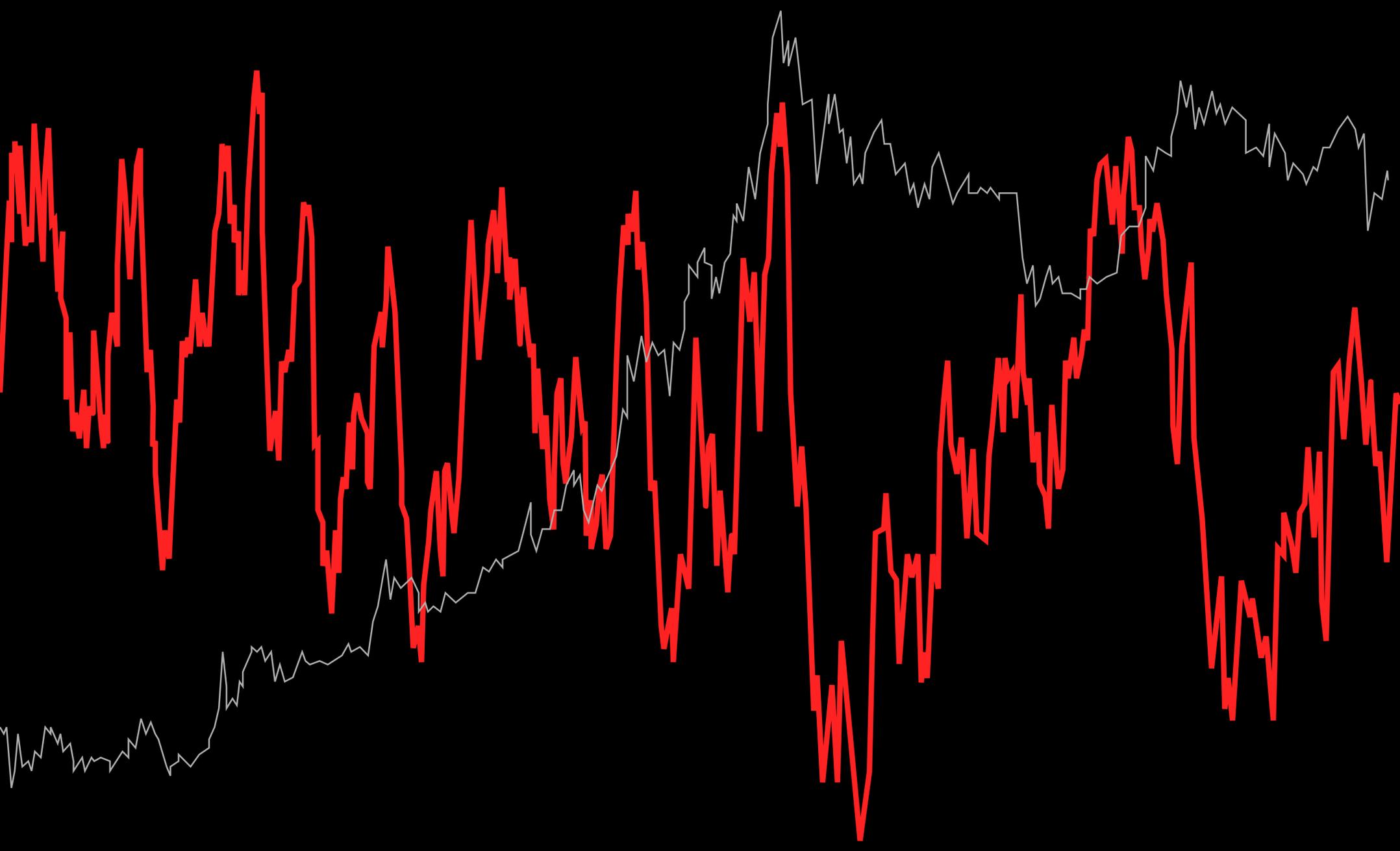


THE MARKET COMPASS

SPECIAL EDITION: INTRODUCING GNI

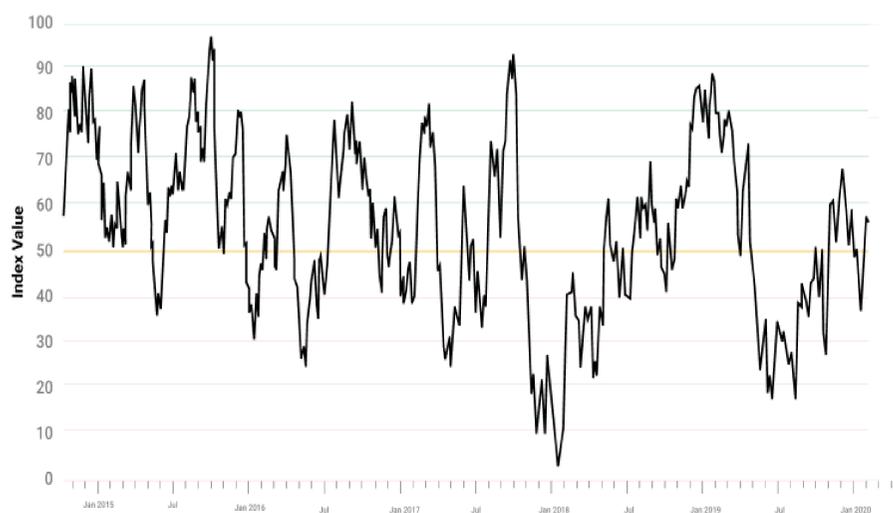
April 2020



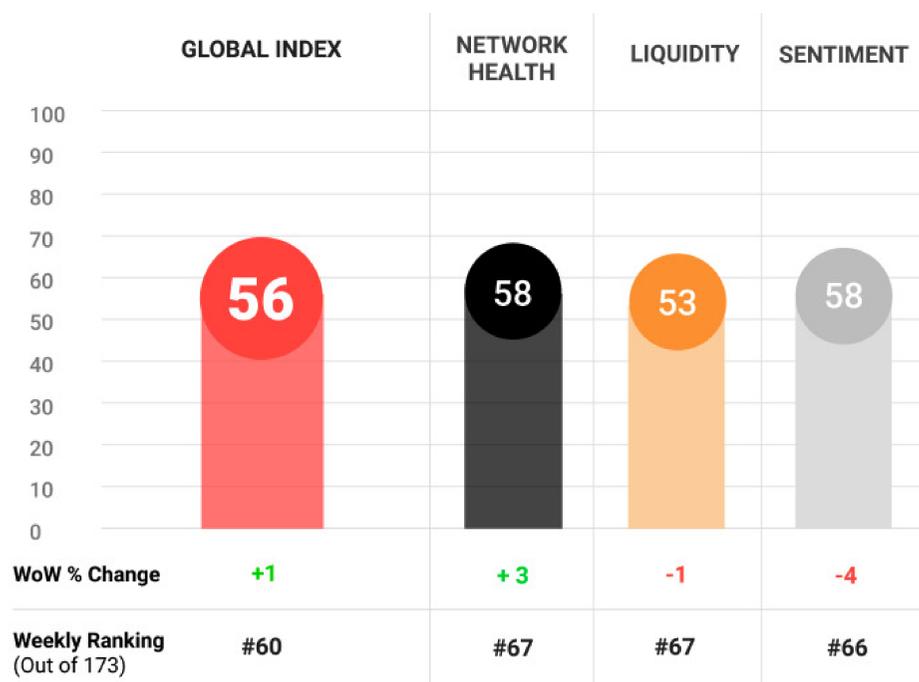
INTRODUCING A NEW **FUNDAMENTAL INDEX**

At Glassnode we are currently undertaking a significant research effort to study the interaction between price momentum and fundamental blockchain measurements. It has become abundantly clear that approaching on-chain data analysis in a systematic and coherent framework can significantly boost investment decisions. This becomes ever more important in today's choppy markets, thrown into turmoil by COVID-19. In this inaugural issue of The Market Compass, we will present to you *GNI*, an index that is built with fundamental on-chain metrics to describe the overall state of the blockchain. Our methodology and results will be laid out in this report in three main steps:

