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# The Bitcoin Halving: A Programmatic Monetary Policy

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# Introduction

Every four years, the amount of new bitcoin being produced by the bitcoin network falls in half. This event—called the "halving"—was programmed into bitcoin's code when the asset was first created. Its quadrennial occurrence is one of the most anticipated events in the bitcoin market, and one that many people associate with rising prices.

This piece offers a primer on the halving: what it is, when it's happening, and what it means for both bitcoin and bitcoin miners.

# What Is Bitcoin Mining?

To understand the halving, you first have to understand bitcoin mining. Fortunately, that's relatively easy.

Think about a bank. The core service a bank offers is to secure your wealth and process transactions. In exchange, it charges fees.[1]

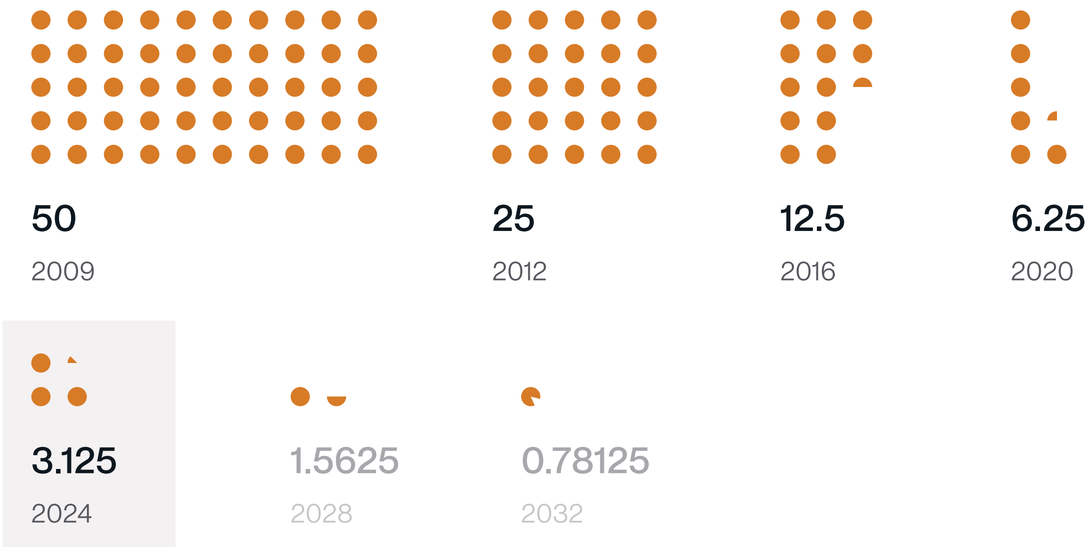
The bitcoin network offers essentially the same service: It secures (bitcoin) wealth and processes (bitcoin) transactions. But unlike a bank, there is no centralized entity providing this service. Instead, this work is done by "bitcoin miners."

Bitcoin miners are paid for providing this service in two ways: through transaction fees paid by users and through the issuance of new bitcoin. Specifically, every time a miner processes a batch of bitcoin transactions, the network rewards them with newly created bitcoin.

It is this newly created bitcoin that is impacted by the halving.

1 Some bank fees are direct, like wire transfer fees, while others are indirect, like interest margin.

Bitcoin Halving Cycles and Bitcoin Rewards Issuance[2]




## The Halving's Impact on Bitcoin

The biggest question surrounding the halving is whether or not the impact of cutting new supply in half is priced into the market before the halving.

On the one hand, halvings should be great for bitcoin's price, as reducing new supply by half should increase scarcity. On the other hand, we have known when halvings would occur since bitcoin's inception. In an efficient market, the impact should already be accounted for.

Rather than dwell in theory, let's look at the data. On a short-term return basis, the data suggest that the halving is a "sell the news" event. On average, the price of bitcoin has risen 19.03% in the month preceding the halving, versus 1.70% in the month following the halving.

Zooming out, however, the reverse is true: On average, bitcoin has risen 3,224% in the year following the halving, versus 185% in the year preceding it. Those numbers are skewed by the huge (8,839%) return in the year following the 2012 halving. But ignoring absolute numbers, returns have been higher post-halving than pre-halving in each of the three historical examples we have.

2 Bitcoin rewards are issued per block. The bitcoin network adds a new block to bitcoin's blockchain ledger about once every 10 minutes, with about 144 new blocks produced per day.

