



The Weekly Hash, 12/16/21

Bitcoin Miners Trail BTC as Difficulty, Price Drive Economics Lower; Hash Outlook Relatively Benign

Bitcoin dropped 3.3% week-on-week (WoW), settling at \$48,830 as of midnight UTC on 12/15, but is up slightly today vs. last Thursday. Several Bitcoin miners have outperformed Bitcoin YTD as well as today, but most trail BTC since 9/30.

Saturday's difficulty adjustment saw an increase of 8.3%, equivalent to a target Hashrate of 172.5 EH/s. The ProShares BITO ETF trails BTC by 2.2% since fund inception; the fund launch correlates strongly with increased CME open interest, as AUM increased rapidly in the first week from launch.

The CME Futures curve has flattened at the front end, inside the liquidity window. Current open interest fell 1.4% WoW to 13,250 lots. The Commitment of Traders data from 12/7 shows that spreading positions increased, while commercial players reduced their longs. The non-commercial player net length on the CME is now short just 117 lots, compared with 729 lots (the YTD minimum) two weeks prior.

Total BTC earnings per PH/s are ~5.26 mBTC, down from ~5.69 mBTC / PH/s last week largely driven by the higher target hashrate (1mBTC or milliBTC = 1/1000 BTC). Transaction fees gained 26 bps WoW to 1.3% of miner rewards, or 0.08 BTC per block. The "Mempool" shows low congestion levels, with 3,912 pending transactions. We continue to assess congestion will likely stay low for awhile with the falloff of trading activity in Asia, where a higher percentage of on-exchange

transactions result in on-chain transactions, as well as increasing Layer 2 adoption, such as the Lightning Network.

Bitcoin mining revenue fell to \$257 / PH/s per day and \$280/MWh, near the lows over the past 30 days, driven by both price and the higher difficulty. Miner economics are on track to come in modestly better than our previous year-end estimate. The current block rate suggests that the actual year-end Hashrate will fall short of our prior 198EH/s forecast, and will likely be closer to 170-180EH/s.

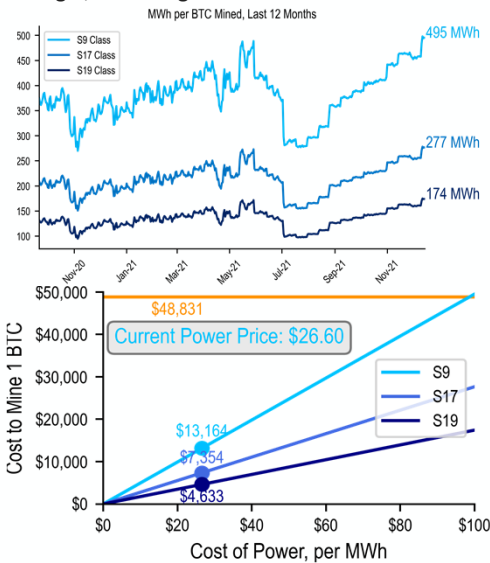
The BitOoda North American Hash Spread™ fell 4.8% from \$266 to \$254.

We define the BitOoda Hash Spread™ as the difference between the cost of power per MWh and the Bitcoin mining revenue per MWh. This gives miners a quick sense of the surplus generated by their business to cover personnel, overhead, depreciation, and profit. The weighted average around the clock U.S. wholesale industrial power price (5 markets) fell to \$26.60 / MWh, leading to an aggregate spread of \$254.

	S9 Class	S17 Class	S19 Class
Hash Spread	\$72	\$150	\$254
Week on Week	13.4%	-0.4%	-4.8%

Older-gen S9-class devices saw their Hash Spread™ up ~13% to \$72/MWh. S17-class devices, the bulk of the installed base, saw a hash spread of about \$150/MWh.

It now takes 174 MWh to mine 1 BTC using S19-class rigs, while S17-class machines consume 277 MWh, and S9-class, 495 MWh. This translates into \$4,633 in power expense to mine 1 BTC with S19 class rigs, and \$13,164 using S9 rigs, a ~73% contribution margin, excluding labor.



Takeaways

- Mining retains attractive margins, with downside to our prior Hash estimates helping maintain margins despite price declines.
- However, most miners continue to underperform Bitcoin
- Net length improved to short 117 lots, recovering from short 729 lots two weeks ago

Please see [slide 10](#) for important disclosures.