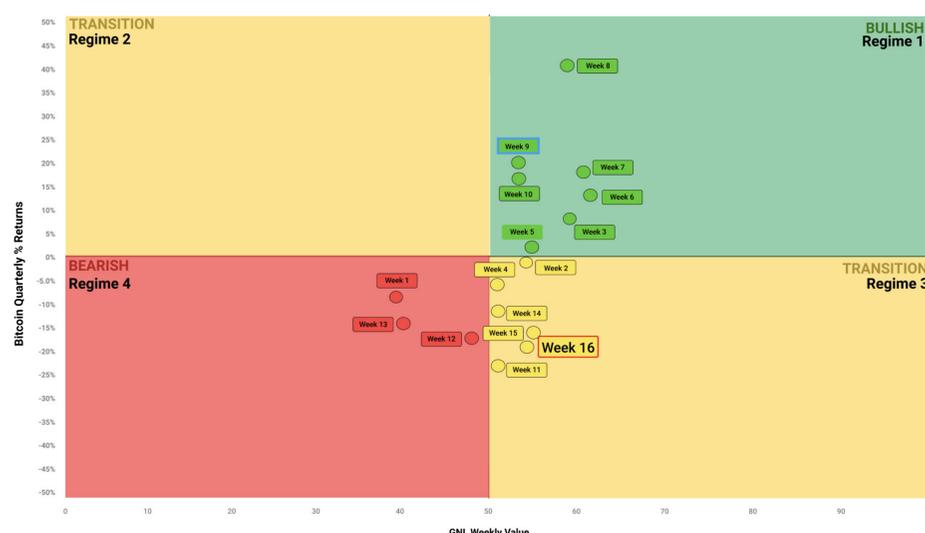
Glassnode On-Chain BTC Index



Index Score



GN Market Regimes



PART 1: THE **BIG PICTURE**

At Glassnode we have made it our mission to provide you with the most wide-ranging suite of on-chain data available. The more granular and varied the data we are able to offer, the better. But as the richness of the data increases rapidly, so do the accompanying evaluation challenges. Individual metrics can only ever deliver a fragmented view of individual aspects of the blockchain. What has been missing up until now is a measure of the global state of on-chain activity.

PART 2: ON-CHAIN INDEX: **A METHODOLOGY PRIMER**

Strong Bitcoin performance can only be decoupled from solid network fundamentals for so long. A sustained positive bull run must be reflected in strong on-chain fundamentals. On the flip side, as on-chain-fundamentals worsen, so too does the outlook for Bitcoin in the nearer term. *GNI* attempts to capture this dynamic by measuring, synthesizing and aggregating a plethora of blockchain fundamentals using scientifically rigorous quantitative techniques.

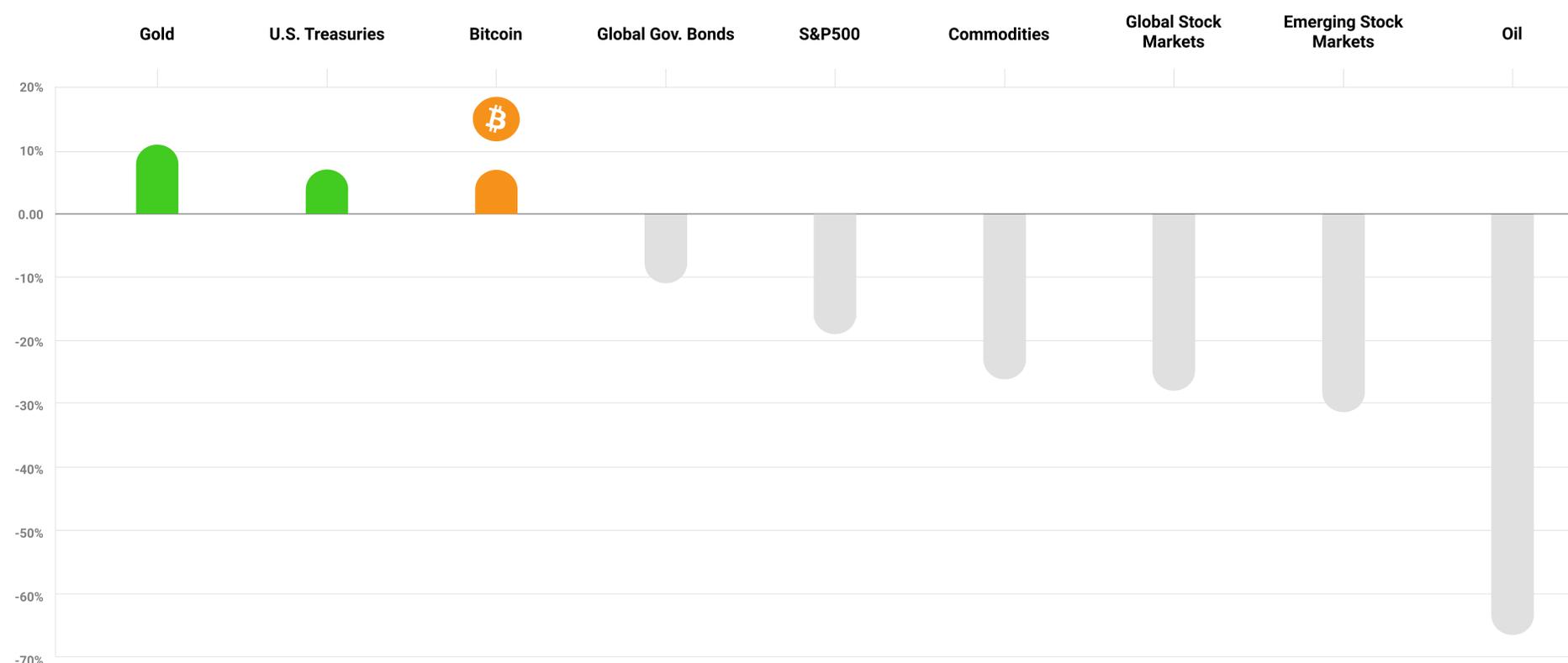
PART 3: THE **GN COMPASS**

GNI captures on-chain fundamentals, and these in turn anchor Bitcoin price expectations. But we also know that bitcoin is a trending asset: for prolonged periods the price trend can deviate and overshadow fundamentals. Analysing on-chain fundamentals can thus only get us so far. By combining both price momentum and *GNI* we gain a more complete insight into Bitcoin's current trading regime.

PART 1: THE BIG PICTURE

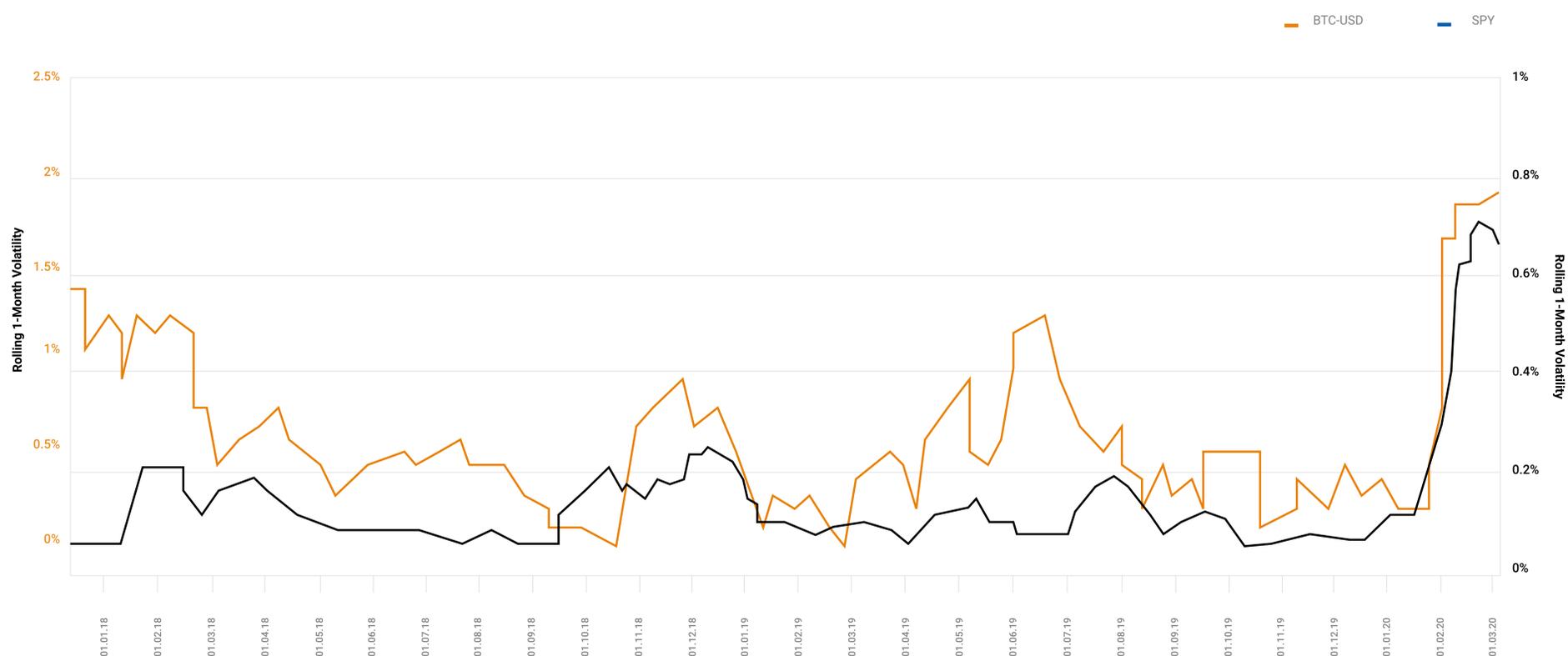
We won't soon forget March 2020. At the time of writing, an estimated 1.7bn people (or 20% of the world's population) have been ordered to stay at home as governments around the globe are taking ever more extreme measures to protect their populations from COVID-19. The public health emergency has led to an economic and financial markets emergency. Asset prices the world over crashed: equities fell by over 25% in mid-March before rallying towards the end of the month, commodities and credit tanked; at one point buying a barrel of oil was actually cheaper than buying just the barrel itself! And for a short while - with investors frantically covering margin calls - even sovereign bonds and the gold price fell.

