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1 Key Takeaways

- The Bitcoin Halving is a landmark event in the crypto calendar and describes the 50% reduction in new Bitcoin issuance that occurs roughly every four years. Given that Bitcoin is a fixed-supply asset with a maximum supply of 21M, the halving of new issuance is seen as a major monetary event and has a number of implications.

- Bitcoin follows a fixed issuance schedule, and part of its attraction is its predetermined monetary policy. A fixed amount of Bitcoin is distributed every year to successful miners per successfully validated block. This is called a block reward and represents the incentive to secure and validate the Bitcoin blockchain (i.e., mine). Every 210,000 blocks, the block reward is halved, i.e., the Halving.

- While Bitcoin has continued to rise in price since the inaugural Halving, there is more to the story. Each Halving has been historically different. The Halving is itself not the primary catalyst for Bitcoin outperformance; other macroeconomic and crypto-native factors are key too.

- Hashrate is a key security metric for the Bitcoin blockchain and describes the total computational power being provided to secure the network. The Halving directly halves the majority of most miners' revenue, which may have a significant impact on smaller miners, potentially impacting Bitcoin's hashrate. However, data shows that this move is historically temporary, and over 70% of Bitcoin's hashrate has been introduced through the crypto winter of 2022, when the price of Bitcoin was much lower.

- The Halving tends to have a "survival-of-the-fittest" effect on the Bitcoin mining industry, which is likely to see a level of M&A and consolidation as smaller firms potentially struggle with lower revenues. Many will seek to find diversified sources of revenue, while others will seek to diversify geographically.

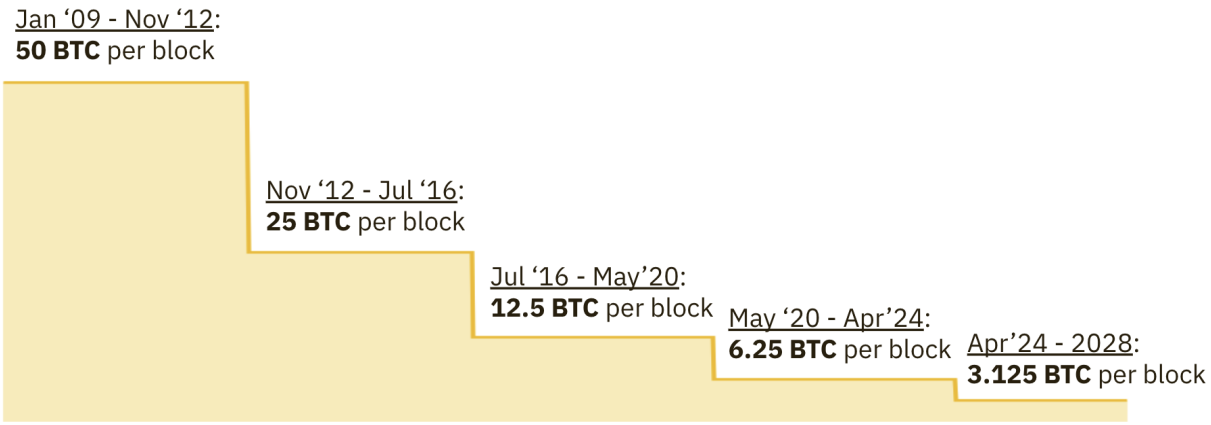
- Perhaps the most important effect of the Halving is its role in serving as a global advertisement for Bitcoin and its inflation-resistant, self-enforced monetary policy.

- Compared to previous Halvings, 2024 is different in that we have US$12B+ of U.S. spot BTC ETF inflows, the highest rate environment for 20+ years, as well as the fact that ~94% of Bitcoin has already been mined.

2 Introduction

The Bitcoin Halving is a landmark event in the crypto calendar, occurring roughly every four years. This time, on the fourth Halving, **Bitcoin's daily issuance will fall from ~900 BTC to ~450 BTC. At current prices, this represents a reduction of over US$10B in yearly Bitcoin issuance.** Considering Bitcoin's limited supply of 21M, a 50% reduction in new supply can be seen as a significant monetary event.

