HASHRATE INDEX

OCTOBER 2021

Hashrate Index
Quarter 3 Report

Visualizing the Effect of China’s Mining Ban on the Bitcoin Network and its Markets

Table of Contents

Hashrate Index Quarter 3 Report:

Visualizing the Effect of China's Mining Ban on the Bitcoin Network and its Markets

Q3 2021 is in the books, and beginning as it did with China's mining ban as its backdrop, it marked perhaps the most historic shift in Bitcoin's mining market to date. Since the beginning of the ASIC era, it was the first quarter on record where Chinese miners, typically anywhere from 50-60% of the market, were no longer heavyweight contenders on the global playingfield.

In the fallout of China's ban, we are witnessing an unprecedented restructuring of hashrate across the globe (with the United States being the largest beneficiary so far), as well as a surge in interest in the mining industry from newcomers and seasoned bitcoiners alike.

The ban created a unique opportunity, something of a reset that leveled the playing field for sidelined investors who never thought it would be possible (or profitable) to enter the industry. In this way, Q3 marked nothing shy of a Renaissance for Bitcoin's mining industry.

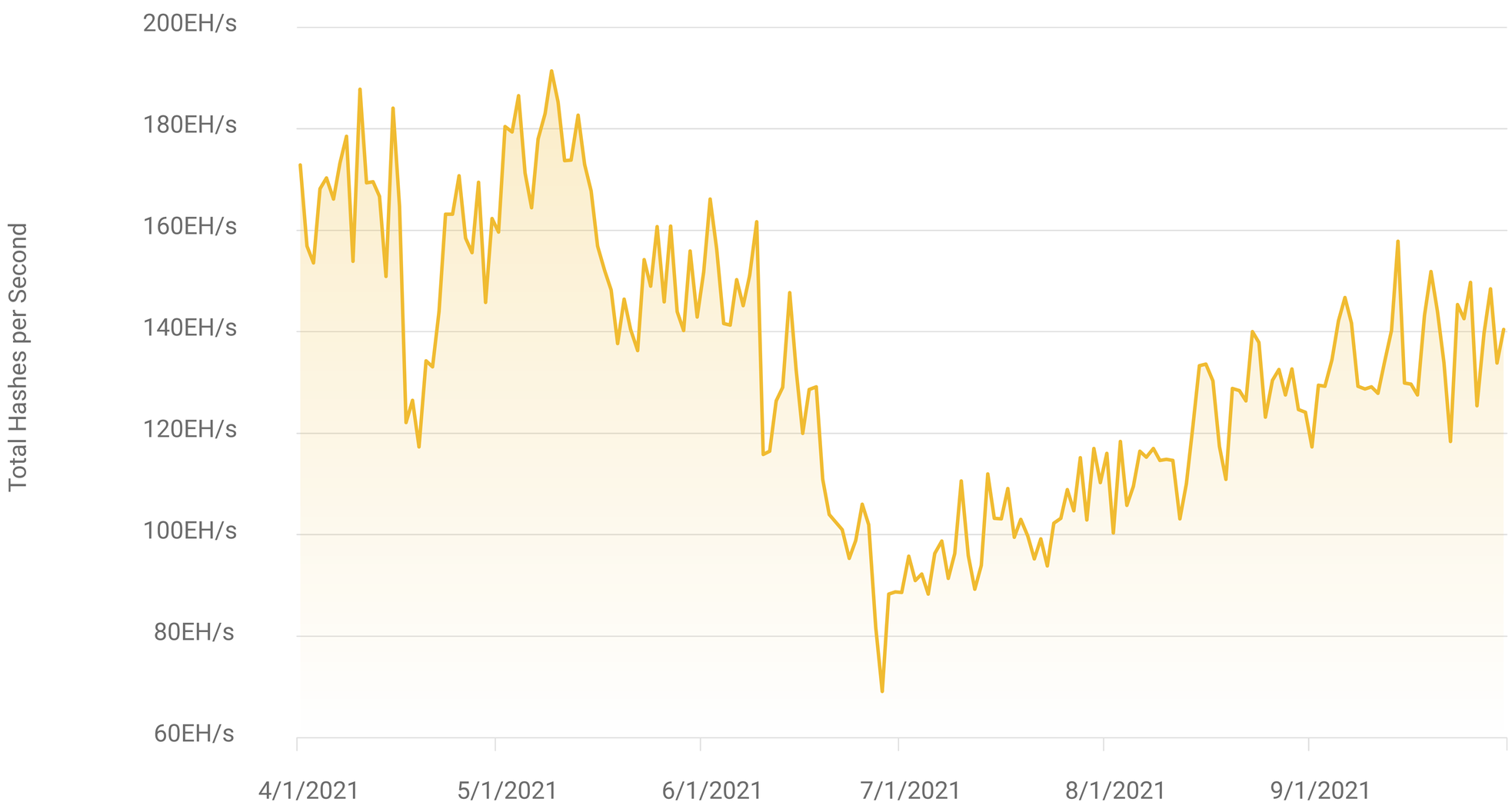
1

The Backdrop: China’s Mining Crackdown Leaves a Cavity in the Market

Three months after China's mining industry went dark, the mining market has shown tremendous resiliency, with most metrics closing in on pre-ban levels.

Hashrate has made a herculean recovery; after being cleft in half following the ban, it rose from late-June lows of 69 EH/s to 140 EH/s by the end of Q3, a 103% recovery. Similarly, rig prices and hashprice were cut in two following the event, but these too are inching back toward their pre-ban highs.

Bitcoin Hashrate (7 Day Moving Average)



The hashrate blackout and subsequent recovery precipitated some wild swings for Bitcoin's difficulty and, by extension, block times; in 2021, we were graced by Bitcoin's largest downward adjustment ever and two of the largest upward adjustments of the ASIC mining era.

Q3's hashrate recovery was driven primarily by North American miners (among others) turning on new machines en masse, with an assist from fast-acting Chinese miners who found new homes in the immediate aftermath of the ban.

Miners the world over are hustling to turn on as many machines as they can to cash in on China’s hashrate blackout. Problem is, power is abundant but rack space and infrastructure are scarce, so many of the industrial-scale miners are having to build out additional warehouse space which won’t be operational until the first half of next year.

2

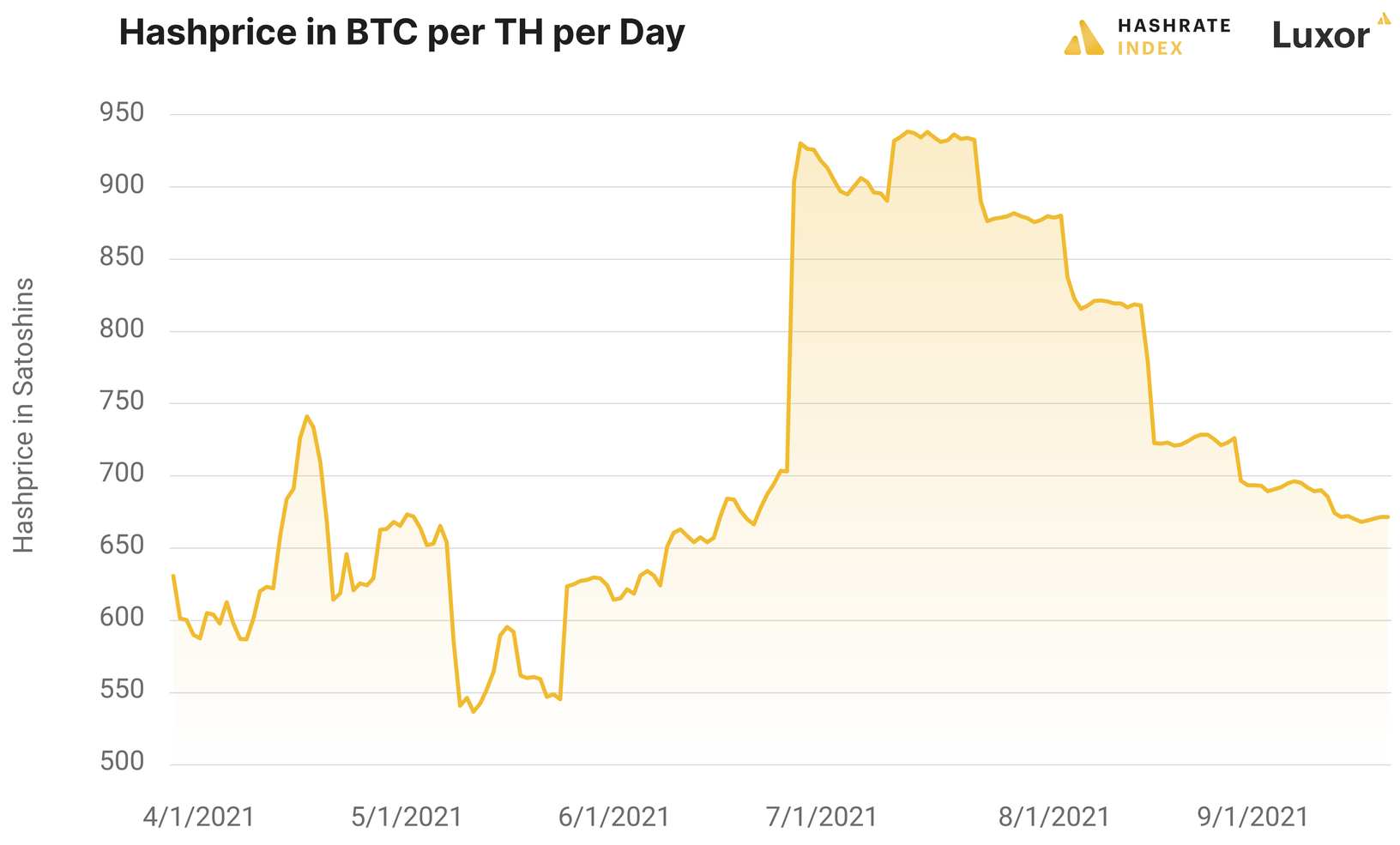
Hashprice and Miner Revenue: China’s Ban is a Boon for Others

- **Block Propogation Plays Games With Miner Monthly Revenue**
- **Fee Revenue Hits Rock Bottom**

For those miners who had the resources and manpower, expanding their hashrate meant cashing in on a lucrative opportunity.

