COINDESK RESEARCH NOTE

COIN DAYS DESTROYED: Giving Meaning to Transaction Volumes

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Contents

This report addresses the measurement of Coin Days Destroyed (CDD): its origins, how it is calculated, what it is used for and its inherent weaknesses.

When applied to bitcoin, for which it was originally created, it is known as Bitcoin Days Destroyed (BDD). In this report, we refer to BDD when using bitcoin as an example. When other cryptocurrencies are being contemplated, however, we refer to the calculation as CDD. In general, what applies to one, applies to the other. We capitalize the term when it applies to the specific calculation, but not when we are referring to the concept.

We also often use bitcoin's ticker symbol BTC when talking about the tradeable asset, to distinguish it from the bitcoin network itself.

Within this report, we will examine the financial situation of Hut 8, one of the sector's largest publicly traded mining companies, as well as the many headwinds it faces.

CONCEPT

First introduced by Bitcoin Talk user ByteCoin back in 2011, Bitcoin Days Destroyed aims to provide a more realistic measure of the economic activity of the bitcoin network, by giving coins that have been inactive for a long time more weight in the network activity calculation.

Why would this give a better idea of network activity? Because it diminishes the often-oversize effect of transfers from short-term traders influenced by price movements, and enhances the weight of coins held by longer term investors who arguably have more information on and insight into the value of the network fundamentals.

In other words, it aims to substitute short-term "noise" with long-term "signal."

CALCULATION

How does it do this? For each day that a bitcoin is not moved, for example, it accumulates one "bitcoin day." When it is eventually transferred, for whatever reason, the bitcoin days accumulated are "destroyed" and reset to zero.

> *BDD = # of bitcoin transferred in the chosen time period * number of days between this transfer and these coins' previous transfer*

Note that the chosen time period could be a block, a day, a week, a month, or any preferred measure, as long as it is consistent throughout the series.

Thus, the number of bitcoin days destroyed in any given transaction is a function of the number of coins moved in that transaction, and how long those coins had been inactive.

For instance, if I send you one BTC that I had held on to for 100 days, the BDD value of that transaction is 100 (1 x 100). This has practically the same economic impact in the overall calculation as if you and I had sent back and forth a day-old bitcoin holding 100 times.

UTILITY

Transaction activity

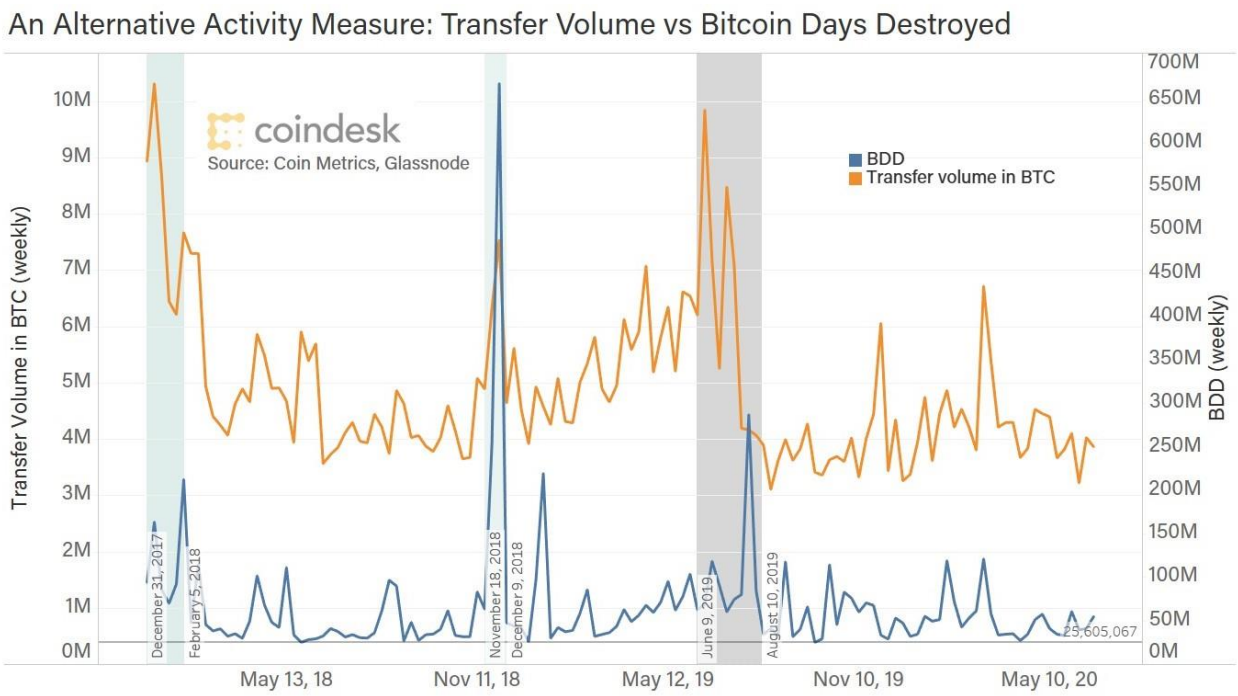
As mentioned above, BDD can offer a more meaningful view on transaction activity. Looking just at transactions can be misleading, as addresses can be shuffling small amounts of BTC back and forth.