YTD % Change



And what about Bitcoin? Bitcoin was not insulated from the global turmoil. Having experienced a solid bull run in January and February, Bitcoin dropped by -26% in March, bringing the performance down to -11% for the year, before rebounding in early April. The 2-day drop Bitcoin recorded on March 12-13 was the largest such drop for seven years, back when Bitcoin markets were nothing like as mature as they are today. Bitcoin has since rebounded from its mid-March low and for the year crypto remains the third-best performing major asset class of 2020, behind only Gold and US Treasuries.

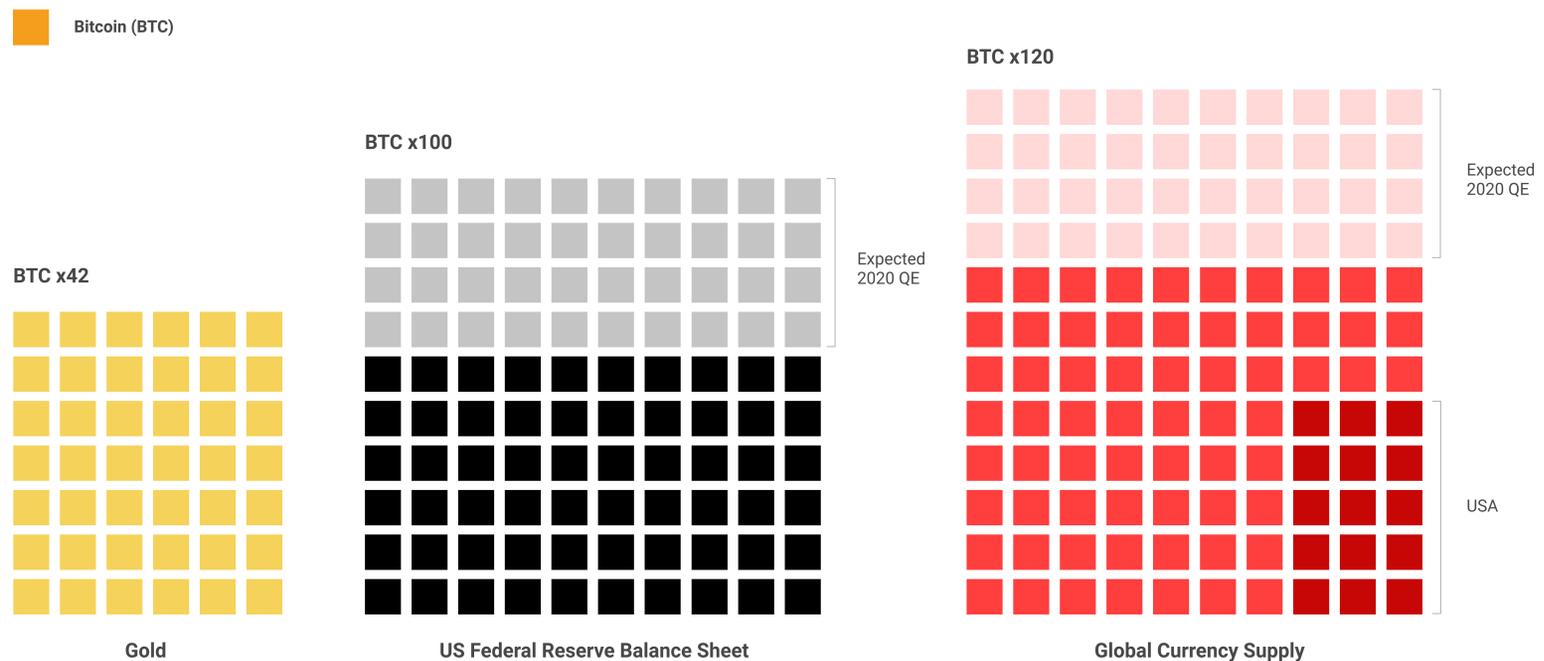
Rolling 1-Month Volatility of BTC & SPY



DAVID VS. GOLIATH

The long-term case for Bitcoin was powerful prior to COVID-19 and if anything the current pandemic has bolstered it further. Take the actions of the US central bank, the Federal Reserve. In March alone, to avoid the total rupture of the financial markets' basic plumbing, it slashed its target interest rate to 0 and embarked upon a bond buying scheme of truly staggering proportions. De facto, the Fed now acts as the ultimate buyer of last resort not only for US Treasuries and mortgage backed securities but also for wider corporate credit, a market of over 40tn USD in size (that's 12 zeroes if you're counting...). Its unlimited quantitative easing and emergency liquidity provision could see the Fed's balance sheet double in 2020 alone, from 5tn to 10tn USD.

The Relative Bitcoin Market Size



Politicians have got in on the action too. The US congress ratified a 2tn USD stimulus deal to boost economic activity and we record similar programs across the globe.

And the upshot of all of this? On the one side we are faced with the largest supply shock for over a century (US Q2 GDP growth is predicted to drop by upwards of -20%). On the other side we're seeing an unprecedented expansion of the monetary base. Well, hello, Inflation anyone? Fortunately, for the strategic Bitcoin investor few scenarios are more preferable to a world characterized by increased inflationary pressure. The Bitcoin markets seem to tentatively agree with our interpretation: save for the aforementioned days in mid-March Bitcoin has behaved a lot more like gold than like a risk-on asset in the current downturn; Bitcoin-Gold correlation is now actually close to an all-time high.

Rolling 1 Year Correlation of Bitcoin & Gold



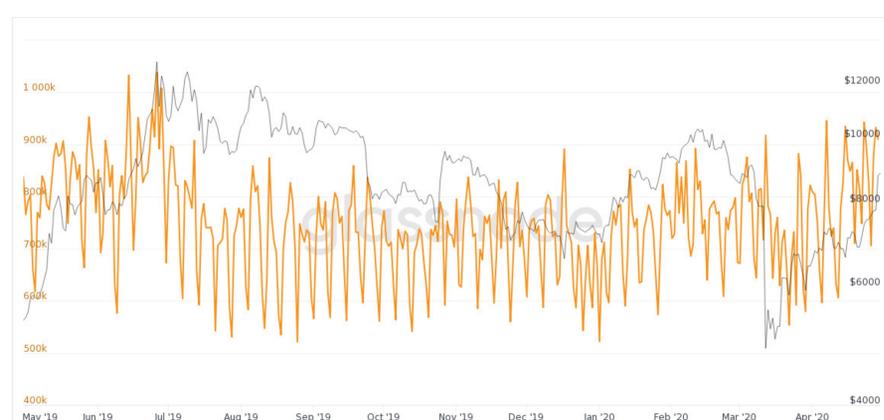
THE POWER OF ON-CHAIN DATA

In the long-term the case for Bitcoin is crystal clear. Nevertheless, Bitcoin remains a risky investment in the medium term: its annualized 1-month volatility exploded to 191% in March. And for over a year now the Bitcoin markets have been choppy. For the moment at least, gone are the days of the great bull run of 2017/18. In sideways-trending, volatile markets vigilantly monitoring your investments becomes increasingly important. Investors in traditional asset classes are restricted to analyzing price and economic data (with the occasional alternative dataset thrown into the mix). We as Bitcoin investors, in contrast, have a significant advantage: we can study events and investor behaviour on the blockchain directly, thereby enriching our information set and providing an important valuation tool for our tactical decision making.