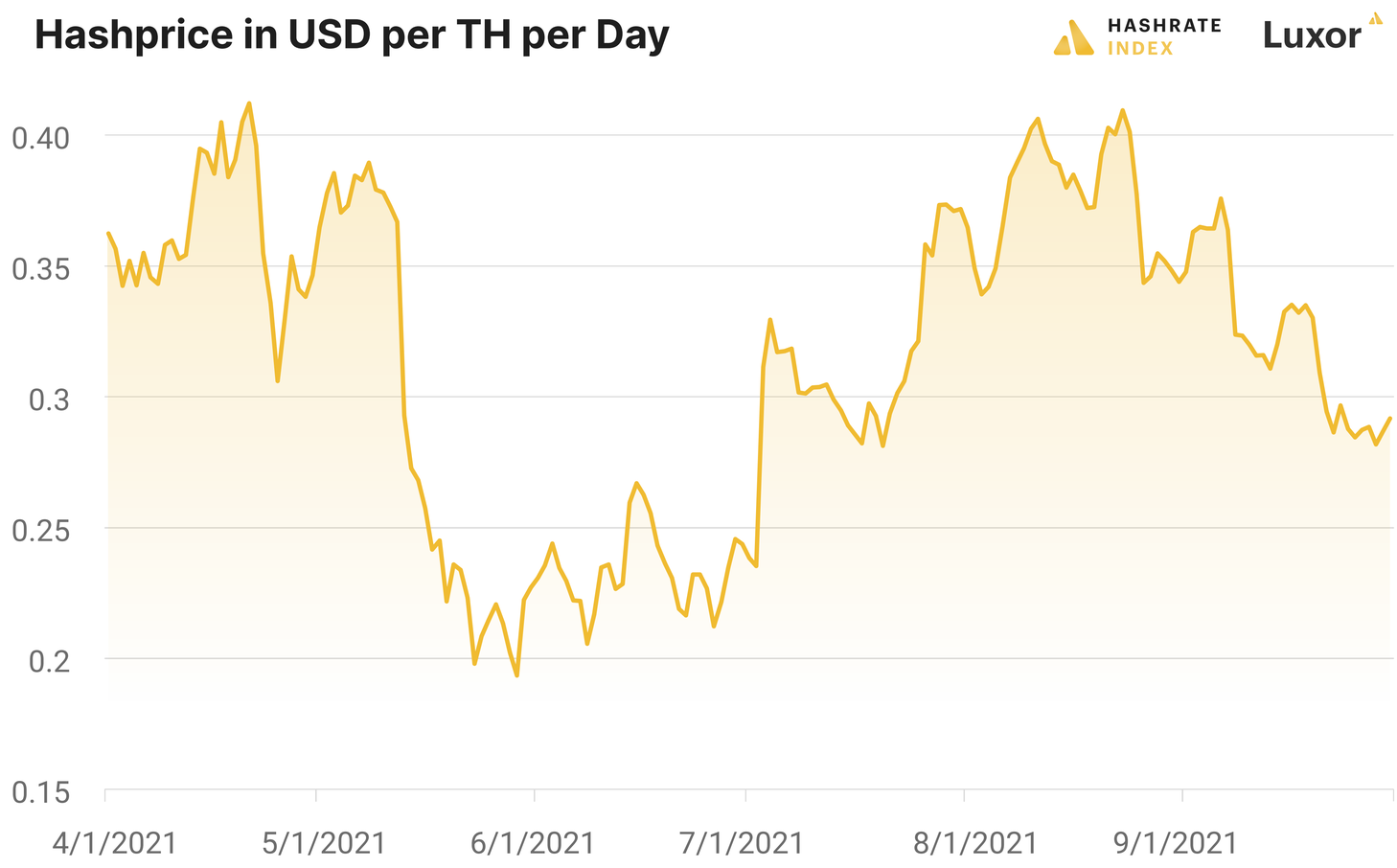
When China's mining market went light's out, Bitcoin's 7-day moving average hashrate **fell 63% from its 190 EH/s peak in May to its 69 EH/s low in June.** Bitcoin's price fell in step, shedding roughly half of its value as well. But with competition clipped by China's crackdown, plugged-in miners have been making bank since the ban.

It's easy to see how profitable this period has been in hashprice denominated in BTC, where revenue for July and most of August exceeded what miners were making during Bitcoin's run-up to a new all-time high in the Spring.



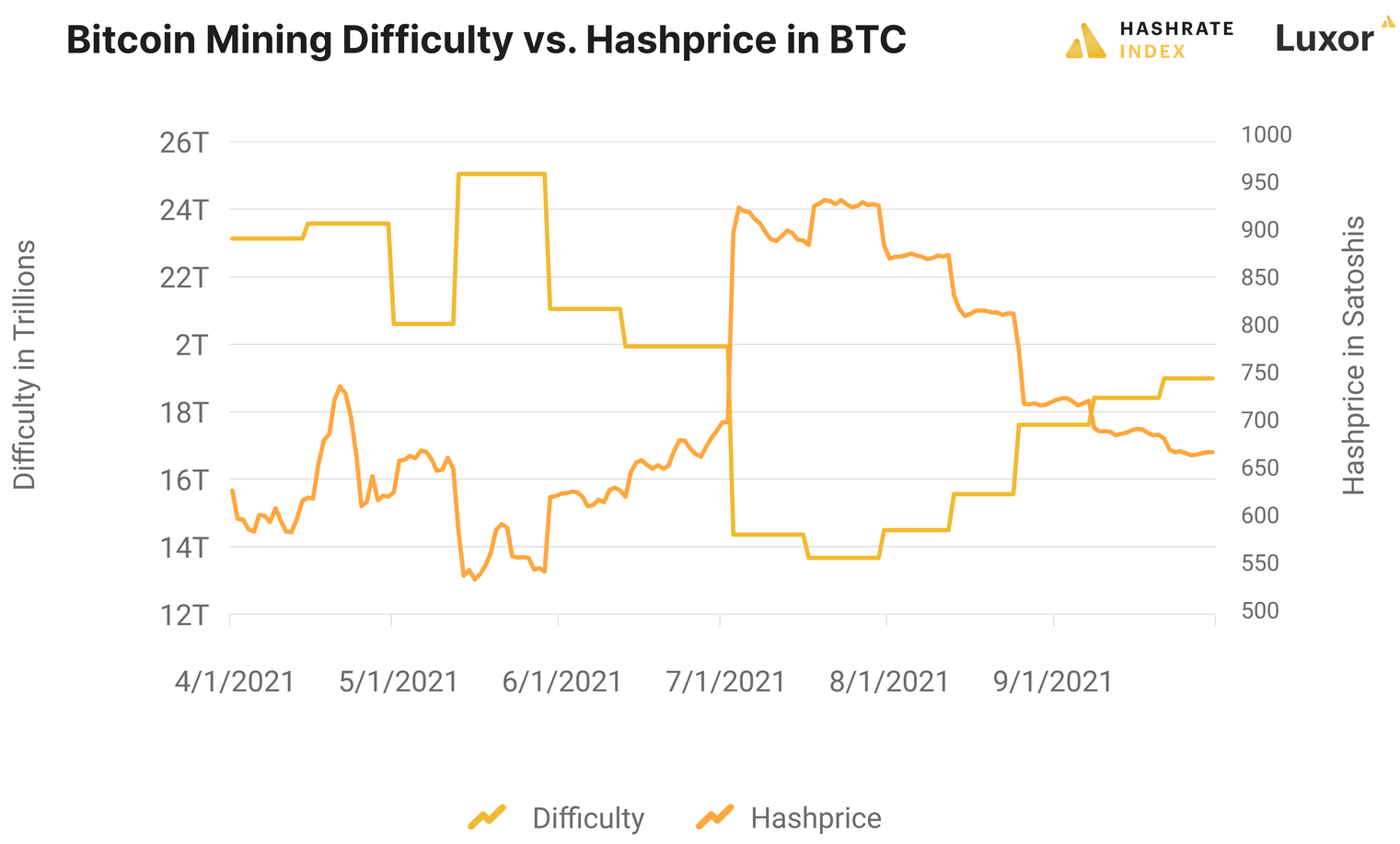
Hashprice is a term Luxor coined and a metric it uses to measure miner revenue. *Simply put, hashprice is how much revenue a miner can expect to earn from their computing power (hashrate). Hashprice is broken down as revenue per terahash (TH) per day, so if you have 100 TH of mining power, you would multiply 100 by hashprice to ascertain your deployment's daily revenue potential (for e.g., 100 TH at a hashprice of $0.35 would be 100 × 0.35, which would equal $35 per day).*

