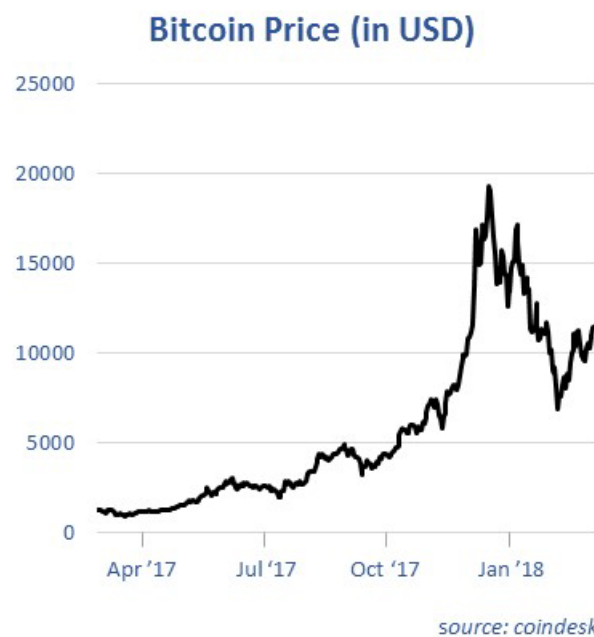


Making Sense of Bitcoin Price Levels

By Joost van der Burgt
 April 2018

The virtual currency Bitcoin has received a lot of attention over the last couple of years. Its recent price surge and subsequent volatility has made Bitcoin one of the hottest topics of the moment. According to the dataset tool Google Trends, in December 2017, searches for “Bitcoin” on Google outnumbered searches for “restaurant,” which indicates that by now, more people are looking for information on this virtual currency than about their local dinner venues.

Recently, a lot of that attention has been focused on Bitcoin’s soaring price levels. In only a year the price of a Bitcoin increased about twentyfold to almost \$20,000, with most of that increase concentrated in the last three months of 2017, before falling back to under \$7,000 in early February.



From a financial supervision perspective, this sudden (and volatile) increase of Bitcoin’s price is both intriguing and potentially worrisome. For this reason we take a closer look at these price developments, and attempt to make sense of the most important drivers of Bitcoin’s price.

When considering price levels, it is vital to understand the nature of Bitcoin’s value. Until now, Bitcoin has been labeled a currency, a security, and/or a commodity. Some even go as far as calling Bitcoin a bubble or scam. Depending on what type of asset you associate with Bitcoin’s behavior, different economic theories might explain the evolution of its price.

Bitcoin Does Not Quite Behave Like a Currency ...

Being a virtual currency, Bitcoin obviously shares at least some characteristics with traditional currencies, but there also are (important) fundamental differences. Furthermore, regulators around the globe do not (yet) consider Bitcoin as legal tender. But say that, for the sake of argument, we would accept Bitcoin as being a genuine currency, where would that leave us in terms of its valuation?

Most monetary determinants of exchange rates, such as interest rates and output levels, do not apply to Bitcoin, as it is not subject to monetary policy or tied to any central government. The only applicable monetary determinant is money supply, as Bitcoin’s limited total supply arguably supported its high valuation. Since Bitcoin does not actually correspond to liabilities or real economic activities, it seems more appropriate to compare Bitcoin supply to the supply of gold (the supply of which, like Bitcoin, is also limited) than to normal currencies. Given that the relative annual increase of the Bitcoin supply over the last couple of years was actually higher (4.4% annually on average) than that of gold, (1.5% annually) supply arguments cannot explain the recent surge of Bitcoin’s price against gold.¹

Another important category of exchange rate determinants is purchasing power. The base assumption here is that certain goods (oil, gold, Big

¹ Percentage increase of Bitcoin in circulation compared to annually mined gold as percentage of total above ground stocks.

Macs, etc.) represent a certain real value. From that perspective, the exchange rate between two currencies can be regarded as a broad measure of the prices of one country's goods and services relative to another country. When looking at the Bitcoin "exchange rate," this category of determinants seems to be inapplicable – there is no current native Bitcoin economy with native Bitcoin prices for goods and services. Therefore purchasing power also cannot explain current Bitcoin price movements.

The last category of exchange rate determinants consists of those related to confidence. In other words, if expectations of future developments are more positive for one currency over another, then the first will receive a higher appreciation. With regard to confidence, a number of serious incidents in recent years (such as Mt. Gox, Bitstamp, Bitfinex and Coincheck) has tempered the security reputation of Bitcoin, and virtual currencies still have a way to go to prove themselves as truly reliable in practice. Furthermore, Bitcoin's prospects as a future global currency have darkened as of late, as recent warnings and decisions regarding virtual currencies by governments across the globe seem to point in the opposite direction. As with the previously discussed categories, confidence-related determinants are unable to explain the recent surge of Bitcoin's price.²

Finally, there is one more observation that is noteworthy from a Bitcoin-as-currency perspective. The daily trading volume of Bitcoin has been at a historic low since January 2017. While during 2015-2016, the average daily transactional volume of Bitcoin was 1.74M, (11.7% of the total volume over that period) in 2017 this declined to an average daily volume of 379,000 (2.3% of the total volume over that period). For traditional currencies, this transactional volume is significantly higher and typically varies between 25% and 75%. Interestingly, the 2.3% daily turnover of Bitcoin is more aligned to turnover rates that characterize stock markets. With that in mind, would we be better off thinking of Bitcoin as a security?