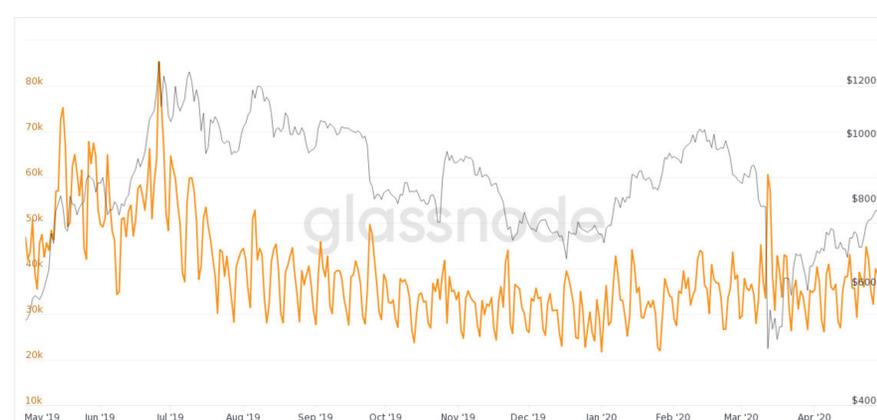
On-chain data can reflect investor sentiment well before the market does. At Glassnode we have made it our mission to provide you with the most wide-ranging suite of on-chain data available. Applying our proprietary clustering algorithms with advanced data science techniques we strive to fully unlock the potential of fundamental on-chain metrics. As of April 2020, our api gives you access to more than 150 separate on-chain metrics (and growing), covering everything from simple UTXO counts to statistically sophisticated coin age analyses for BTC, ETH, LTC and more. See below for a selection of on-chain metrics available via Glassnode Studio.