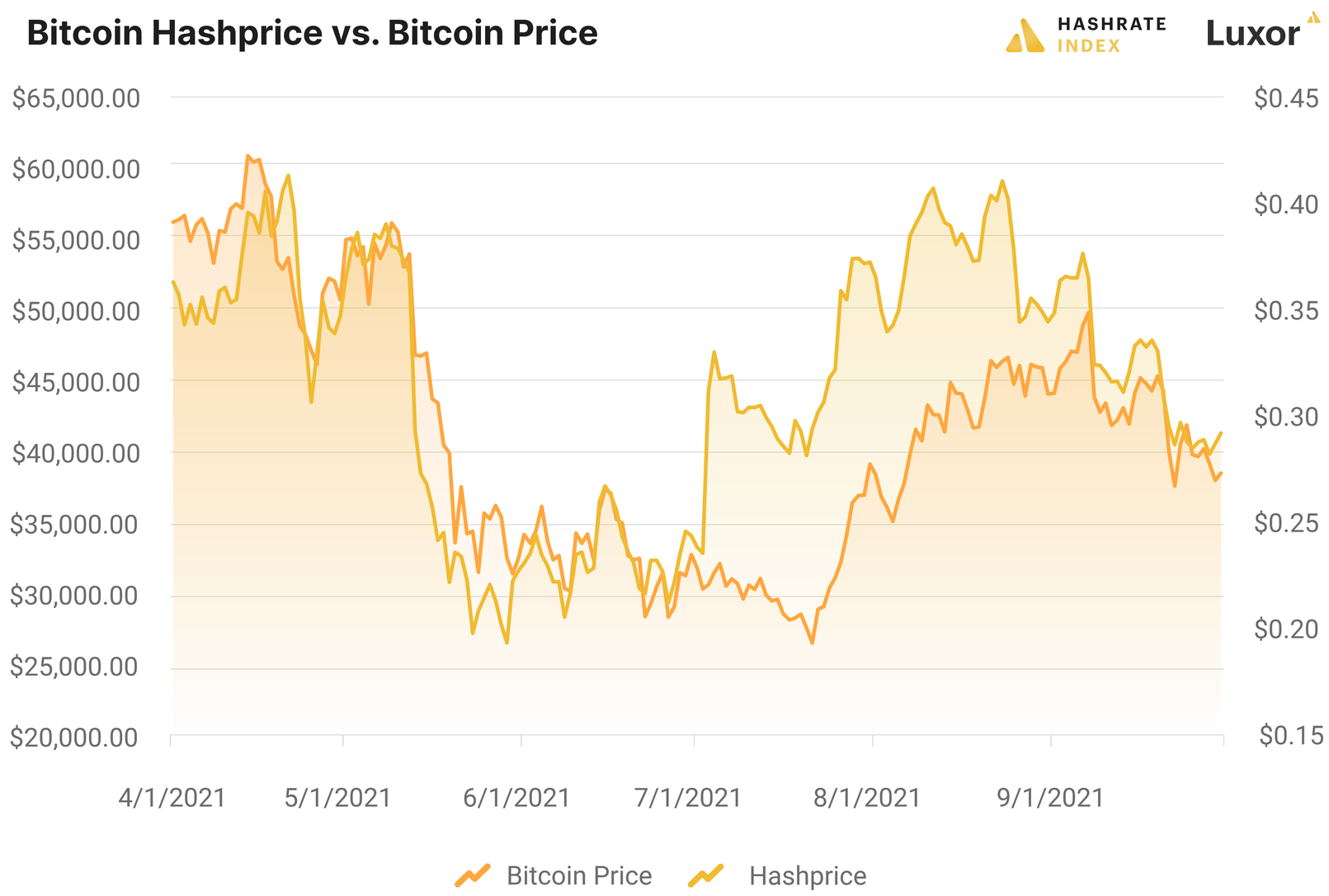
From its Q2 lows in June to its Q3 highs in August, hashprice in USD more than doubled. Hashprice closed out Q3 at $0.29/TH, which was 30% lower than the yearly high set in April. For hashprice in BTC terms, miners saw a 70% increase from the profitability trough in June to its crest in July.



Hashprice denominated in BTC has already transcended its spring highs, while hashprice in USD has not. **The reason being, bitcoin's price decline has affected the USD bottom-line of miners, but they are earning more bitcoin because, in the same time frame, difficulty has fallen roughly 40%.** Put another way, with only half as much competition online, any miners active after the ban began finding significantly more blocks than before the ban (which earned them more BTC) even though this BTC was worth less in USD terms (because BTC's price fell to the $30k range).

When charting BTC hashprice with difficulty, we can see clearly when this profitability boost went into effect: when Bitcoin's highest-ever downwards adjustment (-27%) kicked in on July 3.





As hashrate and difficulty have grown in the aftermath of China's crackdown (and bitcoin's price has bounced between the $30-50k range), this profitability window has shrunk. Profit potentials were juiciest in July.

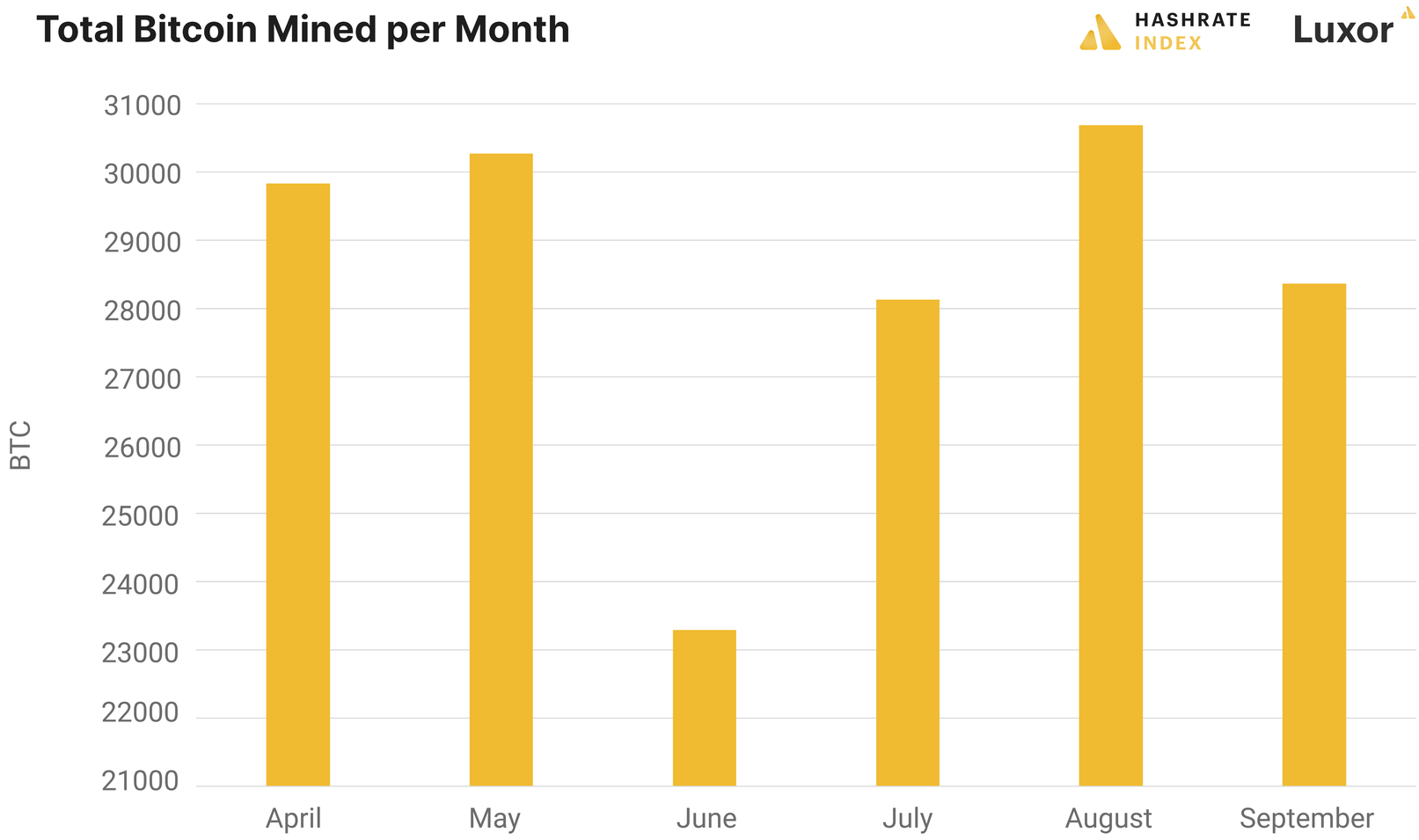
If Bitcoin makes another run this year at an all-time high, we'll see USD-denominated hashprice break its yearly high of $0.41, especially if the fee market picks up (more on this later).

Block Propogation Plays Games With Miner Monthly Revenue

China's crackdown sent wrinkles through every aspect of the mining market, from network metrics to meat-space logistics.