² Conversely, these determinants would explain to a large extent the recent price drop of Bitcoin, following the news of tightened regulations in China and South Korea.

... Nor Like a Security ...

Securities come in many shapes and forms, but commonly denote either a debt security (that generates periodic cash flows in the form of interest and principal) or an equity security (representing a stake in an enterprise that can generate dividend and/or capital gains). At first sight, Bitcoins cannot be considered to be securities (although other blockchain applications and so-called 'Initial Coin Offerings' could very well be regarded as securities under this definition). However, Bitcoins can be said to exhibit certain security-like traits, and the SEC has mentioned on several occasions that virtual currencies could be regarded as securities in certain circumstances.

There have been attempts to apply security valuation models to Bitcoin, although such applications do require some tinkering to make them suitable for virtual currencies since these do not generate interest payments, dividends, earnings, or capital gains. One such attempt is based on the analogy of venture capitalists' valuations of an investment that is not expected to generate positive cash flows in the investment horizon (e.g., a tech company that reinvests 100% of its earnings and aims to be ultimately bought by a tech giant).³ Such an investment would be valued based on the estimated terminal value of such a company, rather than on expected future cash flows, and a similar approach could arguably be taken for Bitcoins.

Bitcoin's terminal value, in this approach, would be its expected future "monetary base." Taking in consideration the recent Bitcoin price levels, we can use this model to see what assumptions would have to be made to justify these price levels. If we consider Bitcoin as a typical VC undertaking, it should provide an expected IRR comparable to other VC projects, roughly in the range of 40-60%. Early Snapchat investor Jeremy Liew thinks Bitcoin will reach \$500,000 by 2030⁴, which roughly corresponds to the lower bound of this range. This valuation, however, result in a market cap of roughly 10 trillion in today's dollar. This would put Bitcoin's market value at about 1.5 times that of the world's current total gold reserve,

³ See "The Easy Way to Measure Bitcoin's Fair Market Value" on Investopedia.

⁴ See <http://www.businessinsider.com/bitcoin-price-could-be-500000-by-2030-first-snapchat-investor-says-2017-3>

and on par with the current total M2 US dollar supply. Tech figure John McAfee even goes as far as to project that Bitcoin's price will reach \$1 million by 2020⁵ – implying an IRR of 350% for the next three years – which would put Bitcoin's market cap above that of the M2 US dollar supply in real terms. Although nothing is impossible, one could wonder how realistic these assumptions really are.

... But Could Best Be Characterized As a Commodity ...

A commodity typically is an object with use value. According to the Commodity Futures Trading Commission (“CFTC”), a commodity can denote a physical commodity such as natural resources or an agricultural product, or a currency or interest rate, and/or all services, rights, and interests in which contracts for future delivery are presently or in the future dealt in.⁶ (The CFTC has ruled that Bitcoin is a “commodity.”⁷)

As with traditional physical commodities such as gold and silver, there are production cost involved in the ‘mining’ of Bitcoins. At the same time, contrary to physical commodities, it is commonly accepted that Bitcoins do not possess any intrinsic (use) value. As noted above, Bitcoin could also be considered as a commodity in the form of a currency or other store of value. Like fiat currencies and gold, Bitcoins can be bought and sold to take advantage of fluctuations in value relative to other currencies and assets.

Unlike most traditional commodities that clearly fall in either the natural resources category or the currencies category, Bitcoin – like gold – might thus best be considered as a hybrid form between these two categories. Whatever its exact nature as a commodity, over the last few months Bitcoin has ostensibly been behaving more like a commodity than as a currency or security. Although Bitcoins do not possess any real intrinsic value, from a commodity valuation perspective, we can estimate a hypothetical value

based on its production costs. Recent estimates regarding the energy involved in mining a single Bitcoin by professional energy-efficient mining rigs put it at about \$1,800 when mined in China (where 80% of the currently mined Bitcoins originate).⁸ To make mining economically viable, we could roughly postulate a lower price bound of \$2,500 for one Bitcoin (taking into account overhead, machine costs, and a 25% profit margin which is comparable to that of the most profitable gold mining companies). This hypothetical intrinsic value is still well below Bitcoin's recent price levels.