In other words, a trader or an exchange could send one BTC back and forth between wallets 100 times. Looking at on-chain transfer data, it would look like meaningful volume, although it wouldn't actually represent economic activity.

Diminishing the weight of recently moved coins removes the impact this could have on the measure of bitcoin's activity.

Also, when the BDD value peaks, it means that either old coins are being moved, or there is a lot of volume. Either is worth keeping an eye on, and looking at other metrics such as transfer volume can shed more light on which.

Transfers on their own only tell part of the story



For instance, the early 2018 colored band in the chart above shows a very high transaction volume, but a relatively low BDD level. Given that this was at the end of the 2017 bubble, it

confirms that the volume was frenetic trading from short-term holders, rather than significant economic activity from serious bitcoin investors.

The blue band, in late 2018, shows a spike in transaction volume that *was* triggered by a significant movement of a long-term holding.

And the grey band, in mid-2019, shows a couple of transaction volume spikes that are close in the timeframe to a spike in BDD, but the fact that they happened just before implies that they were more as a result of short-term churn than significant movement.

The spike in BDD immediately after those transaction volume spikes did not produce a meaningful jump in transactions – which could mean that a small amount of *really* old coins was transferred that week.

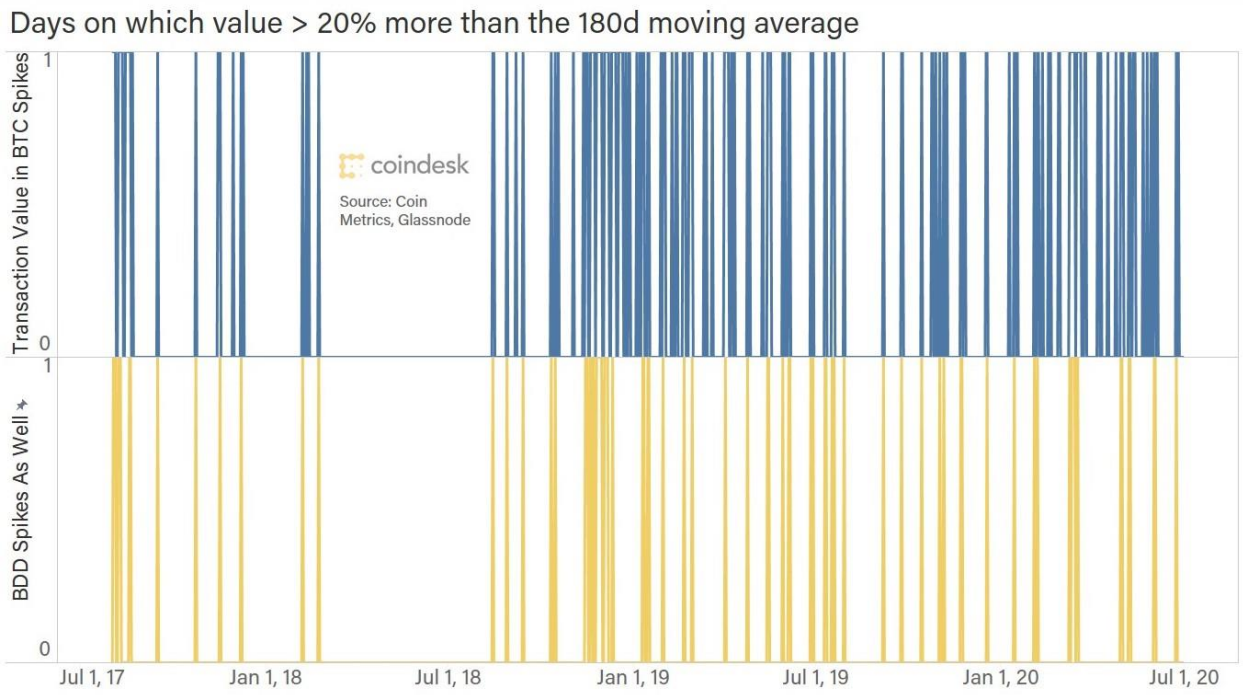
Transaction peaks

A spike in transaction activity could mean that a potential price breakout is building – or, it could mean that more dust (a high volume of tiny transactions) or wash trading (BTC sent back and forth between accounts to artificially boost volume) is clogging the system.

Comparing transaction peaks to CDD levels can help to detect what kind of transaction volume you're looking at.

Taking as the definition of "spike" the days on which a value exceeds 20% more than the 180-day moving average (this definition is subjective), we can see that the number of times a transaction spike coincided with a CDD spike was roughly the same as in the first half of 2019 (a count of 16 in 2019 vs 17 in 2020), but significantly higher than the first half of 2018 (a count of 2).

Some volume spikes can be explained by older coins moving



As we can see from the chart, the number of spikes (the number of transactions with a significant amount of old coins moving) has been decreasing over the past three years.