For example, Bitcoin's difficulty adjusted to 19.93 T in the days immediately preceding the crackdown. As Chinese miners started turning their machines off and hashrate plummeted, the miners who remained online were still working under this difficulty but were hashing collectively with half the computing power that was online when the 19.93T difficulty was set.

In effect, this meant that block times creeped to a sluggish average of 12.6 minutes in June, so miners **only mined 23,289 BTC during the month--13.7% less than they would have minted from a 27,000 BTC block reward given 10 minute block times (sans fees). June's truncated rewards were 23% less than what miners earned in May.**



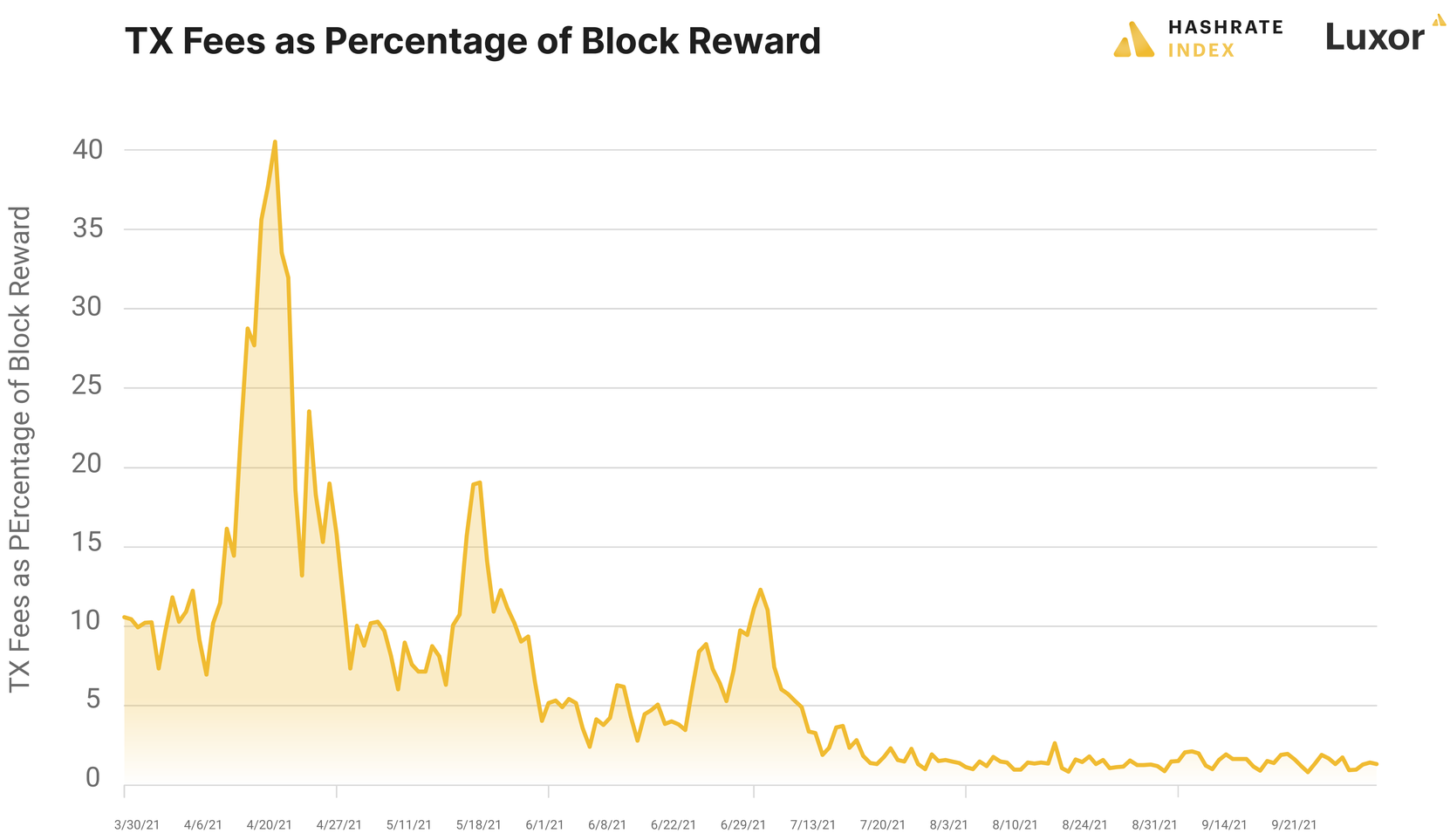
As hashrate began recovering and North American mega-farms booted up fleets of the newest machines, we saw a reversal of this trend in August. With hashrate surging, **block production went into overdrive with an average block time of 8.2 minutes. This netted them 30,683 BTC, a 9% increase from July's rewards and a 24% increase from June's. Moreover, the haul was greater than what they earned in the Spring even with fee revenue at yearly lows.**
Overall, miners mined 87,181.3 BTC in Q3, a 4.5% increase from the 83,394.5 BTC they mined in Q2.

Overall, miners mined 87,181.3 BTC in Q3, a 4.5% increase from the 83,394.5 BTC they mined in Q2.

Fee Revenue Hits Rock Bottom

On the subject of fees, one of the more curious fallouts of the Great Hashrate Migrations comes from Bitcoin's fee market.

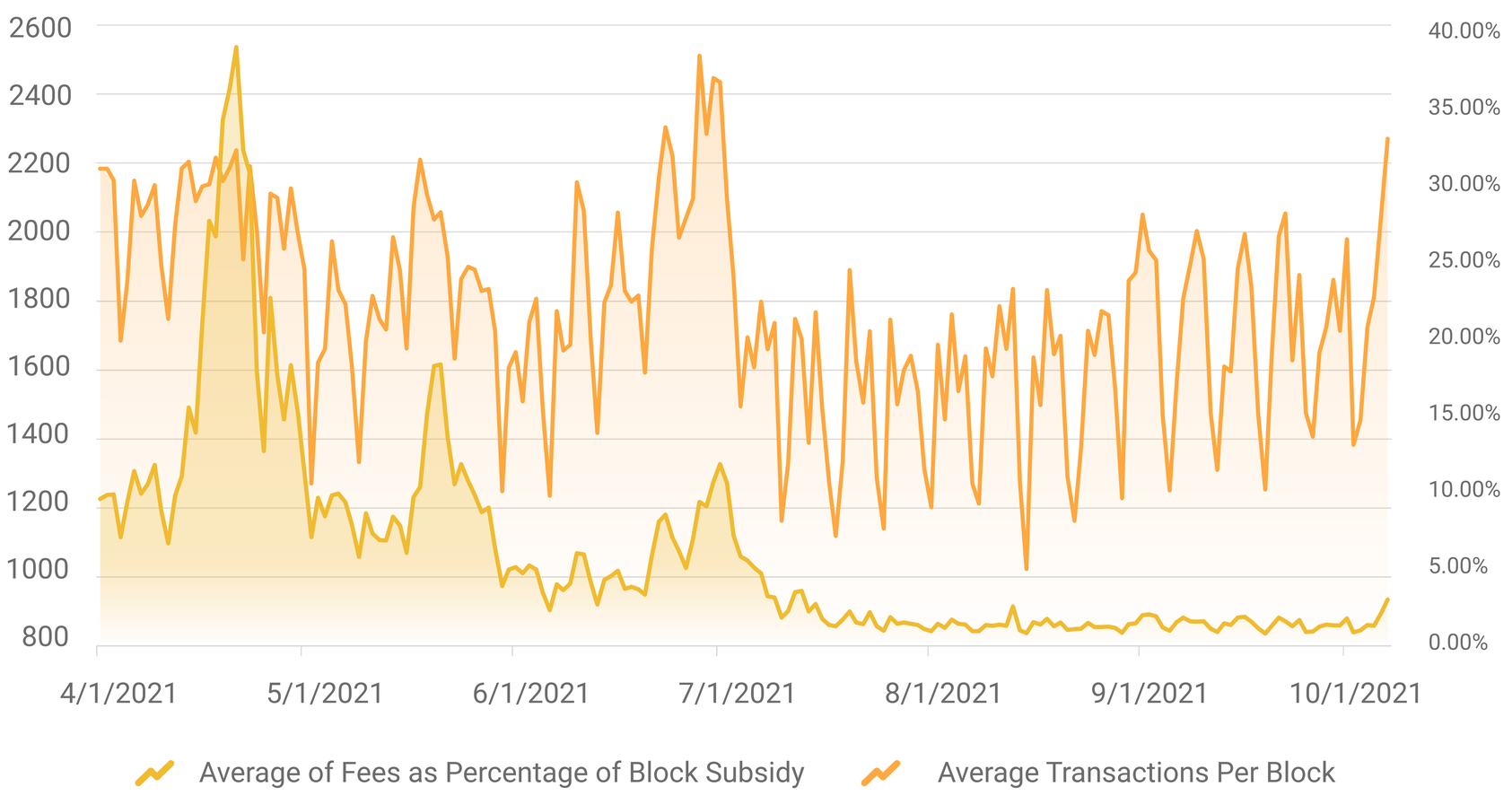
Fees as a percentage of block rewards have plummeted since the event, **with the quarterly average for fees as a share of block rewards falling from 11.14% in Q2 to 2.06% in Q3.**



This makes some sense. Afterall, Bitcoin is still down a good deal from its April all time high of $63,000, roughly $50,000 at the time of writing. This is pretty routine; when bitcoin pumps, more people are using it than when it dumps. Additionally, Segwit and Lightning Network adoption are at all-time highs.