Research

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BTC Price \$48,925
 (12/16 at 10am EDT)

Obs Hashrate 166 EH/s

Bitcoin Miners 7 Day Performance

Mawson	26.7%
Stronghold	1.0%
S&P	0.9%
Bitcoin	0.8%
Ebang	-0.4%
Greenidge	-0.6%
Cathedra	-4.2%
Argo	-4.8%
Canaan	-6.6%
Hive	-6.8%
Riot	-7.2%
Iris Energy	-7.6%
Digihost	-8.2%
Bit Digital	-8.8%
Hut8	-9.4%
Bitfarms	-11.5%
Marathon	-11.7%
Cipher	-12.8%
Northern Data	-14.8%
Terawulf	-49.5%



BitOoda 2021 Hash Estimates

~198 EH/s by Year End Would Be a Stretch

- On September 16, we estimated a ~198EH/s year end (YE) 2021 target Hashrate
- Since then, target Hashrate continues to recover, although it is slightly lower than we had expected at this point and currently stands at 172.5 EH/s
- With just one reset left this year and block count about 20 below expectations at this point in the epoch, the next difficulty reset may end up being negative
- This is perhaps linked to the shutdown and migration of mining activity out of Asia
- **Thus, miner profitability may modestly exceed our expectations over the next few months**

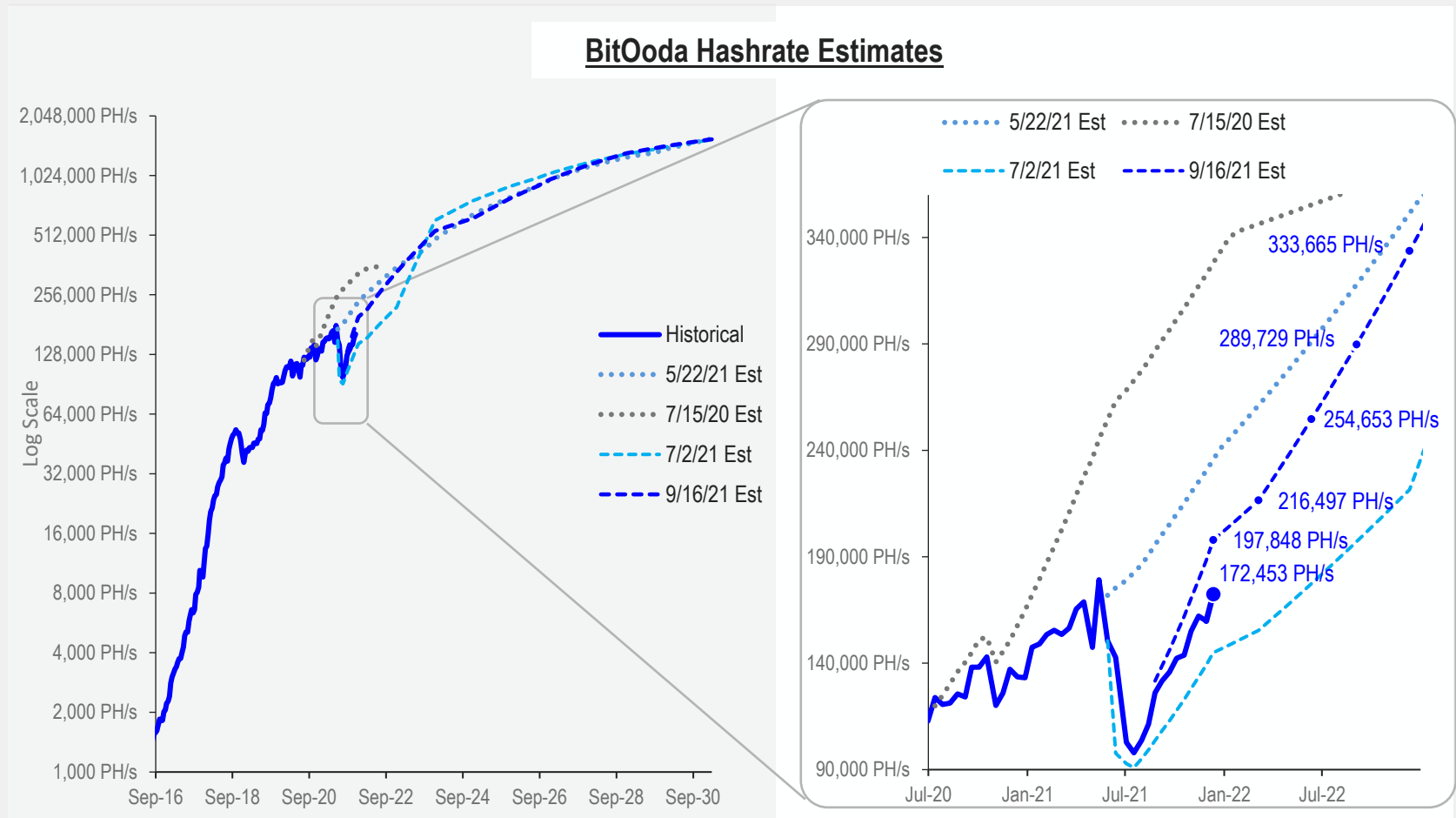


Figure: Historical and Estimated Target Hashrate 2017-2030
 Historical as of 12/11/21; Estimates as of 9/16/21, 7/2/21, 5/22/21, and 7/15/20

