22.5k-$23.0k with a possible rally to $27.0k level, <u>we would be cautious of deteriorating risk reward</u> as i) fiat money supply continues to decline in the next few months (charts 7-9) and ii) inflation expectations remain elevated even if 9.1% CPI is indeed a near-term peak.

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