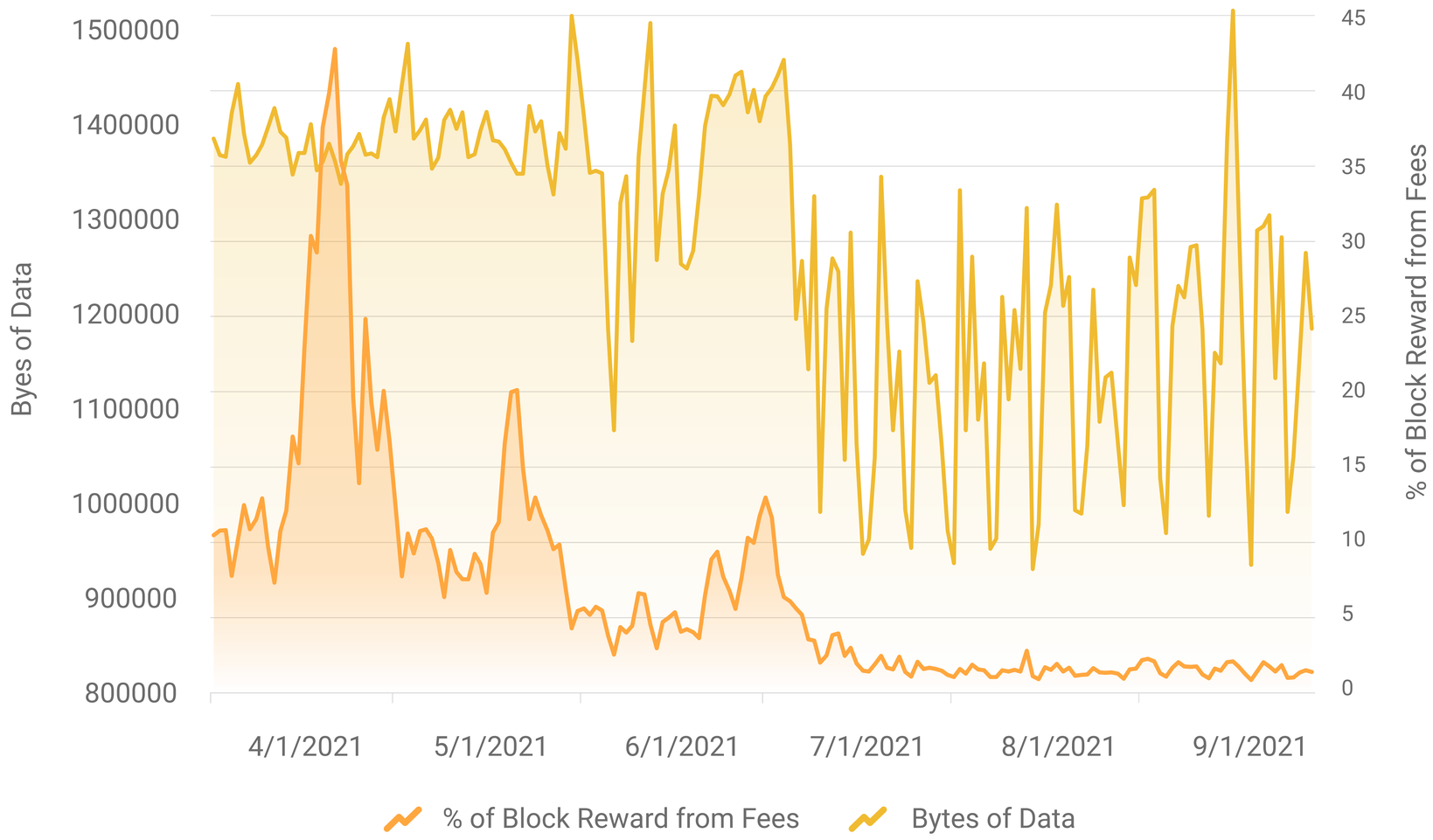
The puzzling part, though, is that there aren't substantial differences in the number of on-chain transactions or average block sizes when we compare the Spring mania to Q3. **In Q2, there was an average of 1,914 transactions per block, while this average fell to 1,613 in Q3. This constitutes a 15% decrease, while the share of fees as total block rewards fell 82% during the same time frame.** As on-chain volume dampens, we'd expect to see some change in total transaction fees, but nothing this extreme.

Average Daily Transactions vs Fess as a % of Block Subsidy



To tease this out a bit more, the average **block size for each quarter fell from 1.32 MB in Q2 to 1.06 MB in Q3, a roughly 20% change.** Again, this is a significant drawdown, but not so much that we should expect an 82% decrease in total fees.

TX Fees as % of Block Subsidy vs. Block Size

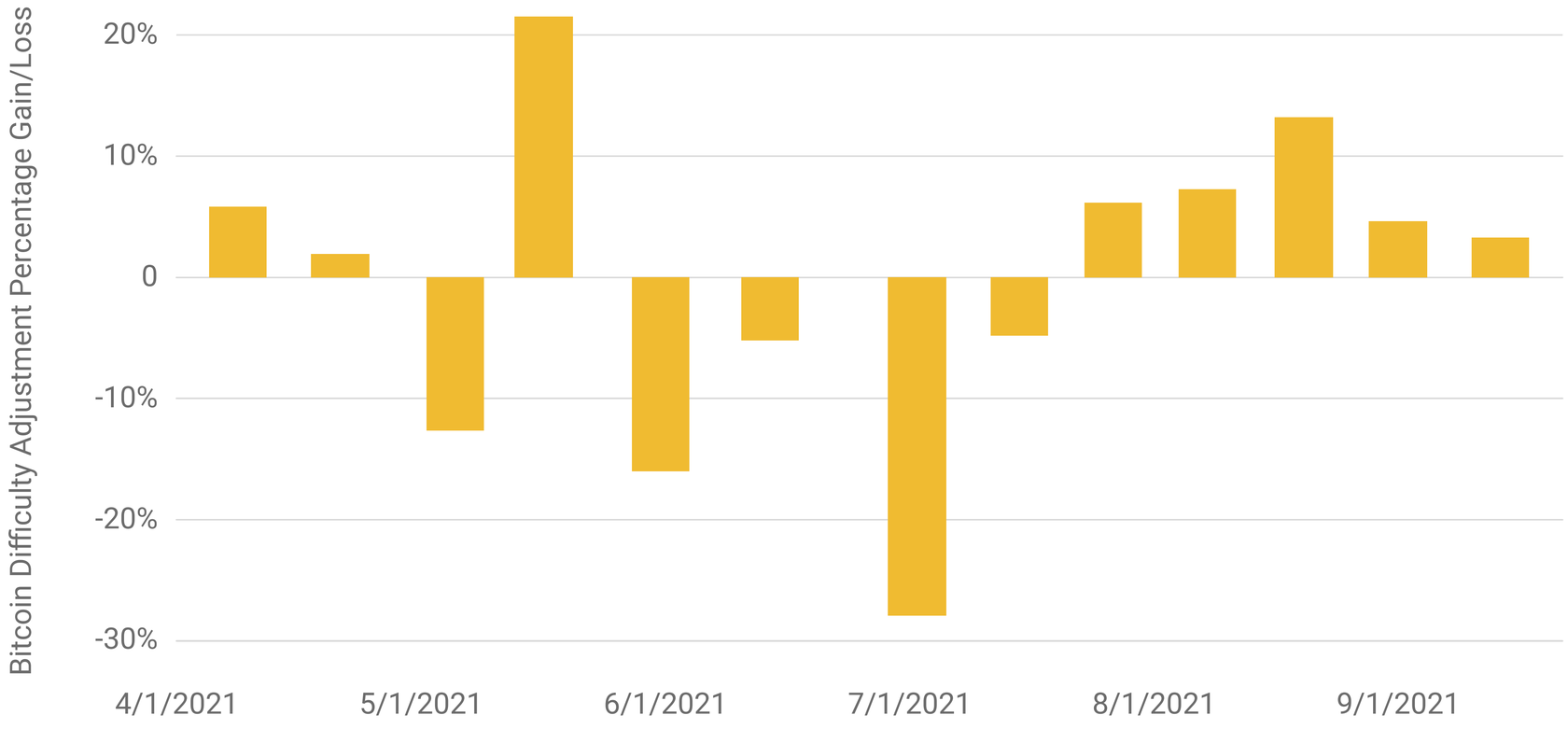


3

Bitcoin Difficulty and Daily Blocktimes Whipsaw

Bitcoin’s difficulty has been on a slingshot trajectory since China’s hashrate blackout. That’s what happens when hashrate is cut by more than half within a matter of weeks and recovers some 75% in a matter of months--Bitcoin’s difficulty gets whipped around as it tries to catch up to the volatility in block production times.