Figure 1: Bitcoin's block reward has decreased from 50 BTC per block to 3.125 BTC per block across its first four Halving events



Source: Binance Research, as of April 18, 2024

Bitcoin has had a great start to the year, strongly supported by the **approval of spot Bitcoin ETFs in the U.S**. These have seen **over US$12B[(1)] in aggregate inflows** in the few months that they have been live. Moreover, growth in the **Bitcoin expressivity** space is going well, with significant movement since the advent of Ordinals and Inscriptions last year. Alongside the development of fungible standards such as **BRC-20 and Runes**, Bitcoin is also seeing a whole host of **layer-2 ("L2") and scaling growth.** Add to this the news of the Halving, and it is no surprise that Bitcoin touched a new all-time high earlier this year. In this report, we explore the Halving and what it could mean for some of Bitcoin's key metrics. We take a closer look at hashrate, miners, and the true strength of the Halving.

This report is part of our new ***The Future of Bitcoin series***, where we will cover the major areas in which Bitcoin is growing over a set of focused reports. In this inaugural edition, we talk about the Halving and key metrics to watch over the next few months.

Note: When referring to Bitcoin, we may sometimes use its ticker, BTC. Technically speaking, Bitcoin (BTC) is the native token of the Bitcoin blockchain.

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3 The Halving

What Is It?

In a nutshell, Bitcoin follows a fixed issuance schedule. **A fixed amount of Bitcoin is distributed every year to successful miners** per successfully validated block. This is called a **block reward** and represents the incentive to secure and validate the Bitcoin blockchain (i.e., mine).

Every 210,000 blocks, the block reward is halved, in what has been famously dubbed the "Halving" (also sometimes called the "Halvening"). This event occurs roughly every four years and represents a 50% reduction in the issuance of new Bitcoin. Given that Bitcoin is a fixed-supply asset with a maximum supply of 21M Bitcoin, the Halving of new issuance is seen as a significant monetary event and has a number of implications.

The next Bitcoin Halving is set to occur on April 19 or 20, 2024 (depending on your geographical location), where the block reward will decrease from 6.25 BTC per block to 3.125 BTC.

Figure 2: Bitcoin in numbers

Source: Binance Research, as of April 18, 2024

Bitcoin's Monetary Policy

Part of the attraction of Bitcoin is its fixed, programmable monetary policy. Unlike the monetary policy of traditional central banks, **Bitcoin's future monetary path is predetermined and cemented in open-source code**. This provides Bitcoin users and miners with predictability into the future issuance of BTC and **prevents the typical inflationary pressures** found in most traditional economies.

Figure 3: Satoshi Nakamoto (the pseudonymous creator of Bitcoin) describes Bitcoin's predictable and transparent monetary policy in 2009

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Total circulation will be 21,000,000 coins. It'll be distributed
to network nodes when they make blocks, with the amount cut in half
every 4 years.