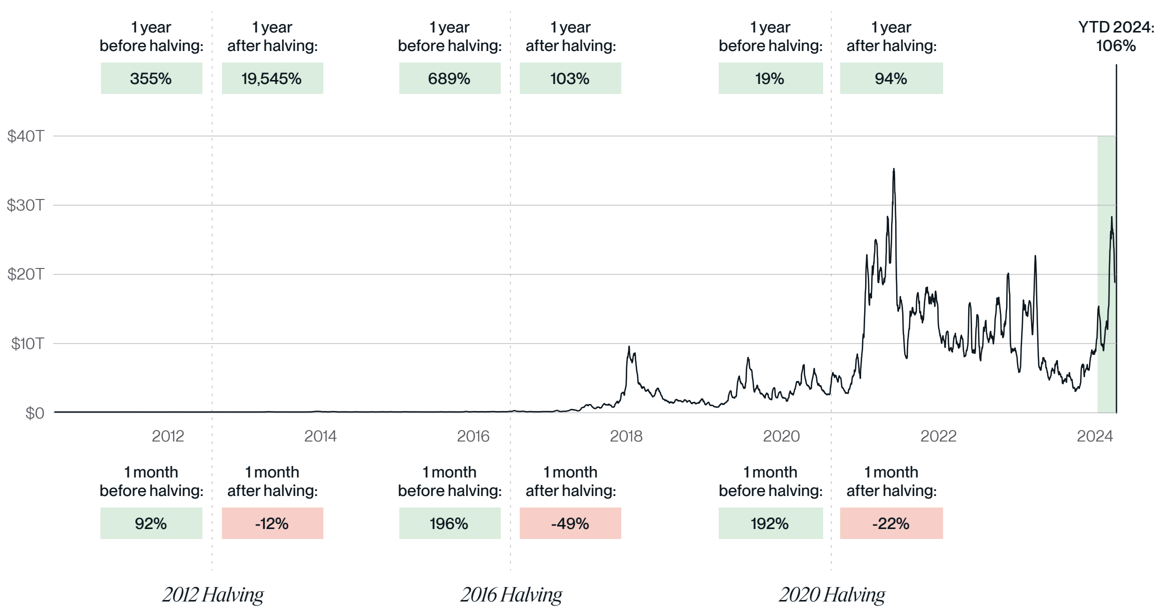
## Bitcoin Price Before and After Halvings


Source: Bitwise Asset Management. Data as of March 31, 2024. Past performance is no guarantee of future results.

Similarly, bitcoin spot trading volumes have historically decreased in the first month after the halving, falling 27.78% on average, but have meaningfully grown in the year after, rising 6,580.69% on average.

## Bitcoin Spot Trading Volume Before and After Halvings

7-Day Moving Average




Source: Bitwise Asset Management with data from Coinmetrics. Data as of March 31, 2024. Past performance is no guarantee of future results.

Of course, we have limited data: We are only working with three historical examples. Still, the picture they paint is relatively intuitive, suggesting that the market prices in the short-term impact of the halving but underestimates the long-term impact. The data also suggests that, long-term, the halving may be conducive to price appreciation.

## The Halving's Impact on Miners

Intuitively, it makes sense that bitcoin halvings would be good for the price of bitcoin. After all, reducing the new supply of a commodity should be constructive for prices.

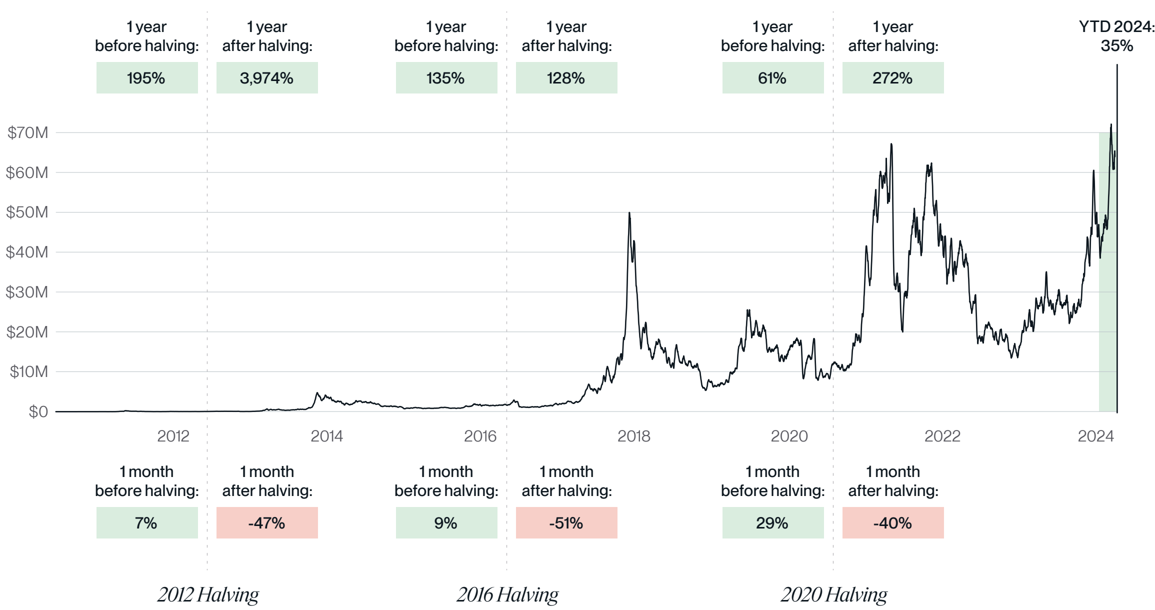
It is equally intuitive, however, that halvings would be bad for bitcoin miners. After all, miners derive the vast majority of their revenue from the bitcoin they receive as a reward for settling transactions. Cut it in half, the theory goes, and revenue will fall sharply.