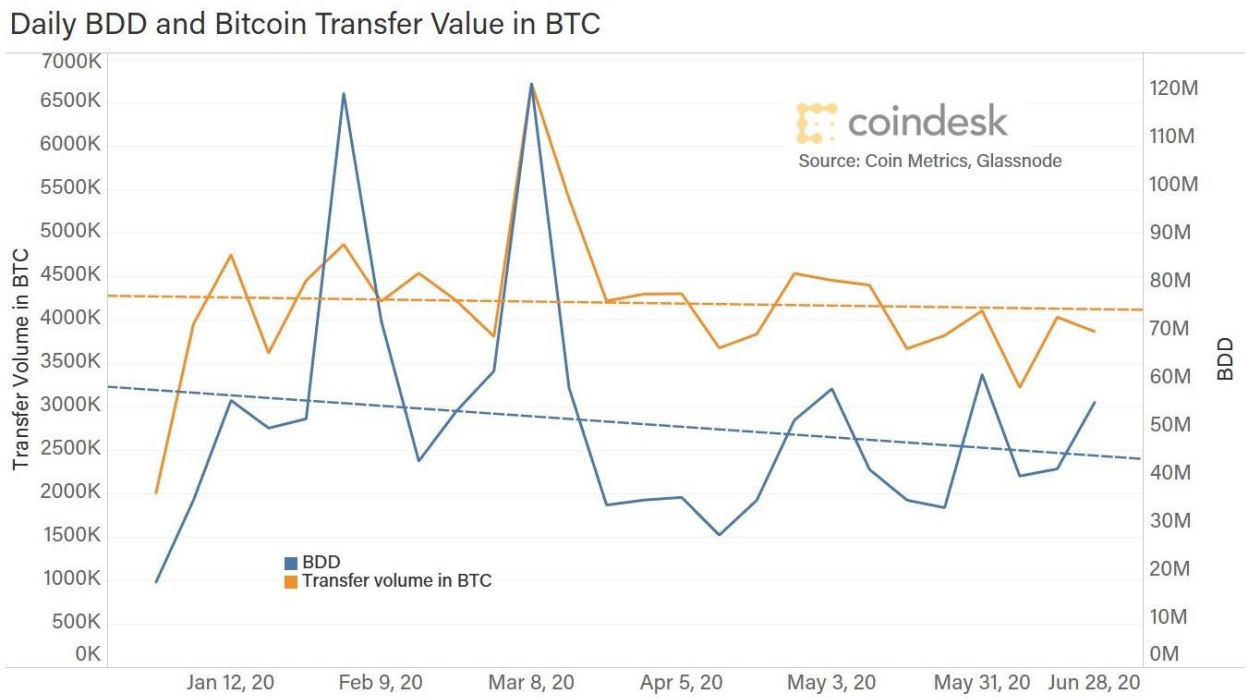
Old coins moving

If the CDD level spikes without a corresponding spike in transfer volume, that could be an indicator that old coins are moving, since old coins can account for a significant level of CDD without needing to have a high transaction volume.

HODL behavior

Trends in CDD levels can also be compared to trends in transaction levels to infer whether or not investors are holding on to coins more (HODL in industry jargon).

BDD value heading down while transfer volume levelling off