first 4 years: 10,500,000 coins
next 4 years: 5,250,000 coins
next 4 years: 2,625,000 coins
next 4 years: 1,312,500 coins
etc...
```

Source: The Cryptography Mailing List (originally sent January 8, 2009)

Bitcoin's fixed issuance schedule is set to continue until it reaches its maximum supply of 21M Bitcoins. This has created the famous Bitcoin four-year cycle, of which we have already seen three (in November 2012, July 2016, and May 2020).

The block reward started out at 50 BTC per block, then halved to 25 BTC, 12.5 BTC, and 6.25 BTC, and is now set to halve once again. The last Halving is set to occur in 2140, when all 21M Bitcoins will be in circulation and no more new units will or can ever be created.

"The last Halving is set to occur in 2140, when all 21M Bitcoins will be in circulation and no more new units will or can ever be created."

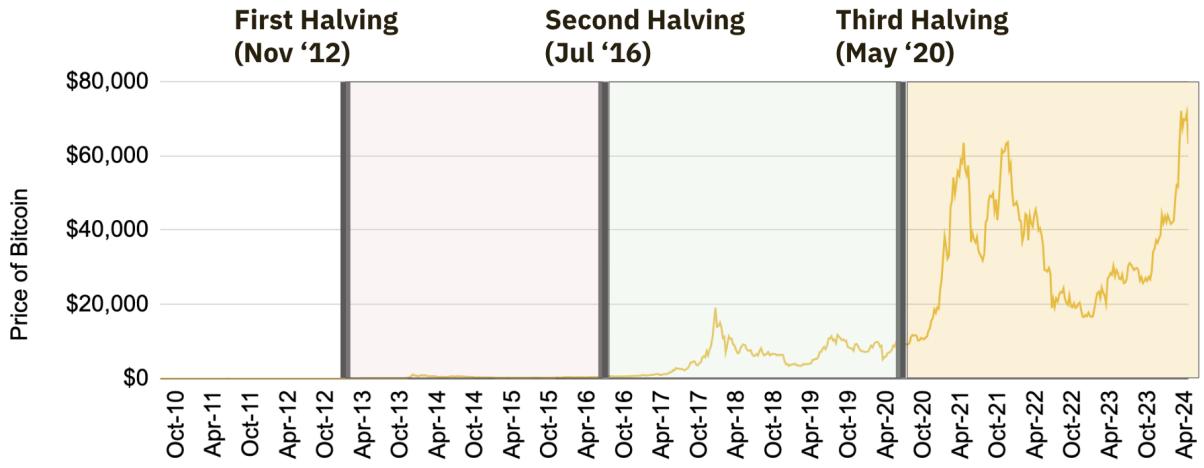
4 Key Metrics to Watch

Price

A simple economic analysis would tell us that if the demand for an asset stays constant, while the production of the asset gets cut in half, the price should naturally rise. In fact, **given that Bitcoin has increased from ~US$12 to over US$63K since the first Halving in 2012, this simple economic analysis is perhaps more than enough to tell the Bitcoin story.**

However, we can look a little more closely at how price has behaved historically to observe specific patterns. Although the price of Bitcoin has maintained an upward trajectory, each Halving has been historically different and most likely context-dependent:

Figure 4: Each Halving so far has been followed by strong BTC performance in the 6-12 months following the event



Source: CoinMarketCap, Binance Research, as of April 18, 2024

	Price of Bitcoin (US$)			
Halvings	**Pre 6M**	**At Halving**	**Post 6M**	**Post 12M**
2012	5.2	12.3 (+139%)	125.9 (+923%)	890.3 (+7,043%)
2016	449	657 (+46%)	902 (+37%)	2,608 (+289%)
2020	8,813	8,990 (+2%)	15,694 (+82%)	56,670 (+559%)
2024	28,714	62,950* (+119%)	TBC	TBC

*BTC Price is based on 18 April 2024

Note: Both post 6/12M % change is based on At Halving prices

Source: CoinMarketCap

1. **First Halving:** The 2012 Halving saw the largest returns, which makes sense as the market capitalization of Bitcoin was very low and thus higher percentage returns were more easily attainable. Six months after the first Halving, Bitcoin was up over 923%, while 12 months later, it had appreciated by over 7,000%.

2. **Second Halving:** The 2016 Halving showed more modest returns. This occurred prior to the famous ICO boom and before the launch of smart contracts.

3. **Third Halving:** The 2020 Halving posted very high returns, likely driven by the initial Covid-19 demand shock, and subsequent fiscal stimulus and market boom. There were also a number of unique use cases with 'DeFi Summer' and NFTs generating more activity and volume.

The primary takeaway from this is that the **Halving is not by itself a primary catalyst for Bitcoin outperformance, but that other factors, whether macroeconomic or crypto-native, matter a lot too.**