Source: BitOoda estimates, CoinMetrics



Bitcoin Miners: Performance Map

- Most public Bitcoin miners have underperformed the asset over the past month, seven days and MTD / QTD
- On a YTD basis, several have outperformed BTC, including Mawson (MIGI) and Marathon (MARA)

	Year to Date	Quarter to Date	Month to Date	30 Day	7 Day	1 Day
Mawson, 266.2%						Stronghold, 4.1%
Marathon, 250.0%						Northern Data, 0.6%
Hut8, 197.5%						Canaan, 0.2%
Bitfarms, 170.5%			S & P, 3.1%			Cipher, 0.2%
Cathedra, 133.8%			Stronghold, (2.0%)		Mawson, 26.7%	S & P, 0.0%
Terawulf, 75.1%	Bitfarms, 20.9%		Ebang, (9.9%)	S & P, 0.2%	Stronghold, 1.0%	Bitfarms, (1.3%)
Digihost, 67.3%	Marathon, 15.7%		Greenidge, (12.9%)	Northern Data, (18.3%)	S & P, 0.9%	Mawson, (1.4%)
Bitcoin, 65.4%	Bitcoin, 11.4%	Bitcoin, (15.3%)	Bitcoin, (20.0%)	Bitcoin, 0.8%	Bitcoin, (1.6%)	Bitcoin, (1.6%)
Riot, 44.8%	S & P, 9.3%	Mawson, (23.1%)	Greenidge, (22.1%)	Ebang, (0.4%)	Greenidge, (2.2%)	Greenidge, (2.2%)
Hive, 44.4%	Northern Data, 7.8%	Cathedra, (23.4%)	Cathedra, (30.7%)	Greenidge, (0.6%)	Cathedra, (2.6%)	Cathedra, (2.6%)
S & P, 25.4%	Cathedra, 3.0%	Iris Energy, (24.4%)	Stronghold, (30.9%)	Cathedra, (4.2%)	Ebang, (3.3%)	Ebang, (3.3%)
Northern Data, (2.4%)	Hive, 2.2%	Northern Data, (25.5%)	Mawson, (31.3%)	Argo, (4.8%)	Argo, (3.4%)	Argo, (3.4%)
Canaan, (7.1%)	Hut8, (2.6%)	Hive, (27.6%)	Ebang, (31.7%)	Canaan, (6.6%)	Hive, (3.5%)	Hive, (3.5%)
Cipher, (48.0%)	Bit Digital, (3.6%)	Digihost, (28.4%)	Hive, (32.3%)	Hive, (6.8%)	Digihost, (3.9%)	Digihost, (3.9%)
Bit Digital, (68.2%)	Riot, (4.3%)	Marathon, (28.4%)	Riot, (33.3%)	Riot, (7.2%)	Bit Digital, (4.5%)	Bit Digital, (4.5%)
Ebang, (78.2%)	Digihost, (8.5%)	Bit Digital, (29.2%)	Marathon, (34.0%)	Iris Energy, (7.6%)	Riot, (4.9%)	Riot, (4.9%)
,	Canaan, (9.8%)	Argo, (30.1%)	Bit Digital, (36.2%)	Digihost, (8.2%)	Hut8, (5.2%)	Hut8, (5.2%)
,	Argo, (21.2%)	Hut8, (32.1%)	Argo, (36.9%)	Bit Digital, (8.8%)	Marathon, (5.6%)	Marathon, (5.6%)
,	Mawson, (23.1%)	Bitfarms, (32.8%)	Cipher, (37.6%)	Hut8, (9.4%)	Terawulf, (10.6%)	Terawulf, (10.6%)
,	Ebang, (30.3%)	Riot, (34.2%)	Bitfarms, (39.0%)	Bitfarms, (11.5%)		
	Greenidge, (33.9%)	Cipher, (34.5%)	Hut8, (41.2%)	Marathon, (11.7%)		
	Terawulf, (38.5%)	Canaan, (37.3%)	Digihost, (43.9%)	Cipher, (12.8%)		
	Cipher, (50.0%)	Terawulf, (47.8%)	Canaan, (48.5%)	Northern Data, (14.8%)		
			Iris Energy, (51.0%)	Terawulf, (49.5%)		
			Terawulf, (57.4%)			

Source: Bloomberg

Futures Curve Front End Flat

Open Interest Dipped 1.4% WoW

- The futures curve is essentially flat through March, with slight backwardation for the active contract.
- Liquidity is limited to the front two months, and dries up rapidly thereafter
- CME open interest increased 3.9% vs. two weeks ago but fell 1.4% vs. last week to 13,250 lots
- Open interest for December is beginning to come down, while January and February both ticking up