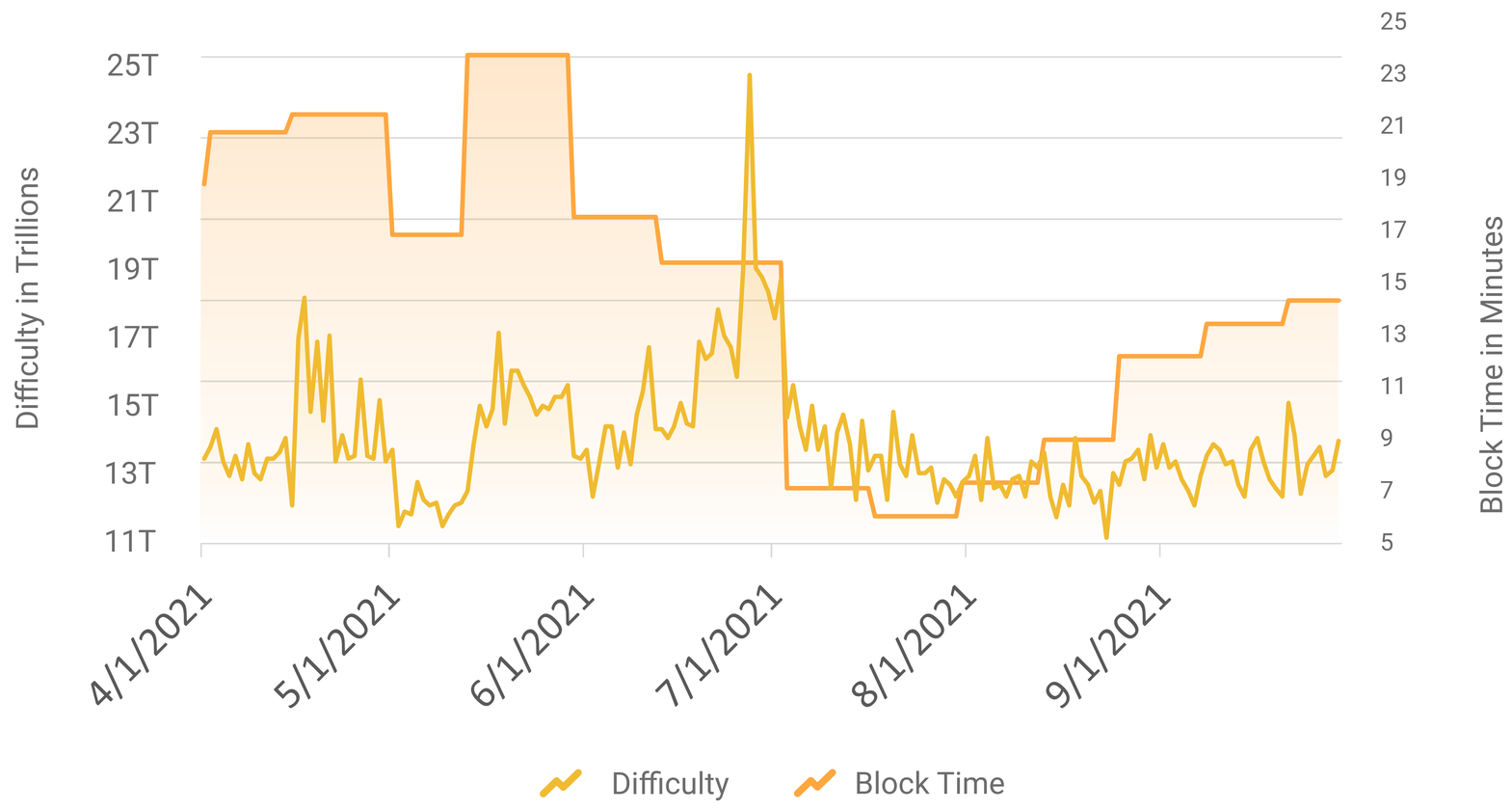
Bitcoin Difficulty Adjustment Percentage Gain/Loss



Looking at daily average block times, these difficulty swings come into focus.

On the 27th of June, for example, the average block time was a jaw-dropping 23 minutes (while June’s overall average was 12.6 minutes). Contrast this with August 15th, when we saw an average of 7.9 minute block times (and an 8.2 minute average for the whole of August).

Bitcoin Difficulty vs. Average Daily Block Times



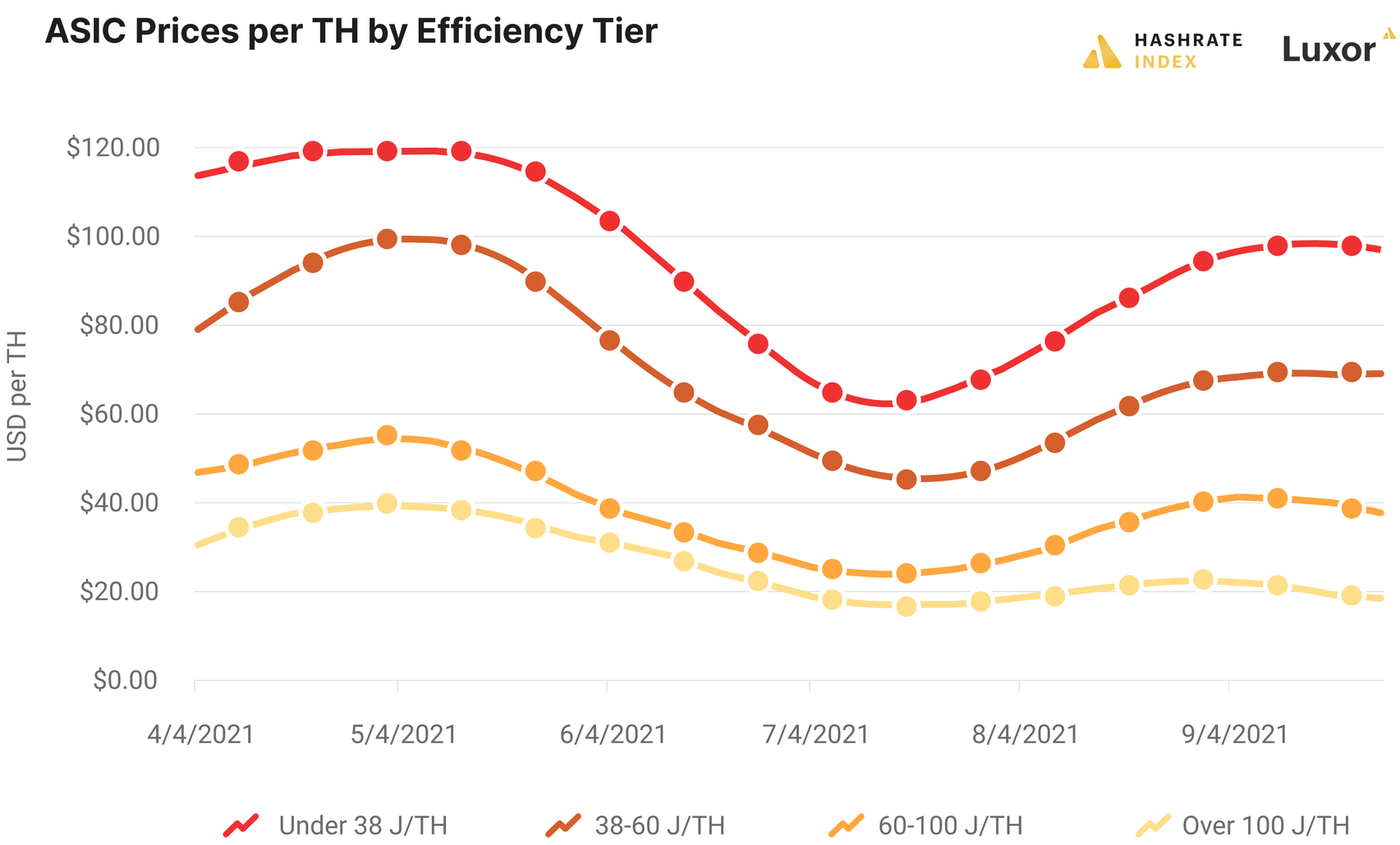
We anticipate that these swings in both difficulty and block times will smooth out over the next quarter as the disruptions caused by China's ban ease. That said, we in no way anticipate difficulty to flatten over the next quarter or for the first half of next year. As Chinese miners continue to relocate and North American miners turn on pre-ordered machines by the tens-to-hundreds of thousands, difficulty will skyrocket on pace with hashrate.

4

ASIC Prices Dip Then Rip

Everything follows bitcoin's price in this market, and ASICs are certainly no exception.