We should also remember that **correlation does not imply causation**. While historical trends suggest that the 2024 Halving may also lead to a positive price impact for Bitcoin in the next 6-12 months, this is still speculative given we have only three Halvings to look back at.

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Hashrate

What Is Hashrate?

Hashrate is a **key security metric for the Bitcoin blockchain and describes the total computational power being provided to secure and validate the network.**

As a reminder, in a proof-of-work ("PoW") blockchain like Bitcoin, miners compete for the right to populate and add the next block of the transactions to the blockchain. In order to win the right to add the next block, miners must compete using their machines to find the next "hash". The **miner who correctly finds the hash and gets to record the next block to the chain is given the next block reward, alongside any transaction fees associated with that block.**

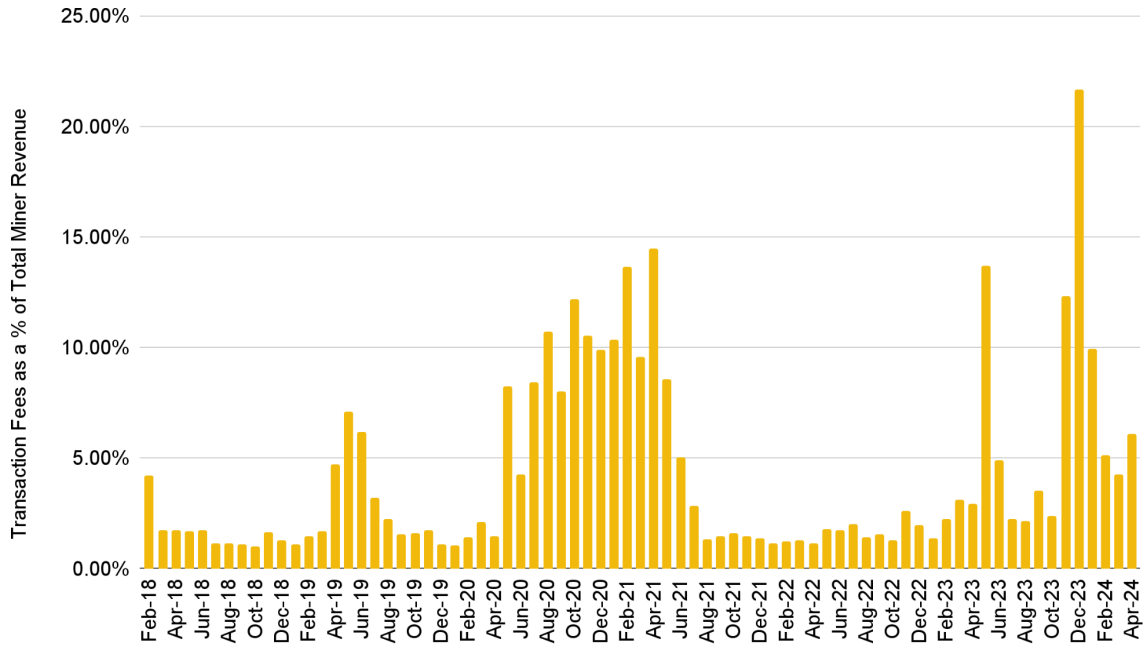
The more computational power that miners collectively provide in order to find the next hash and earn the block reward and fees, the higher the hashrate. **The higher the hashrate, the harder it becomes for malicious parties to disrupt the Bitcoin network.** For example, a 51% attack can occur if attackers get hold of enough mining equipment to control over 50% of a blockchain's hashrate. They could then theoretically block or reorganize transactions. This type of attack helps explain why hashrate is a key metric to assess the security of a blockchain network.

"The more computational power that miners collectively provide in order to find the next hash and earn the block reward and fees, the higher the hashrate. The higher the hashrate, the harder it becomes for malicious parties to disrupt the Bitcoin network."

What Does the Halving Mean for Bitcoin's Hashrate?

Firstly, for Bitcoin miners, the Halving means an **immediate halving of revenue from block rewards (from 6.25 BTC per block, to 3.125 BTC per block).** As a reminder, miners' revenues consist of block rewards and transaction fees. **Historically, transaction fees have made up a relatively limited percentage of their overall revenues, although this has been changing since the start of the advent of Ordinals, Inscriptions, and BRC-20 tokens last year.** Nonetheless, as Figure 5 shows, since Feb 2018, Bitcoin's monthly transaction fees as a percentage of total miner revenue has often been below 5%. Specifically, Bitcoin's monthly transaction fees have averaged 4.2% of total miner revenue since the start of 2022, although this number has been trending upwards, and is 6.4% since the year started.

Figure 5: Bitcoin's monthly transaction fees as a % of total miner revenue have averaged 4.2% since 2022



Source: The Block Data, Binance Research, as of April 16, 2024

Thus for miners, they will see the direct impact of a large part of their revenue taking an immediate 50% cut. This could be quite difficult for some operations, including **smaller miners, which could be forced out of business. Less miners would lead to a lower hashrate, at least temporarily** until other large miners pick up the extra opportunities (explained in more detail below). Lower hashrate could cause a temporary contraction in this aspect of the security of the Bitcoin network. However, we should note that, **at its current hashrate of over 620,000 PH/s, the theoretical cost of an attack on Bitcoin is over US$2M per hour**.