Glassnode Studio

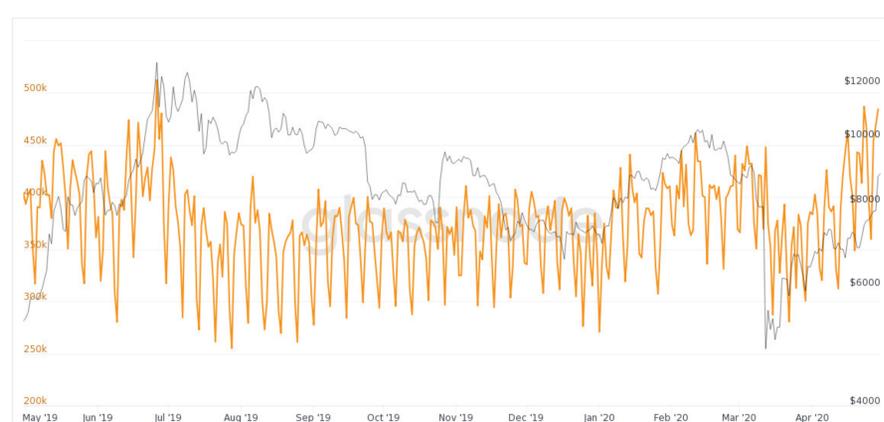
Active Addresses



Exchange Deposits



New Addresses



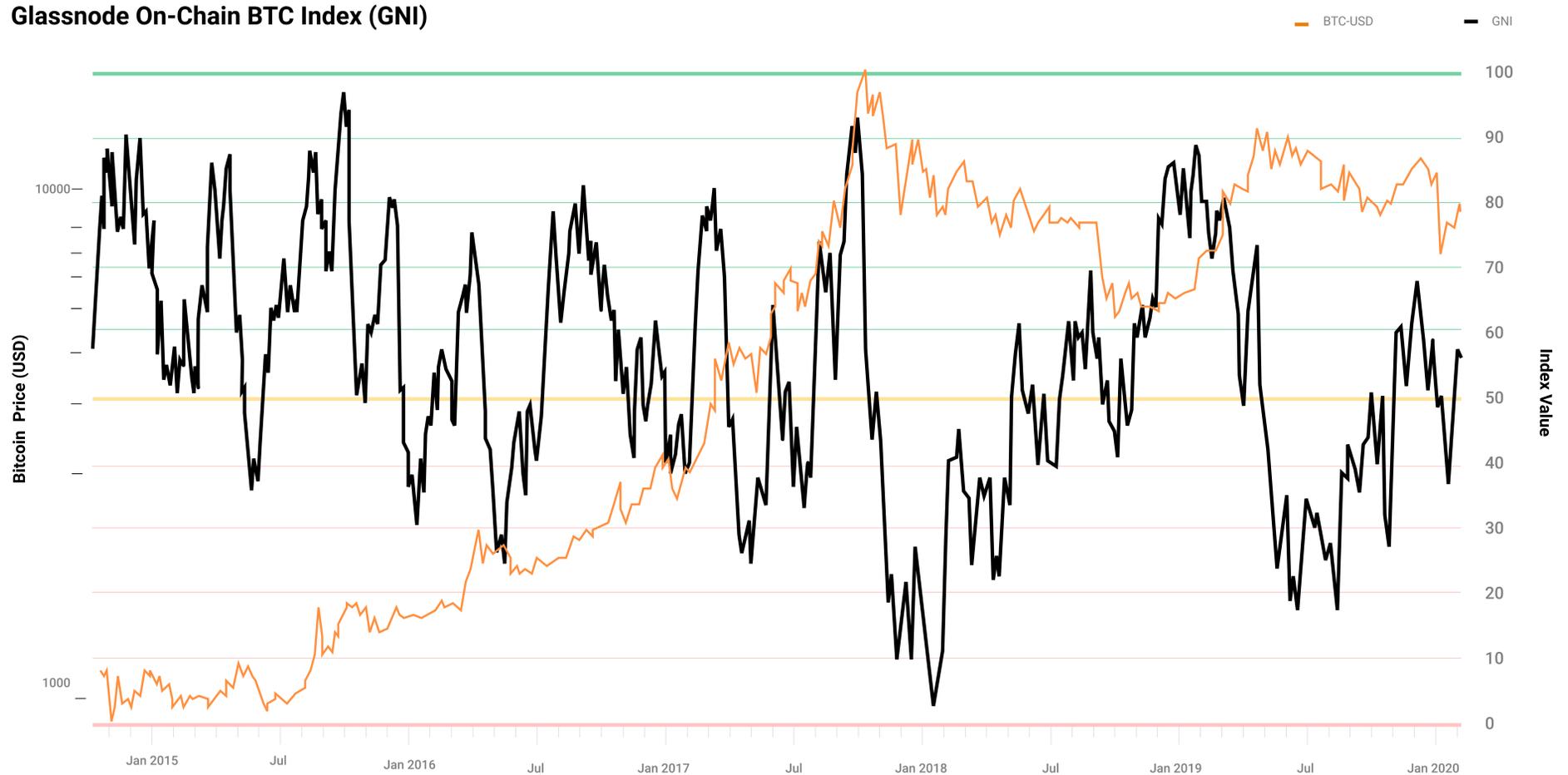
Exchange Balance



THE NEED FOR A GLOBAL VIEW

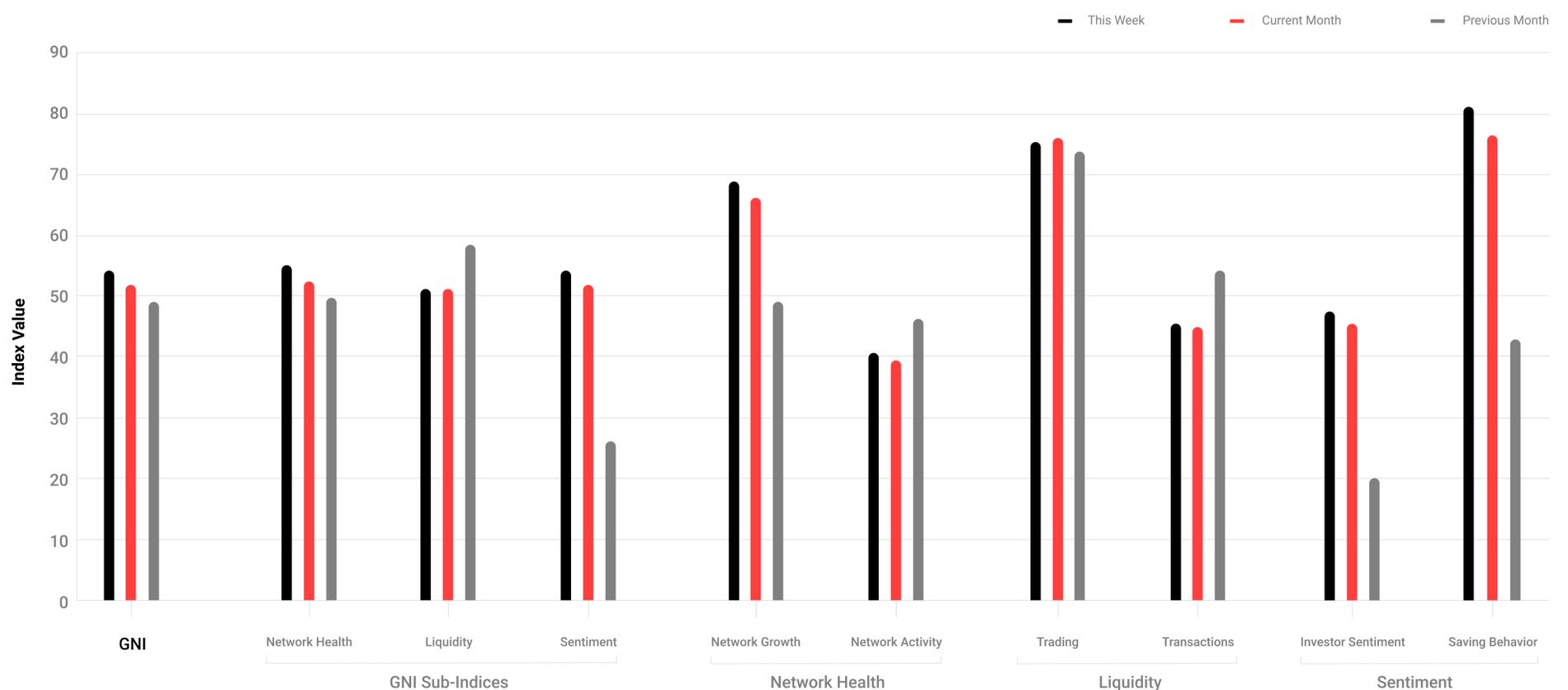
The more granular and varied the data we are able to offer, the better. But as the richness of the data increases rapidly, so do the accompanying evaluation challenges. Individual metrics can only ever deliver a fragmented view of individual aspects of on-chain activity. What has been missing up until now is a measure of the global state of blockchain. Alas, no longer: we've been hard at work in our R&D labs and are now able to launch the Glassnode On-Chain BTC Index (*GNI*), our brand-new measure of the state of the Bitcoin universe. By analyzing and synthesizing diverse strands of on-chain data and measuring medium-term trends across different categories the *GNI* yields insights not only into the current state of the blockchain but also acts as a useful signpost as to where Bitcoin may evolve, neatly summarized into a single, comprehensive number.

Glassnode On-Chain BTC Index (GNI)



To accompany the index, we will launch a regular performance report, in which we will highlight recent on-chain developments through the prism of the *GNI*, discuss their relevance to our wider Bitcoin market outlook and show how you can incorporate the index into your own investment process. In this inaugural issue we will focus on giving a brief sketch of the *GNI* methodology.

Glassnode Fundamental Index Values



PART 2:

ON-CHAIN INDEX: A METHODOLOGY PRIMER

Strong Bitcoin performance can only be decoupled from solid network fundamentals for so long. A sustained positive bull run must be reflected in strong on-chain fundamentals. On the flip side, as on-chain-fundamentals worsen, so too does the outlook for Bitcoin in the nearer term. *GNI* attempts to capture this dynamic by measuring, synthesizing and aggregating a plethora of blockchain fundamentals using scientifically rigorous quantitative techniques.

The index construction incorporates **3 MAIN STEPS:**

(For readers not interested in the nitty-gritty of index construction, skip directly to the Bottomline.)

STEP 1 Metric Selection

The heart and soul of any index lies in the information it processes. The primary goal of the *GNI* is to get an accurate impression of the state of the Bitcoin network as a whole. This information in turn is a critical factor in assessing Bitcoin's attractiveness as a tactical investment opportunity. We carefully select 19 metrics that capture the breadth of available on-chain data. They range from simple measures such as the transaction rate to more complex ones such as short-term holder MVRV.

STEP 2 Metric Clustering

In line with the *GNI*'s main purpose as a tool for analysis rather than a mere predictor, we assign each metric to individual categories and then cluster the categories into a set of sub-indices, each of which captures different conceptual parts of the blockchain ecosystem. By combining fundamental economic principles with our on-chain expertise, we identify the following set of sub-indices:

● Network Health

Network Health is the subindex that acts as a straight-forward measure for the health and size of the current Bitcoin ecosystem. Is it growing or shrinking? How active are its users? Are they trading cautiously or without fear? The answers are captured by the metric clusters *Network Activity* and *Network Growth*.

● Liquidity

Liquidity is one of the fundamental price driving properties of any commodity. How easy it is to exchange your Bitcoin into the object of your choice, be it USD, Ethereum, Stablecoins, or your preferred altcoin. To arrive at a broad-based measure of Bitcoin's liquidity, we propose two different categories. Firstly, *Transaction Liquidity*, a proxy for the overall supply and demand mechanics of Bitcoin, which contains metrics such as Entity Adjusted Transaction Volume and Transaction Count. Secondly, we capture how easy it is to exchange bitcoin for other currencies in the category *Trading Liquidity*, which measures among others the supply of stablecoins and the transaction flows to and from exchanges.

● Sentiment

Sentiment is another, if not the, key factor driving the price of any good. Ultimately, Bitcoin's value is what people are willing to pay, either directly, via actual transactions or indirectly via the opportunity cost of not transacting. We therefore apply valuation measures for potential and actual profits, such as the MVRV and SOPR, and combine them under *Investor Sentiment*. We also make use of one of the blockchain's fundamental features -- the ability to track the age of each traded coin -- to understand *Saving Behaviour* within the network. Are long-term holders selling their old coins or accumulating for the next bull-run?