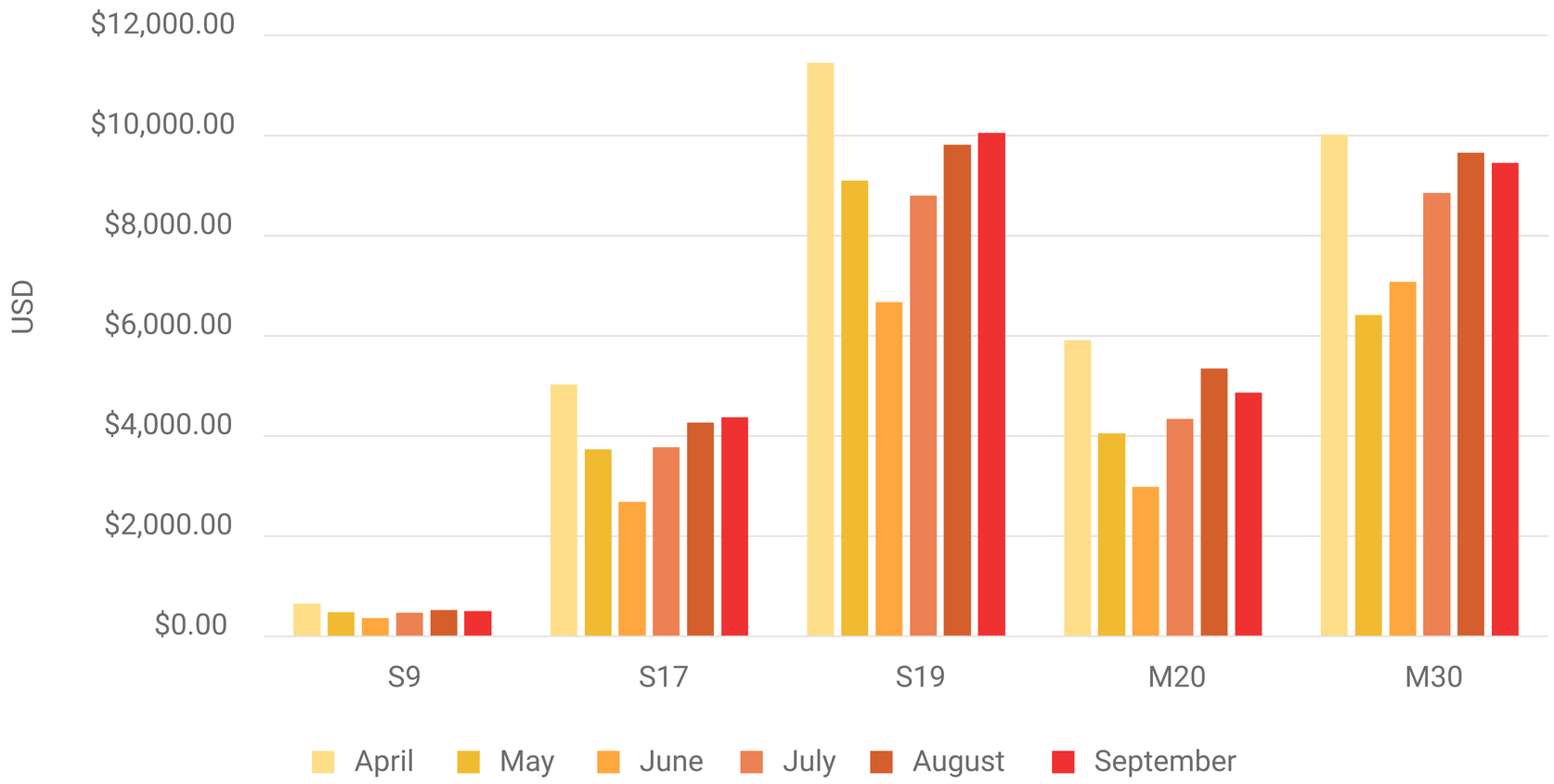
When bitcoin tanked this summer, mining rigs fell with it, something that was exacerbated by frenzied liquidations following China's mining ban. In the resale market, some Chinese miners opted to sit on their rigs and keep them in storage, while others liquidated. **The average price per terahash of an S19 and similar hardware, for instance,fell 48% from its summer high of $119.25 to its summer low of $62.04. Still, new gen rigs closed Q3 out at an average price per terahash of $93.68, rising 51% over the period.**



Newer generation rigs like the Antminer S19 and Whatsminer M30 series are beginning to separate themselves from the pack. Miners are understandably prioritizing these rigs as they consume less electricity per terahash and are more profitable to operate. They also take up less rack space to achieve the same level of output of older models (for example, it takes roughly 7 S9s to achieve the same hashrate as a 100TH S19J Pro, and these S9s would consume more than twice the electricity of the S19).

Older machines, then, are being phased out of farms with higher electricity cost and shipped to countries with lower power cost (like Venezuela, to name one example), oil and gas mining sites, and to the homes of hobbyist miners.

Monthly Average Price of Popular Rigs



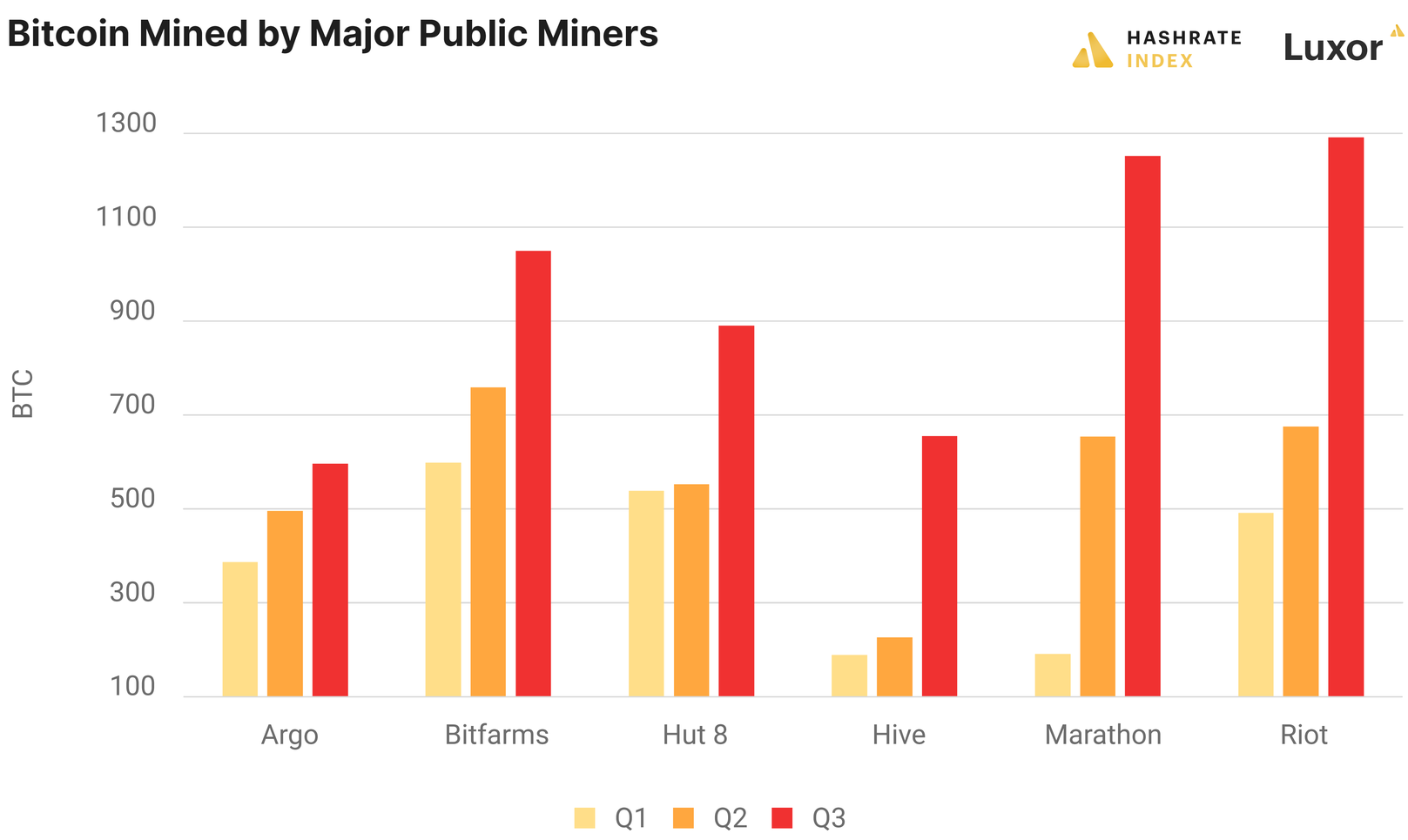
Month	S9	S17	S19	M20	M30
April	$651.19	$5,021.80	$11,451.33	$5,909.82	$10,015.75
May	$476.79	$3,729.46	$9,096.34	$4,050.95	$6,412.74
June	$366.86	$2,686.19	$6,673.44	$2,978.78	$7,079.05
July	$472.67	$3,774.79	$8,800.59	$4,338.69	$8,854.47
August	$525.41	$4,270.43	$9,812.96	$5,341.56	$9,654.58
September	$500.60	$4,374.18	$10,053.23	$4,864.60	$9,457.10

With Bitcoin's price overtaking $50k once again, rig prices will likely rise from here after cooling off from this summer's meteoric recovery. Assuming we see a bitcoin all-time high sometime this quarter (or even something close to it), expect rigs to reclaim their own all-time high valuations, as well--perhaps as soon as next month.

5

North American Bitcoin Miners Profit From the Migration

Anyone with hardware online in the aftermath of China's hashrate exodus saw an uptick in profitability, and nowhere is this more clear than in the Q3 production of North American mega-farms.