It seems that from a commodity perspective, recent Bitcoin price developments are predominantly driven by speculation regarding future supply and demand, rather than by any underlying value. The question then is whether or not there are signs of these expectations being overheated.

... That Could Very Well Turn Out To Be a Bubble

Since there seem to be no convincing economic arguments for the recent developments of Bitcoin's price, other than speculation, it begs the question whether the current Bitcoin frenzy constitutes a bubble.

Hyman Minsky's financial instability hypothesis gained popularity as a Bubble-paradigm after the global financial crisis that started in 2007.⁹ Minsky identified five stages in a typical credit-cycle: displacement, boom, euphoria, profit taking, and panic. Although it is impossible to definitively prove a bubble before it actually burst, Minsky's hypothesis seems to fit recent Bitcoin price developments quite well.

First, a displacement occurs when investors get enamored by a new paradigm. While Bitcoin was initiated in 2009, it only got some initial traction in 2012, and became popular after its first price surge at the end of 2013 (when it briefly surpassed the \$1,000

⁵ See <https://www.ccn.com/john-mcafees-1-million-bitcoin-price-bet-leaves-even-the-most-ardent-bitcoin-opponents-praying-that-hes-right/>

⁶ See A CFTC Primer on Virtual Currencies; and 7. U.S.C. § 1a(9).

⁷ See, In the Matter of: Coinflip, Inc. d/b/a Derivabit, and Francisco Riordan, CFTC Docket No. 15-29

⁸ See <https://www.wsj.com/articles/china-quietly-orders-closing-of-bitcoin-mining-operations-1515594021>.

⁹ See <https://www.economist.com/news/economics-brief/21702740-second-article-our-series-seminal-economic-ideas-looks-hyman-minskys>

mark). The subsequent ‘Boom’ phase is characterized by prices rising slowly at first, but then gaining momentum as more and more participants enter the market, fearful of missing out. This is arguably what we saw starting in late 2015 when, after a long lull, Bitcoin’s price rose past the \$300 mark again, slowly rising up to \$1,000 in early 2017. The second half of 2017 could aptly be called the ‘Euphoria’ phase in Minsky’s theory, in which caution is thrown to the wind as asset prices skyrocket, as Bitcoin’s price surged past the \$2,500 mark, all the way up to almost \$20,000 in December 2017. The “greater fool” theory plays out everywhere, particularly noticeable in the light of the number of cab-drivers that – out of nowhere – will start to talk about Bitcoin to you.

The Euphoria phase is also when people start to borrow extensively to finance their investments. Although accurate information on the extent of borrowing regarding Bitcoin is currently unavailable, there are a few indicators that suggest that Bitcoin is currently in its Euphoria phase. According to a recent survey, 18% of active Bitcoin investors have financed their investments by credit card, and 22% of this group indicated that they have not yet paid off their credit card balance.¹⁰ Furthermore, in a recent interview, the SEC’s Joseph Borg told the interviewer that “We’ve seen mortgages being taken out to buy Bitcoin”.¹¹ Besides these run-of-the-mill borrowing examples, in 2017 several Bitcoin exchanges started to offer margin trading. Moreover, Japan-based BitFlyer indicated in December that some investors leverage their cash deposits up to 15 times to finance their Bitcoin investments.¹²

Should Bitcoin indeed be a bubble, what we will see next would be the “Profit-taking” phase, in which well-informed investors cash out before the bubble really bursts. We might actually have already entered this phase with the recent drop that cut Bitcoin’s price by more than 60% (although Bitcoin recovered somewhat since, and has surpassed the \$11,000 mark again). The subsequent “Panic” phase, should it come

to that, commences when reality sets in and Bitcoin’s price would substantially crash.

Takeaways

Traditional asset valuation models fall short of effectively explaining recent developments in Bitcoin price. As far as these models do have some merit, they suggest that Bitcoin is currently overpriced, to say the least. Moreover, Minsky’s financial instability hypothesis seems better at explaining Bitcoin’s recent price developments than any proven economic theory, as by now Bitcoin seems to bear most – if not all – hallmarks of a bubble.

Then again, maybe Bitcoin *is* different than anything we have seen before, and maybe a decade from now its market capitalization will be sky-high as it attains the status of a new global currency. Somewhat telling, perhaps, is that this is exactly the way of thinking that Minsky says characterizes the “Euphoria” phase that heralds the bursting of a bubble.

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¹⁰ See <https://lendedu.com/blog/bitcoin-and-credit-cards/>; as reported in the 2 February Edge JPMorgan and Bank of America have halted crypto purchases with credit cards.

¹¹ See <https://www.cnbc.com/2017/12/11/people-are-taking-out-mortgages-to-buy-bitcoin-says-joseph-borg.html>

¹² See <https://www.ft.com/content/7f02cdba-dbd6-11e7-a039-c64b1c09b482>