So is it true?

The data provides an interesting result. In the month following halvings, miner revenue fell 46% on average. However, as a result of rising bitcoin prices and more efficient hardware, miner revenue increased in the year following halvings by 1,458% on average. In fact, in each of the prior three halvings, miners grew revenues by more than 100% in the year following the event.

### Total Miner Revenue Before and After Bitcoin Halvings

7-Day Moving Average

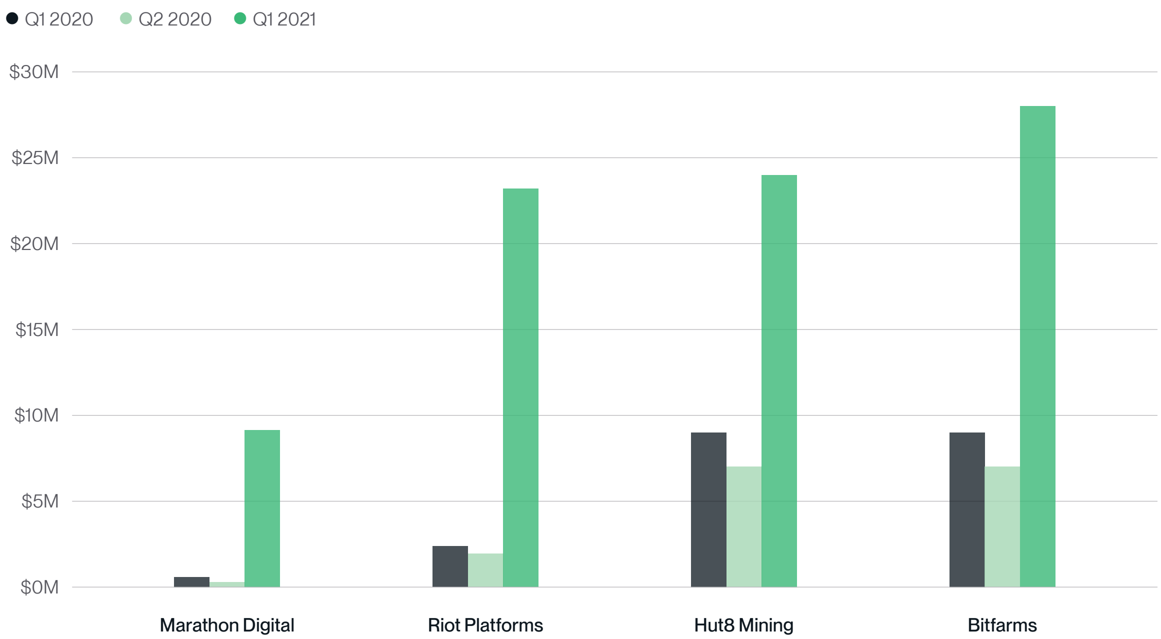



Source: Bitwise Asset Management with data from Coin Metrics. Data as of March 31, 2024. Past performance is no guarantee of future results.

The 2020 halving is particularly interesting since it was the first halving during which publicly traded miners existed. Let's take a look at four leading miners: Marathon Digital, Riot Platforms, Hut 8, and Bitfarms.

Not surprisingly, we see a similar result. Miner revenues fell in the quarter after the halving as a result of the drop in mining rewards. However, as miners adjusted to the new network economics, and as the price of bitcoin rose, miner revenues not only recovered but were at much higher levels a year post-halving.