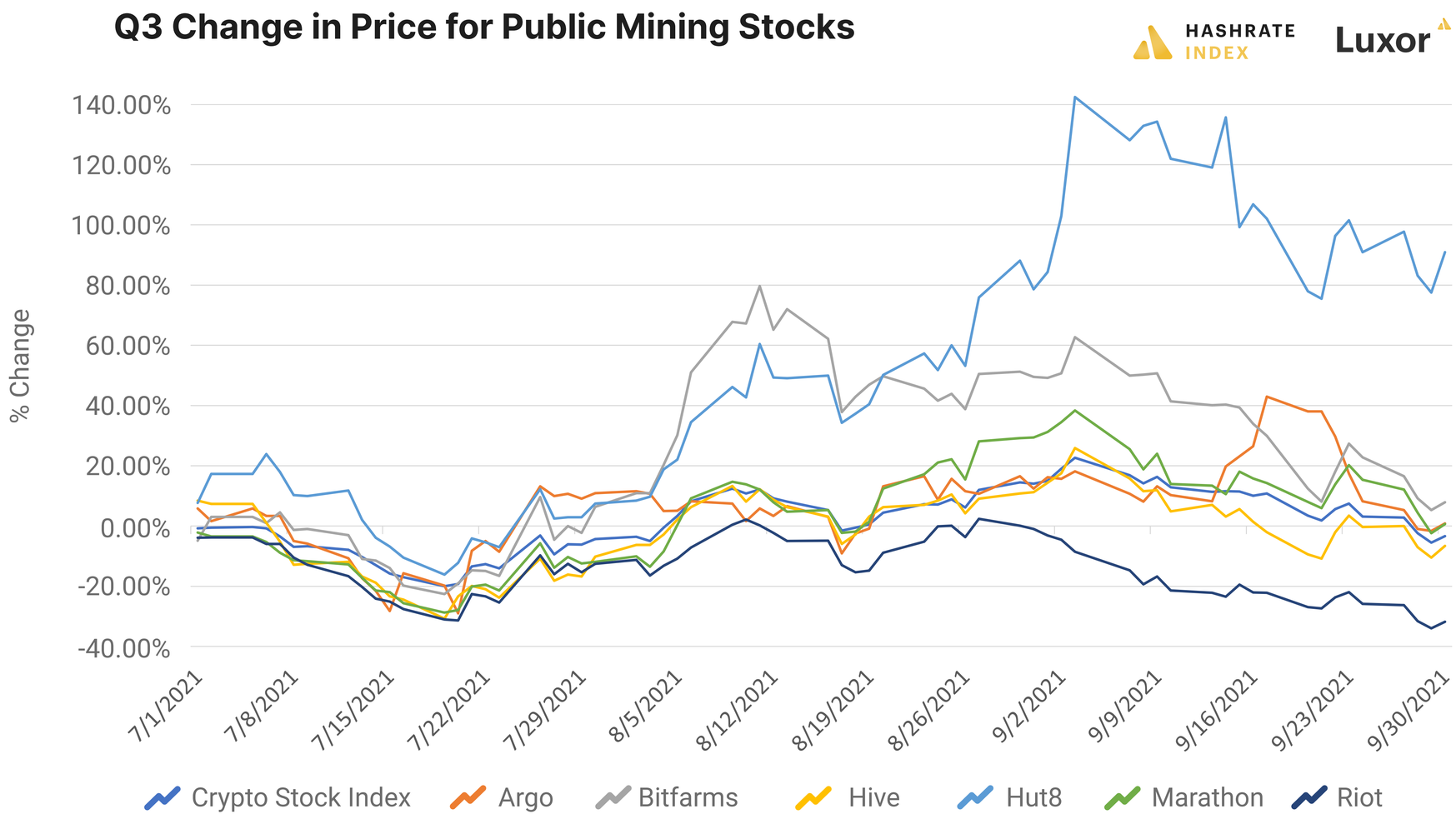


Collectively in Q3, these miners mined 79% more bitcoin than they did in Q2 and 155% more than they mined in Q1.

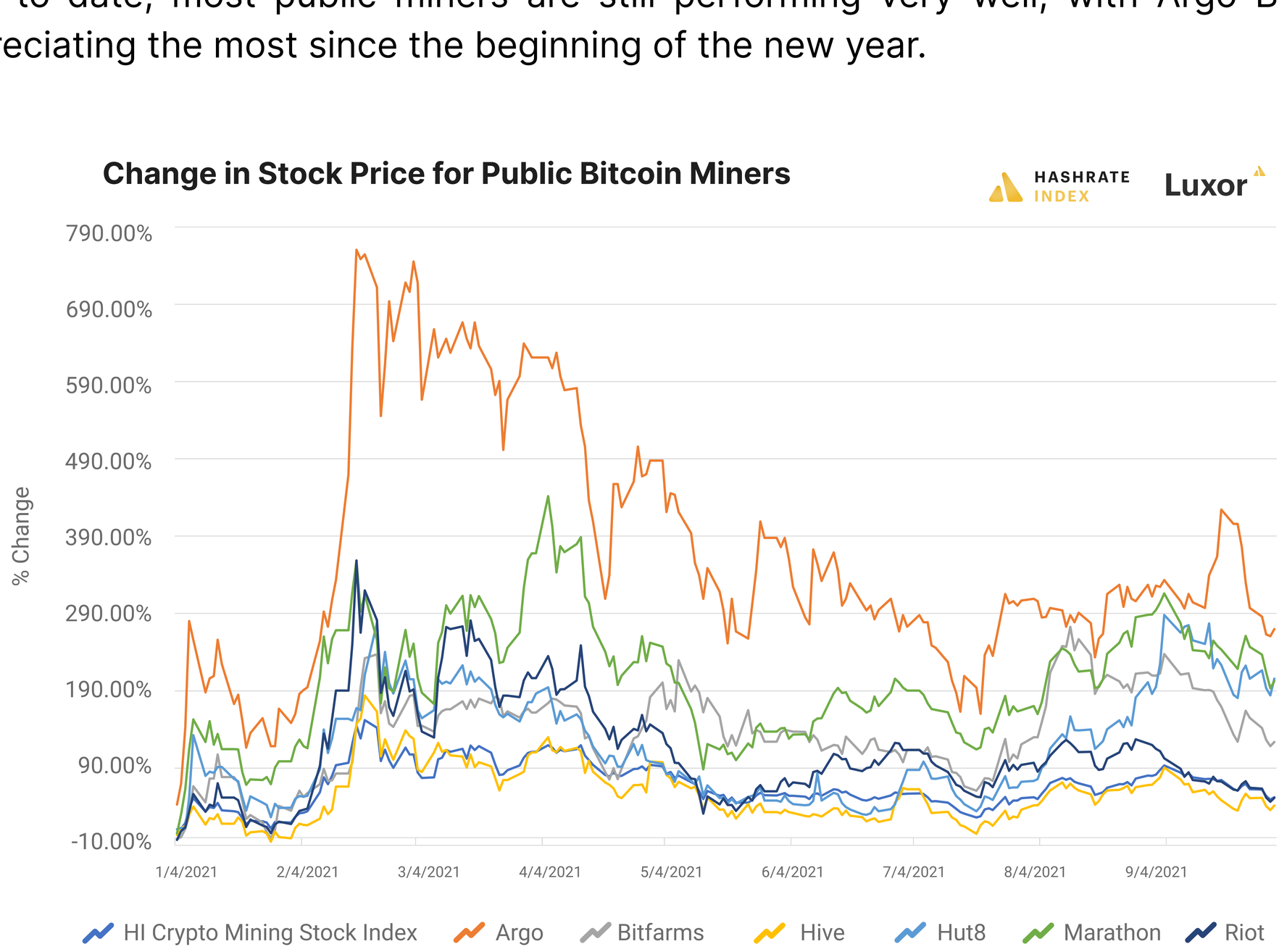
With competition clipped by China's mining ban, the public miners are producing more blocks than they otherwise would have if China's mining industry, which represented anywhere between 50-60% of the network's hashrate before the ban, were at full capacity. In addition to having their competition reduced, these miners also added new machines to their fleets over the quarter, thus improving their hashrate.

Quarter	Argo	Bitfarms	Hut 8	Hive	Marathon	Riot
Q1	387 BTC	598 BTC	539 BTC	189 BTC	191 BTC	491 BTC
Q2	496 BTC	759 BTC	553 BTC	226 BTC	654 BTC	675 BTC
Q3	596 BTC	1050 BTC	890 BTC	655 BTC	1252 BTC	1291 BTC

Even with such a blockbuster production for the quarter, the stock prices for most public miners did not see any outsized returns (with the exception of Hut 8, which not only transcended its all time high in Q3 but which also appreciated 90% over the course of the quarter).



Year-to-date, most public miners are still performing very well, with Argo Blockchain appreciating the most since the beginning of the new year.



6

Predictions for Q4 and Beyond

With the close of Q3, Bitcoin has emerged from one of its greatest--if not the greatest--stress tests to date.

The time-honored FUD that China controls (or will attempt to control bitcoin) is now moot. Hashrate is being distributed around the globe with North America emerging as the new dominant hub.

Given the current trajectory of mining markets, we anticipate the following for Q4:

1. **Hashrate will close Q4 near its all-time high range, somewhere in the ballpark of 185 EH/s.**
2. **ASIC prices will exceed the all-time highs they set this Spring.**
3. **Hashprice will transcend its yearly high and close the year above $0.50/TH**
4. **We will continue to see successive upward difficulty adjustments, though none will be as drastic as the largest positive adjustments we experienced in Q2 and Q3.**
5. **Transaction revenue from fees will at least double.**

HASHRATEINDEX.COM

TWITTER.COM/HASHRATEINDEX

HASHRATE
INDEX