It is also important to mention that Bitcoin's hashrate has been hitting all time highs for the past two years, and is currently at an all time high. Additionally, as Figure 6 shows, **over 70% of Bitcoin's hashrate has been introduced since 2022, during the depths of the previous crypto winter when Bitcoin has traded between US$19 - 40K**. This demonstrates that miners are not deterred by the upcoming block reward reduction and have been expanding during the bear market.

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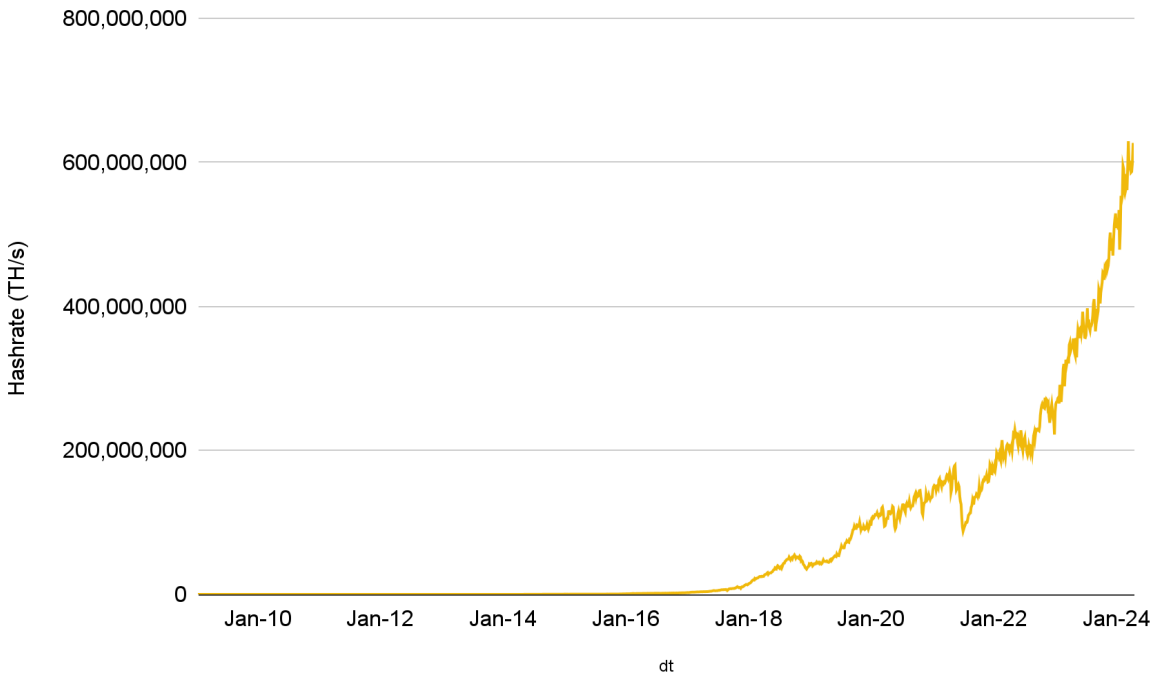
Figure 6: Bitcoin's hashrate has reached all-time highs, with over 70% introduced since the start of 2022



Source: Blockchain.com, Binance Research, as of April 18, 2024

How much will Bitcoin's hashrate drop after The Halving? Data[(2)] shows that after Bitcoin's first three Halvings, the hashrate decreased by 25%, 11%, and 25%, respectively. However, the **network recovered its pre-Halving hashrate within an average of 57 days each time.** This shows that the Halving can perhaps be viewed as a brief pause in the Bitcoin hashrate's growth, rather than a long-term hashrate disruptor. In fact, the **likes of Hashrate Index predict only a 3-7% drop[(3)] in hash rate,** keeping in mind the higher profitability in mining due to its current all time high price. The outlook also takes into account that a significant proportion of Bitcoin's hashrate has only emerged during the bear market of the last two years.

Miners

Industry Consolidation

In this section, we are going to assume that you understand the basics of mining, but if not, please have a quick look here.

Due to the revenue implications that we described earlier, the Halving may lead to **consolidation in the mining industry,** with some smaller, cash-strapped firms potentially defaulting as profit margins tighten. In a situation like this, **larger firms may seek to use**

M&A to benefit from economies of scale and opportunistically try and improve their slimmer revenues, particularly if they can purchase smaller miners at cheap valuations.

On the other hand, the past few years have seen rising energy prices (a primary cost for Bitcoin miners running computationally powerful mining rigs), rising interest rates (which increase debt payments and make it more expensive to take out loans), and a low Bitcoin price owing to the crypto winter.

All of this has **already led to some level of M&A in the industry, including last November's "merger of equals" between Hut 8 Mining and US Bitcoin Corp[4].**

Revenue Diversification

Many miners have been seeking to, or will seek to, diversify their sources of revenue, positioning as energy companies, or vertically integrating with other businesses in order to survive. A simple example is **Marathon's recent launch of Slipstream**[5]. Slipstream is a direct Bitcoin transaction submission service designed to streamline confirmations of large or non-standard Bitcoin transactions, which are sometimes excluded by Bitcoin nodes.