Since the beginning of 2020, BDD has been trending lower, while transaction value in BDD has been relatively stable, implying a greater tendency of investors to hold on to coins.

Similarly, growing transaction volumes without a corresponding growth in BDD levels would imply greater churn.

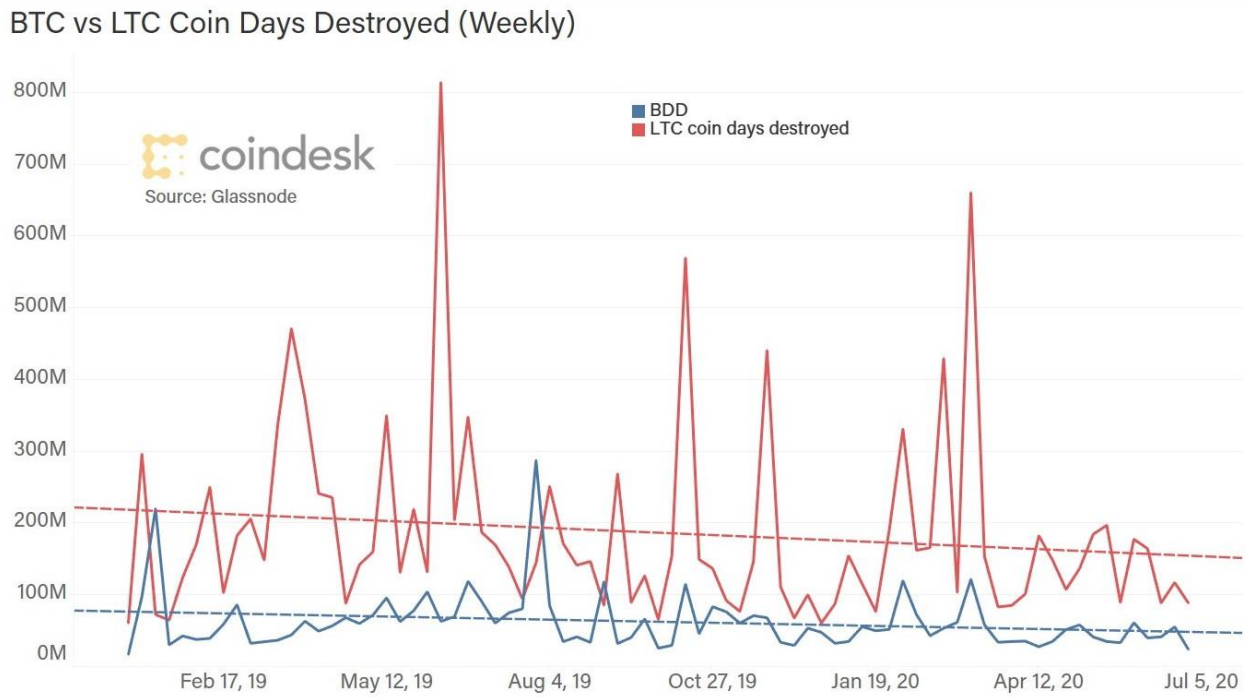
In this case, however, the gradient is gradual, however, so we cannot draw a concrete conclusion from the data.

Relative network strength

Coin days destroyed can also shed light on the relative strength of two different cryptocurrency ecosystems. A network with a lower CDD value implies a greater level of commitment from investors.