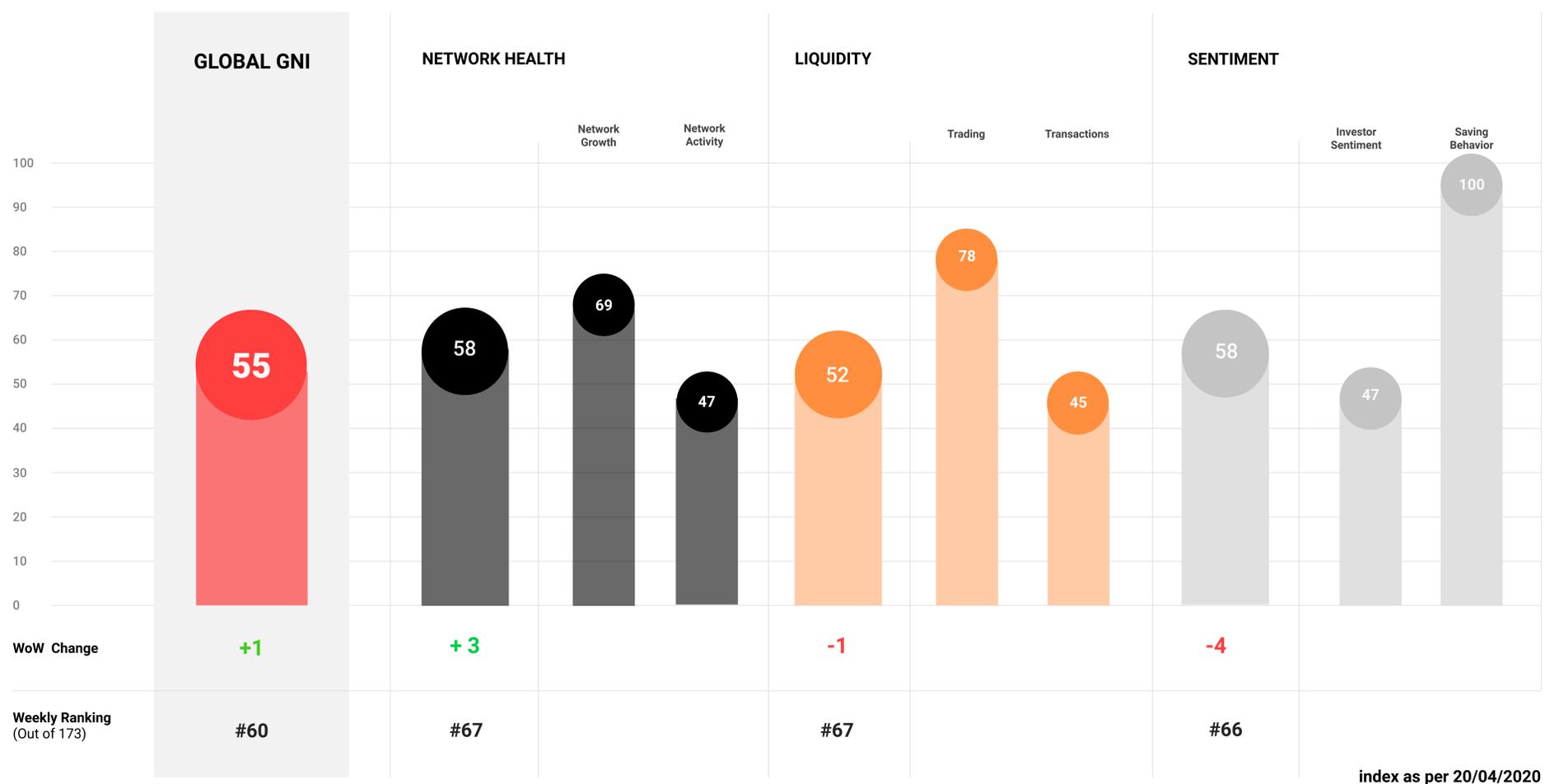
STEP 3 Index Calculation

Each metric undergoes a rigorous, custom preprocessing step, reducing noise and extracting the information we are actually interested in. We subsequently apply different filtering methods to assess the metric's current level and medium-term trend and map the result into a range of 0 to 100; the stronger the fundamental, the higher the value. After carefully weighing the individual signals, we then combine them into the categories and sub-indices discussed above, and finally merge them into the *GNI*.

Bottom Line

GNI hierarchically combines and synthesizes a multitude of different on-chain metrics: first into conceptual categories, then sub-indices and ultimately the final index. This methodology guarantees a balanced evaluation of different aspects of the available on-chain data and yields a single number between 0 and 100 which describes the overall state of the blockchain network. Each construction step incorporates rigorous statistical processing to ensure the maximum information content is maintained.

GNI & Sub-Indices Weekly Values

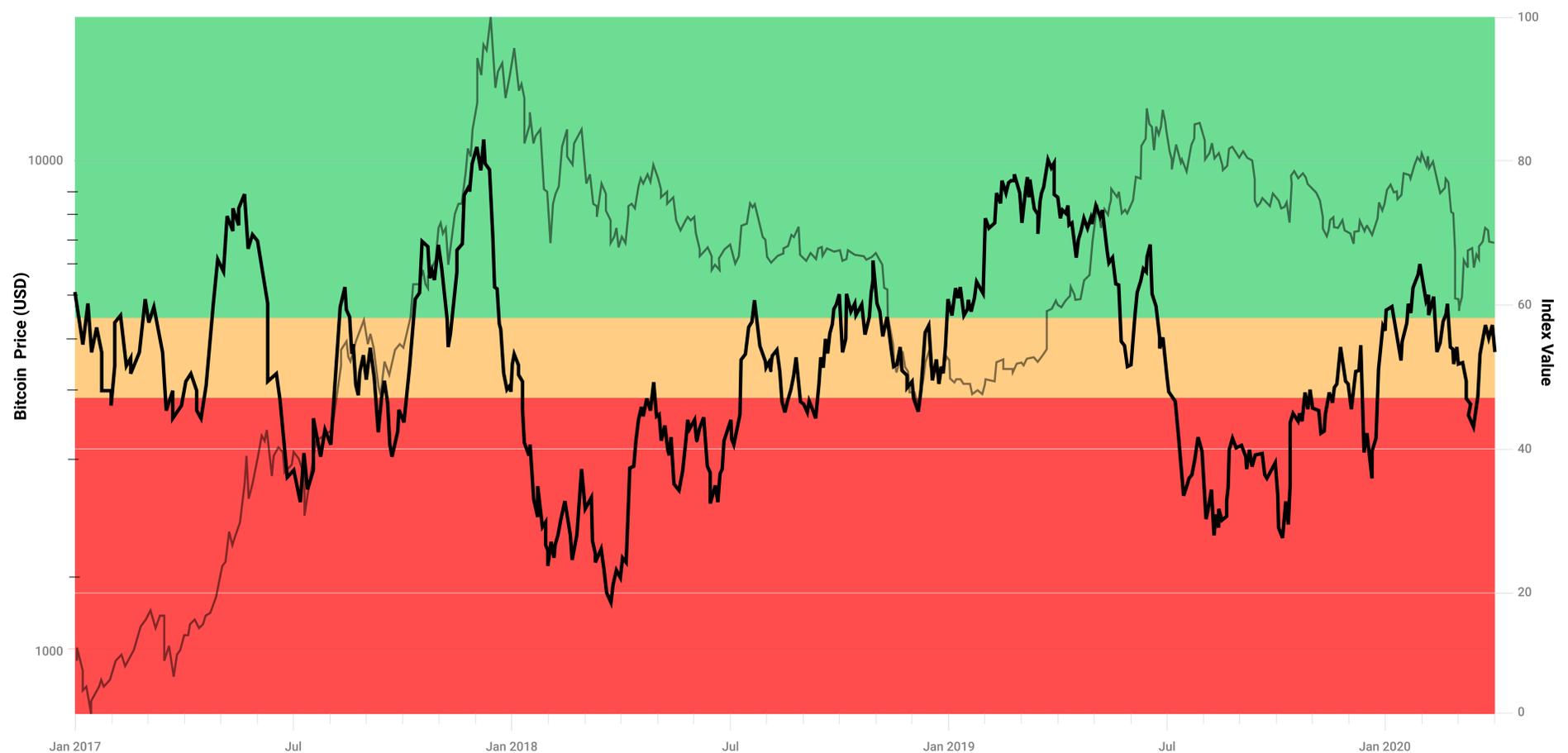


THE THREE REGIONS

High *GNI* implies solid Bitcoin fundamentals. But when is *GNI* high? And vice-versa, when should we consider it to be low? By construction the *GNI* is a continuous measure, but it is more straightforwardly assessed by identifying 3 distinct regions. The chart below depicts the historical evolution of the *GNI* and maps these 3 regions.

On average, *GNI* hovers around 50. In this region (highlighted in yellow), on chain fundamentals are, from a tactical perspective, neither particularly attractive nor particularly unattractive. Trends aren't particularly strong and metric readings are in line with their medium term averages: in other words, the blockchain is not sending off strong signals either way. *GNI* reaches higher levels only once the fundamentals become extraordinarily strong across categories and sub-indices (green area). When *GNI* is in this region, the on-chain fundamentals are strongly bullish. In contrast, if *GNI* drops to around 40 and below, from an on-chain perspective, it means that the Bitcoin ecosystem is experiencing substantial turmoil and blockchain data is sending out bearish signals.

Glassnode On-Chain BTC Index (GNI)



All things, good and bad, come to an end and we want to invest proactively rather than reactively. The yellow area allows us to detect the all important trend changes. *GNI* dropping from strong to neutral indicates a worsening of on-chain fundamentals and should raise warning flags, whereas a turn from weak fundamentals indicates an on-chain recovery and that the general environment has improved materially.