The Halving has a "survival-of-the-fittest" effect on the mining industry and every four years, the most inefficient operators get wiped out, with all their capital and resources passing on to more efficient operators.

"The Halving has a "survival-of-the-fittest" effect on the mining industry and every four years, the most inefficient operators get wiped out, with all their capital and resources passing on to more efficient operators."

Geographical Distribution

The **key input for a Bitcoin miner is power.** It is computationally expensive to run enough nodes to create a business out of Bitcoin mining and by nature of this, miners target the cheapest sources of power they can. As things stand, the U.S. has ~38% of global hashrate, while China has around 20%.[6] As **miners have been getting ready for the Halving, many have been exploring alternative mining markets across Asia, Latin America and Africa**, where electricity might be relatively cheaper. We have seen Bitfarms expand in Paraguay[7], Bitdeer building in Bhutan[8], whereas Hashlabs is offering solutions based out of Ethiopia[9].

What Does the Halving represent?

Marketing

Perhaps the most important role of the Halving is its marketing effect. In a way, **this is a global advertisement for Bitcoin and its inflation-resistant, self-enforced monetary policy.** Given Bitcoin is near its all-time high, in addition to the recent TradFi involvement through the spot ETFs, this Halving is likely to be the most popular and widely-covered Halving yet.

The Halving **reminds people that the supply of Bitcoin is truly limited, and that demand is increasing.** It draws attention to the absolute scarcity of Bitcoin at a time when it is more accessible for investors than ever before, owing to the ETF-approvals in the U.S. and Hong Kong.

We should keep in mind that the U.S. ETFs only got approved in January, whereas the Hong Kong ETFs are not even trading yet. Many TradFi financial advisors are yet to even begin pitching BTC to their clients. If the Halving serves as effective marketing and catches enough attention, the potential for latent ETF demand that it may help unlock over the next few months and years is immense.

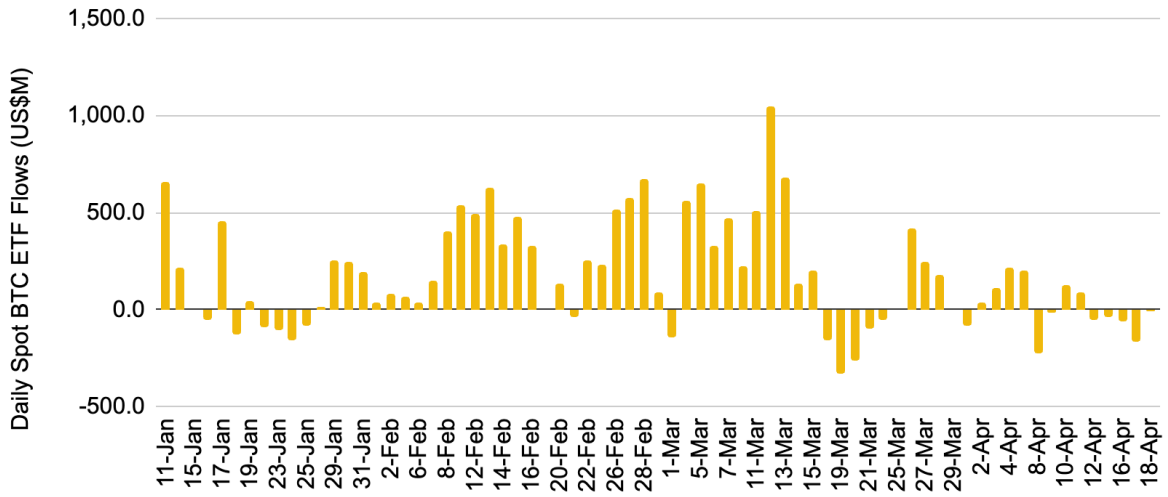
Is This Halving Different?

Compared to the previous Halvings in 2012, 2016, and 2020, this year has some significant differences:

- **Institutional demand:** The U.S. spot BTC ETFs have completely changed the market dynamic and have brought a new wave of institutional demand with them. To date, we have seen **over US$12B of inflows via these ETFs**[10].

  Hong Kong also recently approved spot BTC ETFs, with early estimates of U$1-2B of inflows expected[11] in the first two years of trading. More important than the flows we have already seen are the flows we might see in the future as Bitcoin and crypto continue to become more popular.

Figure 7: The new spot BTC ETFs have seen over US$12B in inflows, with US$172M of inflows per day, on average



Source: farside.co.uk, Binance Research, as of April 18, 2024