### Revenue of Leading Bitcoin Miners Before and After 2020 Halving




Source: Bitwise Asset Management with data from company filings. Data as of March 31, 2021. Past performance is no guarantee of future results.
Note: The 2020 bitcoin halving took place on May 11.

We see a similar pattern when we study the price performance of mining stocks. All four of these stocks showed strong performance in the year following the halving, rising from 401% for Hut 8 to 3,314% for Marathon Digital. Clearly, in this instance, the halving was just a bump in the road.

## The 2024 Halving

The upcoming halving in April 2024 is expected to bring down bitcoin's annual inflation rate from 1.73% to 0.85% as a result of the reduction in new block rewards from 6.25 to 3.125 bitcoin. At bitcoin's current price, that implies $11.6 billion of new annual supply removed from the market.

In anticipation of this halving, let's compare how various metrics are faring. 2024 is looking like a strong year leading up to the halving with bitcoin up 66.99%, bitcoin spot volume up 106.16%, and total miner revenue up 34.87% through the end of Q1.

Mining stocks have underperformed bitcoin year-to-date, with the four mining companies discussed above falling between 3.87% and 23.72%, even as bitcoin has risen 66.99%. Nonetheless, they look poised to do well post-halving. Revenue growth estimates for 2024 are robust, ranging from 66.00% to 89.23%, and balance sheets look strong enough to withstand the drop in revenue. Importantly, their average cost to mine one bitcoin ranged from $14,578 to $22,249 in the most recent quarter, giving them comfortable cushions even in the event of a drop in the price of bitcoin (currently at $70,850).[3]

| | YTD Performance | 2024 Revenue Growth Estimate | Current Ratio[4] | Operating Cash Flow Ratio[5] | Net Debt/ Equity Ratio[6] | BTC Held in Treasury | Cost To Mine One Bitcoin |
|---|---|---|---|---|---|---|---|
| Marathon Digital | -3.87% | 81.79% | 30.51 | -2.70 | -0.42 | 15,126 | $22,249 |
| Riot Platforms | -20.88% | 69.59% | 8.33 | 0.37 | -0.48 | 7,362 | $14,578 |
| Hut 8 | -17.24% | 66.00% | 0.55 | -0.19 | 0.31 | 9,195 | $18,815 |
| Bitfarms | -23.72% | 89.23% | 1.88 | 0.20 | -0.38 | 754 | $16,200 |

Source: Bitwise Asset Management with data from company filings. YTD Performance and 2024 Revenue Growth Estimate as of March 31, 2024. Data for other columns as of December 31, 2023 (most recently reported data). Past performance is no guarantee of future results.

## Conclusion

The halving is a cornerstone of bitcoin's monetary design, programmed to help ensure scarcity and control inflation. It reinforces bitcoin's value proposition as a store of value while aligning the network's incentives toward long-term sustainability. Despite the challenges that halvings pose, past instances have been followed by increased interest, price appreciation, and adoption, both for bitcoin itself and (with a lag) bitcoin miners.

3 Cost to mine bitcoin based on most recent company filings for the period ending December 31, 2023. Bitcoin price as of March 31, 2024.
4 "Current Ratio" measures a company's ability to cover its short-term obligations with its current assets; it is calculated by dividing a company's current assets by its current liabilities.
5 "Operating Cash Flow Ratio" measures a company's ability to pay its debts with its existing cash flows; it is calculated by dividing a company's operating cash flow by its current liabilities.
6 "Net Debt/Equity Ratio" is used to evaluate a company's financial leverage; it is calculated by dividing a company's total liabilities by its shareholder equity.

## Risks and Important Information

No Advice on Investment; Risk of Loss: Prior to making any investment decision, each investor must undertake its own independent examination and investigation, including the merits and risks involved in an investment, and must base its investment decision—including a determination whether the investment would be a suitable investment for the investor—on such examination and investigation.

Crypto assets are digital representations of value that function as a medium of exchange, a unit of account, or a store of value, but they do not have legal tender status. Crypto assets are sometimes exchanged for U.S. dollars or other currencies around the world, but they are not currently backed nor supported by any government or central bank. Their value is completely derived by market forces of supply and demand, and they are more volatile than traditional currencies, stocks, or bonds.

Trading in crypto assets comes with significant risks, including volatile market price swings or flash crashes, market manipulation, and cybersecurity risks and risk of losing principal or all of your investment. In addition, crypto asset markets and exchanges are not regulated with the same controls or customer protections available in equity, option, futures, or foreign exchange investing.

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