Compare, for instance, the CDD levels for bitcoin and litecoin.

Litecoin has higher churn than bitcoin



We can see that litecoin has significantly more "churn" than bitcoin. This is to be expected, though, since litecoin was created to be more of a transactional cryptocurrency than bitcoin, with shorter confirmation times and a higher supply limit.

WEAKNESSES

As with virtually all metrics, there are weaknesses in this interpretation.

- For instance, exchange operators hold large amounts of bitcoin. Every now and then they need to move cold wallet funds to upgrade their technology, or for other reasons.This movement can be misclassified as large holders cashing out, when it's actually a non-event.
- Exchange operators aren't the only ones that can distort the figure. An individual long-term investor may decide to upgrade his or her custody security and move BTC from one address to another. This shows up in the BDD calculation as meaningful economic activity, when it actually isn't.
- Also, a higher BDD *could* mean that bitcoin is increasingly being used as a store of value, as holdings on average could be getting older. Or, it could simply mean that there are more transactions of short-term holdings, which would imply the opposite.
- This calculation can only be applied to a limited range of cryptocurrencies that use the proof-of-work algorithm, which restricts its use as a sign of relative network health. Two often-used sources for the CDD metric are Glassnode and Blockchair. Glassnode only has this calculation for bitcoin, litecoin and bitcoin cash. Blockchair adds bitcoin SV, dogecoin, dash, groestlcoin and zcash.
- BDD will most likely become less useful in the future should transaction fees significantly increase in response to future halvings. To keep bitcoin miners incentivized, transaction fees will need to increase if the value of bitcoin has not materially done so. Should this happen, there will be less need for a measure that strips out transaction "noise," as this type of transfer will make less economic sense.

VARIATIONS

Adjusted CDD

First developed by Hans Hauge, an analyst at fund manager Ikigai, supply-adjusted CDD accounts for the impact of time.

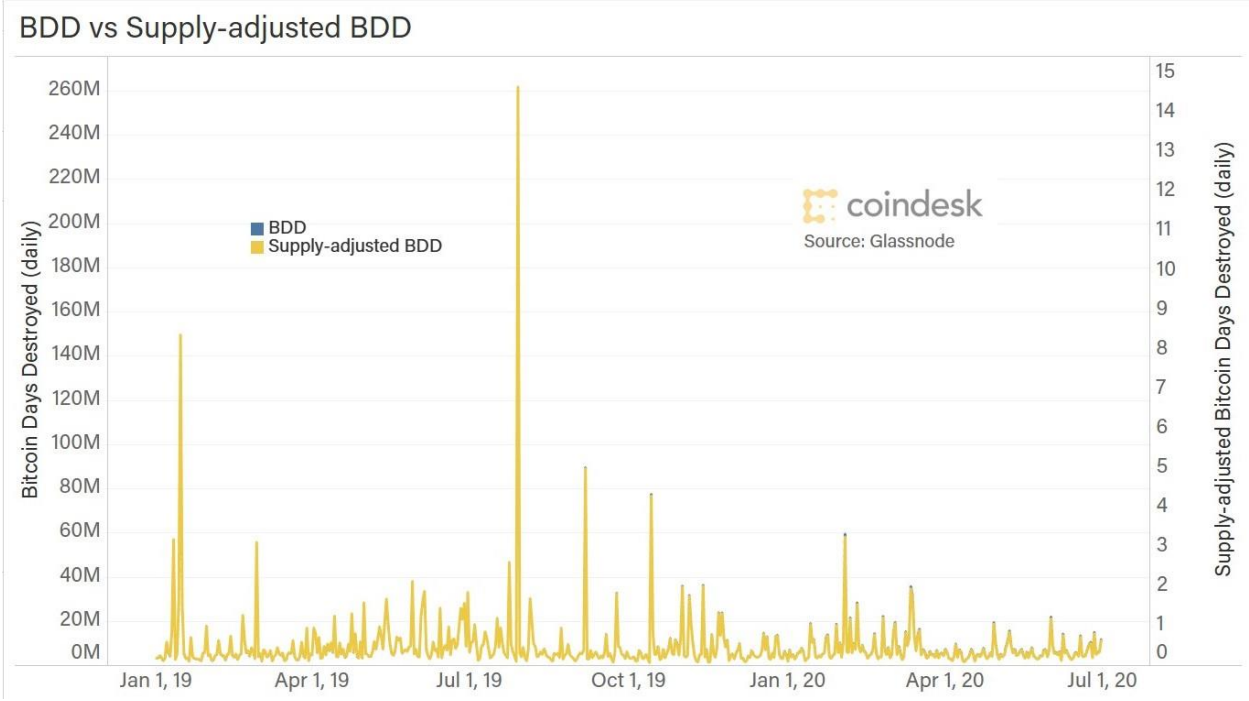
Bitcoin days accumulate over time, as new bitcoins are produced and as more medium- to long-term investors enter the network. Because of this, the total *potential* CDD increases over time.