- **Different macroeconomic environment:** We are in the **highest interest rate environment in 20+ years**. All prior Halvings have occurred in periods where rates were lower, and with more fiscal stimulus. Although growth assets have been performing well recently, traditionally, higher rates are not ideal for them. Whether this affects performance post-Halving will be important to monitor, especially considering the recent geopolitical tensions in the Middle East.

- **Less of a supply shock than before:** **~94% of BTC has already been mined**, so the supply-side impact of lowering issuance is going to be smaller in each Halving going forward. This means that the **demand-side is more and more important** when we think about the 2024 Halving. Whether these are more ETF flows, or a more crypto-native demand driver (like a new consumer dApp or a DeFi Summer-esque moment), is something to ponder.

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4 Outlook and Closing Thoughts

The Bitcoin Halving is a landmark event and something that will be widely referenced for the next few months. With over 93% of Bitcoin having already been mined, perhaps the most important feature of the Halving is its global marketing effect rather than its direct supply-side impact on production.

Ultimately, it is a key reminder that no other majorly traded commodity has a fixed production schedule with a regular 50% production supply shock in the manner that Bitcoin has. Imagine this was the case in the oil markets; things would be drastic.

Over the next few weeks and months, there might very well be some volatility, as some smaller miners experiencing slimmer profit margins become forced sellers as they enter bankruptcy. On the other hand, if the price of Bitcoin continues to rise or the broader ecosystem keeps taking off, creating more transaction fees, miners could continue to receive strong revenues despite the halving of their block rewards.

The demand-side factors will be key to monitor and something we'll keep a very close watch on. The spot ETF flows from the U.S. and potentially from Hong Kong, as well as signs of rate regime changes across the world, will make this an interesting time for the largest cryptocurrency.

This is part one of our new The Future of Bitcoin series. Keep an eye out for the next one, where we will cover another noteworthy aspect of Bitcoin: scaling.

References

1. https://farside.co.uk/?p=997
2. https://www.coindesk.com/consensus-magazine/2024/04/08/6-ways-the-halving-will-impact-bitcoin-mining/
3. https://hashrateindex.com/blog/bitcoin-halving-2024/
4. https://hut8.com/investors/hut-8-and-usbtc-merger/
5. https://ir.mara.com/news-events/press-releases/detail/1343/marathon-digital-holdings-launches-slipstream
6. https://chainbulletin.com/bitcoin-mining-map/
7. https://investor.bitfarms.com/news-events/press-releases/detail/225/bitfarms-purchases-land-in-yguazu-paraguay-in-support-of
8. https://www.datacenterdynamics.com/en/news/bitdeer-completes-construction-of-100mw-bhutan-cryptomine-data-center/
9. https://www.hashlabsmining.io/ethiopia
10. https://farside.co.uk/?p=997
11. https://cryptoslate.com/hong-kongs-bitcoin-ethereum-etfs-projected-to-hit-1-billion-in-assets-within-two-years/

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