GNI Region Breakdown

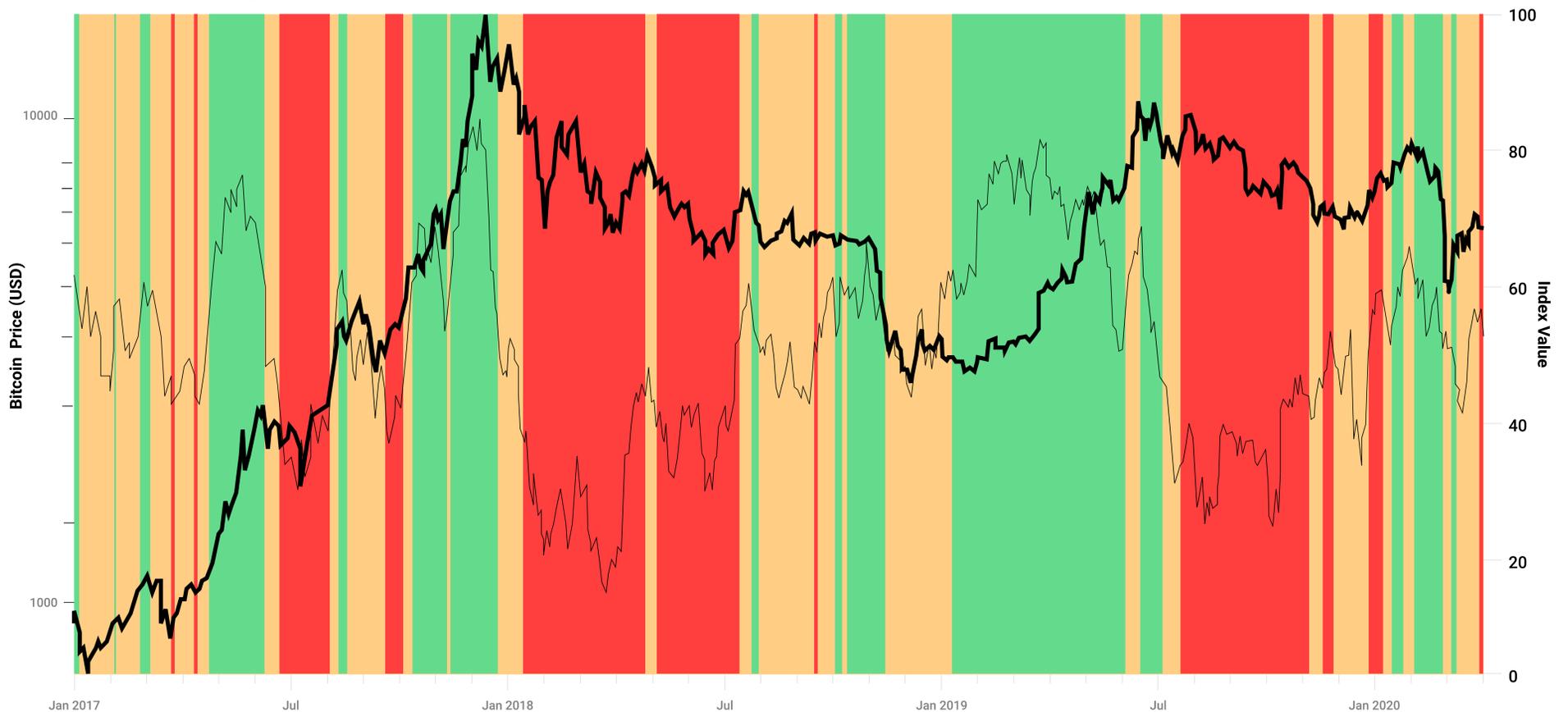
	Current Value	Last Week	Last Month	Year to Date	Current Region
GNI Index	55	51	50	35	Neutral
		9.70%	11.63%	58.68%	
Network Health	58	50	50	25	Neutral
		13.59%	12.63%	131.28%	
Network Growth	69	62	53	26	Strong
		13.29%	34.29%	176.28%	
Network Activity	47	38	48	24	Weak
		14.09%	-11.01%	82.04%	
Liquidity	52	52	61	40	Neutral
		2.26%	-11.44%	35.58%	
Trading	78	79	75	45	Strong
		-2.38%	2.71%	71.53%	
Transactions	45	44	56	38	Weak
		5.05%	-17.78%	21.36%	
Sentiment	58	48	26	48	Neutral
		17.89%	113.55%	16.48%	
Investor Sentiment	47	42	22	36	Neutral
		17.04%	122.64%	39.01%	
Saving Behavior	100	70	43	100	Strong
		42.85%	132.55%	0%	

GNI AND BITCOIN PRICE

GNI describes the overall state of the blockchain and does not explicitly predict Bitcoin price performance. But on-chain health and Bitcoin returns are intrinsically linked concepts and cannot diverge indefinitely. Do we see this link in the data?

The chart below plots the price evolution of Bitcoin (logarithmic price) over the different GNI regions. We can easily identify that high GNI tends to coincide with periods of strong, sustained bull runs and low GNI with bear markets. Likewise, periods of strong GNI and weak Bitcoin performance and vice-versa are unstable and unsustainable. The end-of- 2018 Bitcoin sell-off for example registered only weakly on GNI: the on-chain fundamentals throughout this period remained relatively strong. Alas, Bitcoin performance picked up again soon thereafter. This sell-off was not driven by weakening fundamentals but proved to be a short-term market over-correction.

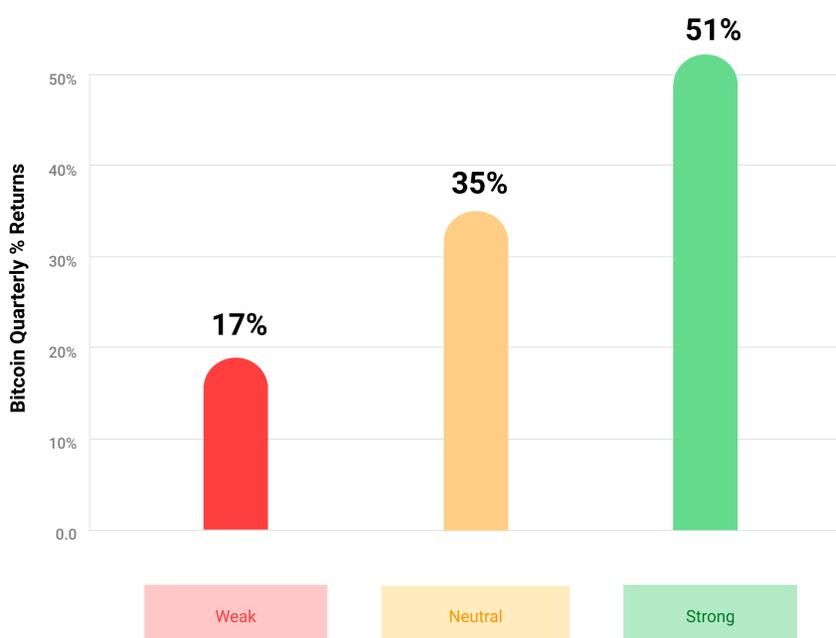
BTC Price per GNI Region



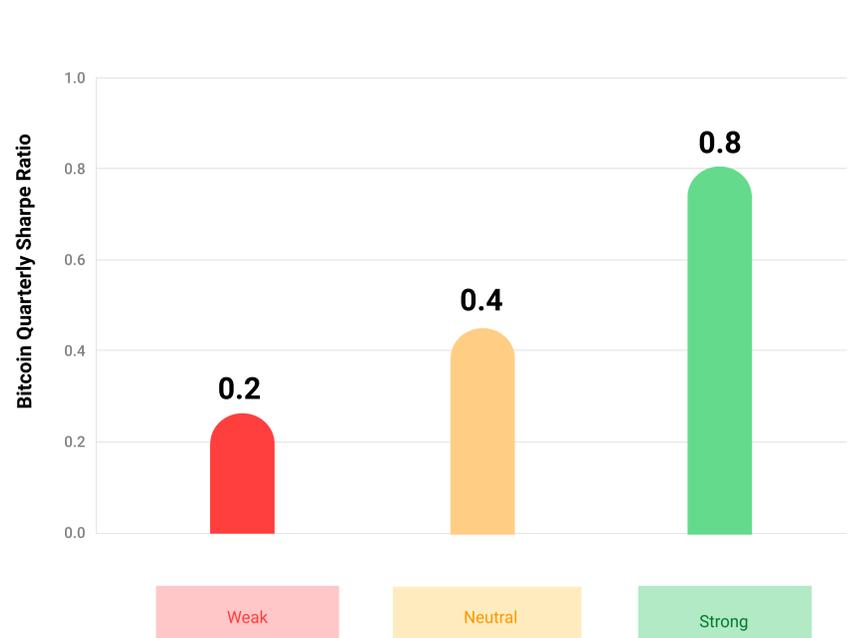
Historically strong on-chain fundamentals coincide with good Bitcoin performance and vice-versa. But do the GNI regions also predict average Bitcoin returns? In the chart below, on the left-hand side, we cluster all dates into their specific GNI region, calculate the subsequent 3-month Bitcoin returns for every date, then average over dates. On the right we adjust these average returns for their within cluster volatility. Each bar thus shows the Bitcoin Sharpe Ratio (the return per unit of risk) for a specific GNI region.