To remove the direct impact of this supply-related trend on the measurement, you can divide the daily BDD value by the total amounts of BTC issued (circulating supply) on that day.

Adjusted CDD = CDD / Circulating Supply

In reality, the two measures differ little in other than scale. The graph below plots daily BDD and the supply-adjusted measure on two different axes, and overlays them.

Different scales, but indistinguishable

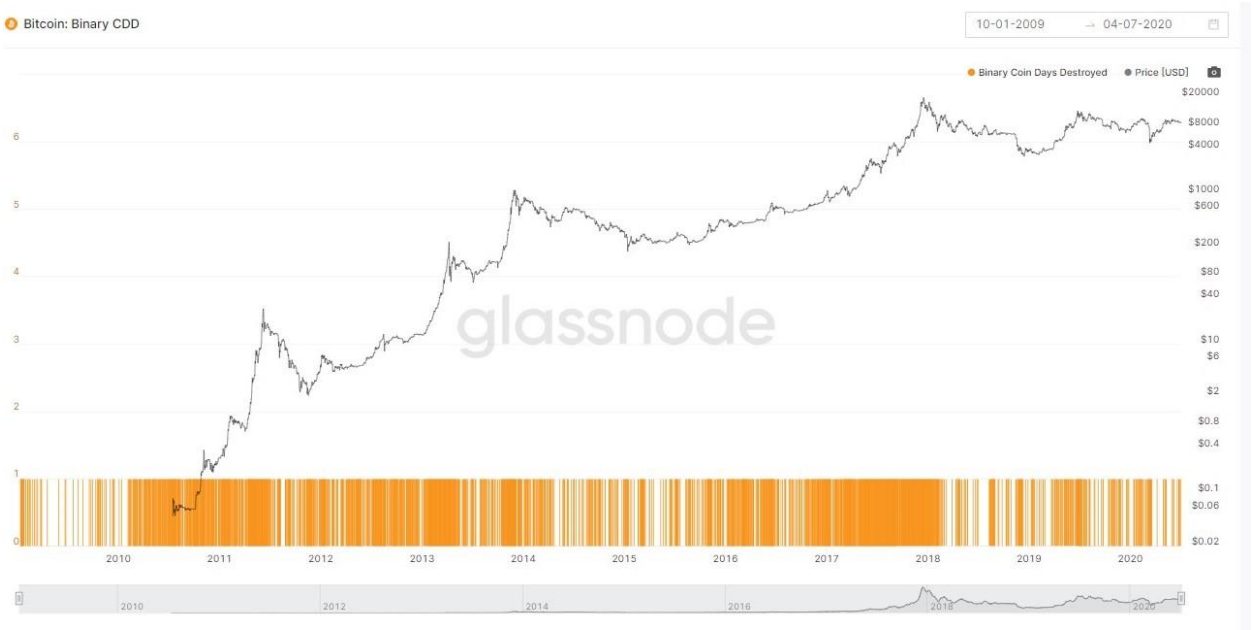


Binary CDD

Also developed by Hans Hauge, this technique can indicate whether or not a price drop could be imminent.

It asks whether each day's CDD level is above its historical average, and gives it a 1 if "yes," a 0 if "no."

Binary CDD shows concentrated movement periods



As the above chart from Glassnode shows, the "yes" days appear to concentrate before price dips. The correlation is weak, though, and should not be taken as a firm indicator.