We see clearly that a weak GNI predicts poor average quarterly Bitcoin returns, while strong GNI readings imply high average returns. Once we adjust for risk, the contrast becomes even more pronounced. Returns in region 2 are quite high but also significantly more volatile, reducing their Sharpe Ratio accordingly.

GNI Region Returns (Quarterly)

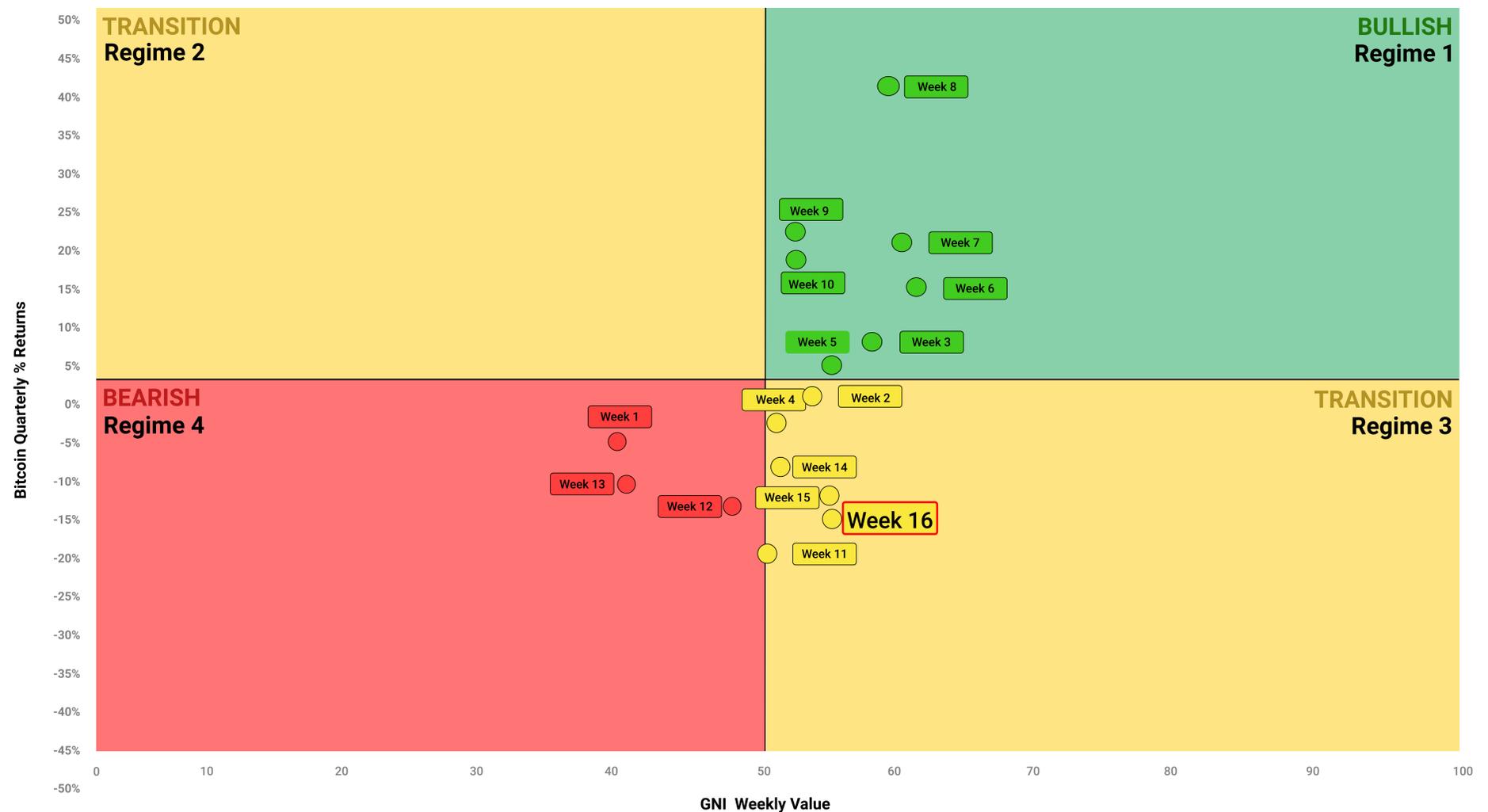


GNI Region Sharpe (Quarterly)



PART 3: THE GN COMPASS

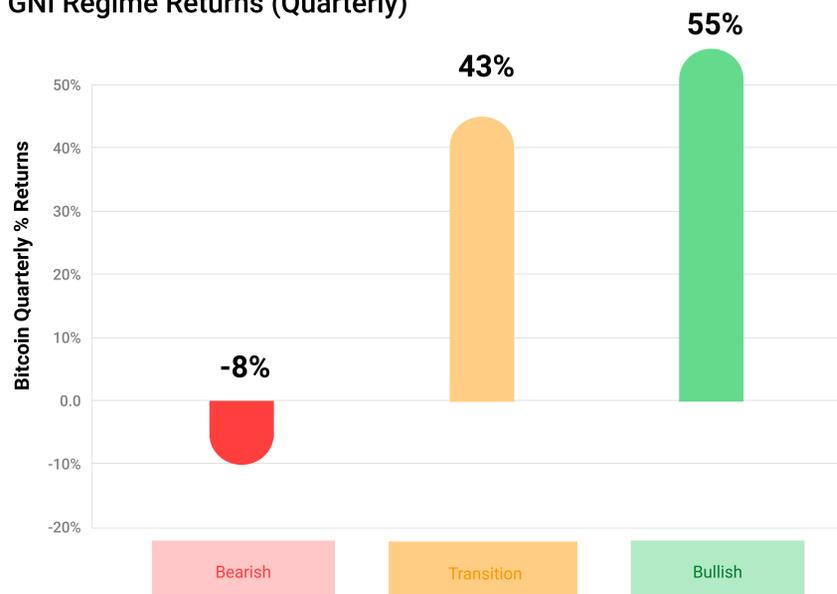
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The *GN Compass* identifies 4 distinct Bitcoin environments. Along the x-axis we measure the state of the blockchain fundamentals, as calculated by *GNI*. On the y-axis we measure current Bitcoin momentum (defined as the lagged 3-Month Bitcoin performance). **Regime 4** describes an environment where both price and fundamentals are trending downwards, and marks a state of medium-term bearishness. **Regime 1** is characterized by strong positive price trends and is backed by strong fundamentals i.e. it is the quintessential bull market. **Regimes 2 and 3** meanwhile are unstable: on-chain fundamentals and price trends are divergent, a state that cannot go on for long.

We can show the power of the *GN Compass* empirically. The chart below repeats the analysis from the previous section but now applied to the 4 regimes, where for simplicity we report the data for the unstable regimes 2 and 3 jointly. The results are even more pronounced than before: average Bitcoin quarterly returns in regime 4 are negative as they should and regime 1 returns on average more than 50%! Meanwhile the unstable regimes 2 and 3 are characterized by a significant return dispersion. The same story holds true when looking at risk adjusted returns, but with an even clearer distinction between the unstable regimes 2 and 3 and regime 1.

GNI Regime Returns (Quarterly)



GNI Regime Sharpe (Quarterly)



THE MARKET COMPASS **CONCEPT**

At Glassnode we are undertaking a significant research effort to further explore the interaction between price momentum and *GNI*. A richer understanding of their co-dependence leads to superior investment decisions. *GNI* can help us distinguish short-term price corrections from long-term bear markets, while its subindices enable us to delve deeper into specific questions such as 'how does liquidity, a critically important measure in financial theory, impact Bitcoin price development?'. The *GN Compass* with its distinct regimes, on the other hand, can prove invaluable to predict market stability and indicate looming market shifts.

It is evident that approaching on-chain data analysis in a systematic and coherent framework can significantly boost investment decisions, particularly in today's choppy markets. We look forward to picking up on these themes in our next edition of The Market Compass.

The Market Compass is the result of a collaboration between Glassnode and Swissblock Technologies. Please direct questions and suggestions to contact@glassnode.com.

Disclaimer: This report does not provide any investment advice. All data is provided for information purposes only. No investment decision shall be based on the information provided here and you are solely responsible for your own investment decisions.