Cumulative value-days destroyed

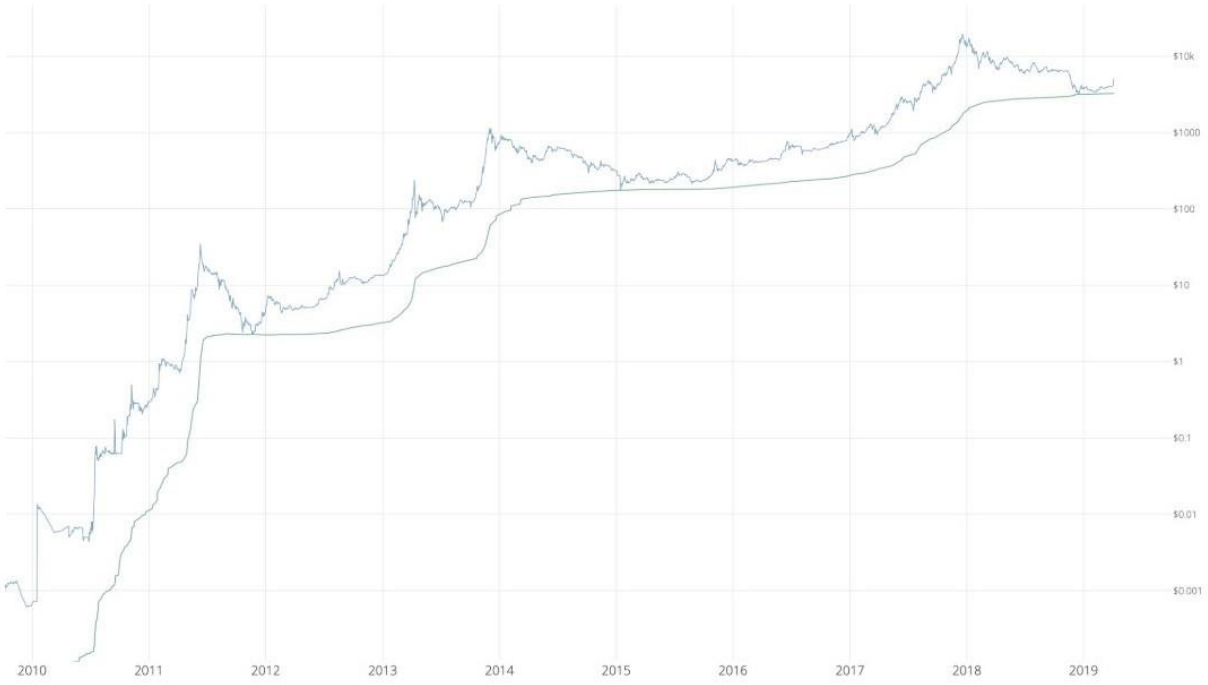
Developed by Willy Woo, cumulative value-days destroyed aims to predict market bottoms.

It takes the sum of bitcoin days destroyed multiplied by the price, and divides that amount by the number of days passed and a scaling factor of 6,000,000.

$$CVDD_{USD} = \frac{\sum(\textbf{coin days destroyed} \cdot price)}{days \cdot 6000000}$$

As the below chart from woobull.com shows, the metric does seem to identify market bottoms. However, different scaling factors could produce different results, and this should not be taken as a predictor.

Cumulative Value-Days Destroyed vs BTC price in USD



Source: woobull.com

CONCLUSION

Virtually all cryptocurrency metrics should be examined in context of network characteristics and related measures, since most only portray a small snapshot of activity. Coin Days Destroyed enhances more traditional measures of transaction volume by giving insight into the origin and significance of transfers.

Beyond that, they represent the intriguing and unique insights that examining onchain activity can lend to understanding investor behavior. Being able to see, in real time, all onchain cryptocurrency transfers and deduce the age of the coins that are moving is a level of information unique to the cryptocurrency asset group, and just one of the many aspects that make this such a fascinating area of study.

With this report, we hope to give investors a tool with which to further their understanding of the type of network activity they are seeing; as well as an appreciation for the detailed information available for blockchain-based assets. In future reports we will continue to explore the world of crypto asset metrics, with a view to furthering interpretation and insight.