Figure: Bitcoin futures metrics

Source: CME, Bloomberg



CME YTD Open Interest Flattish in December

- CME Bitcoin Futures open interest increased significantly ahead of the launch of the Bitcoin Futures ETFs
- It fell back after the October expiry, and climbed through most of November
- While it dropped with the Nov futures expiry, OI has been mostly stable

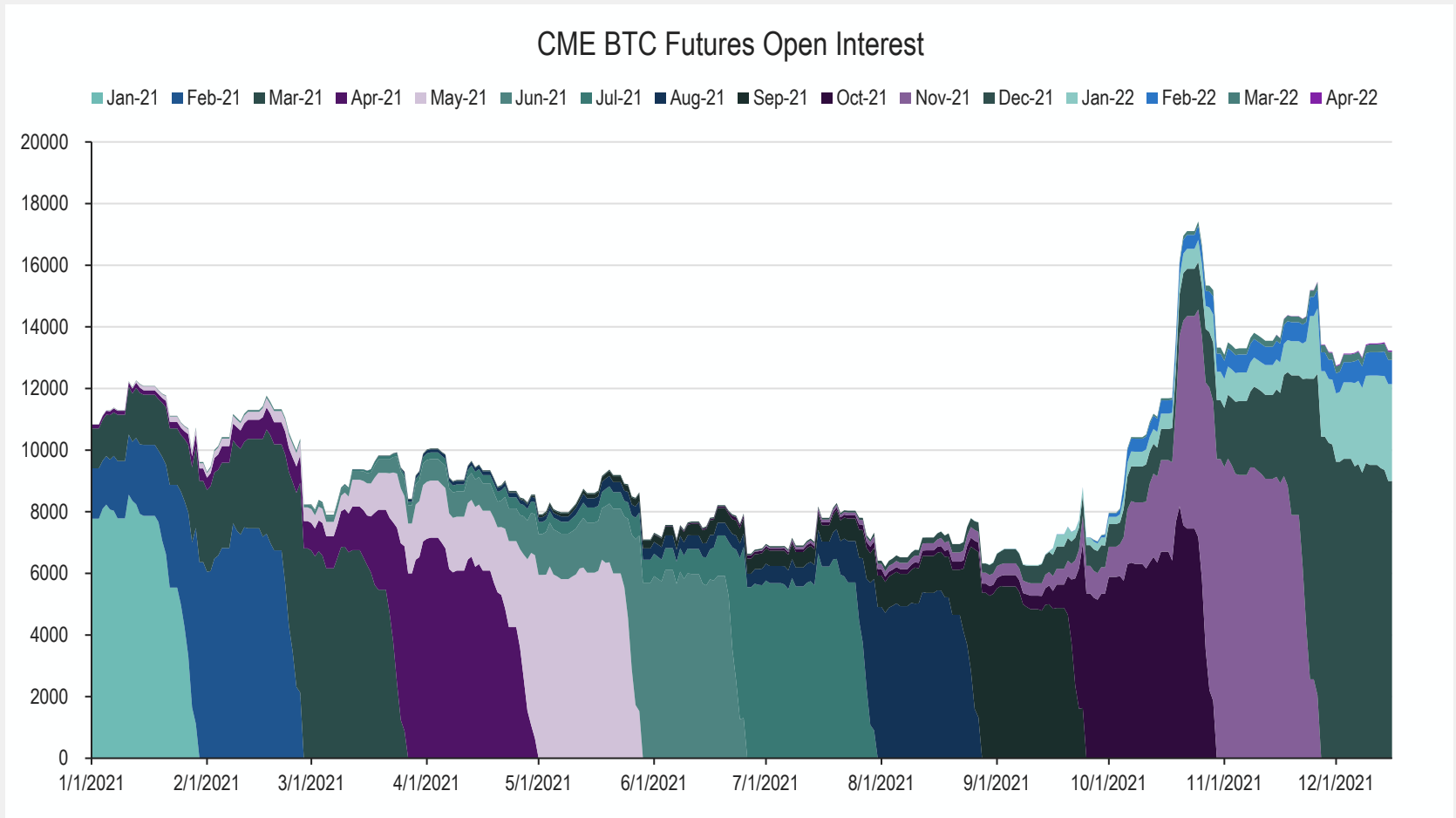


Figure: CME BTC Futures Open Interest history

Source: Bloomberg



ProShares Futures ETF BITO Slightly Below BTC

- The ProShares ETF BITO currently has a market cap of \$1.3 billion
- The ETF has underperformed Bitcoin by 2.2%, declining by 25.5% since launch vs. a 23.3% decline in the price of BTC in the same timeframe

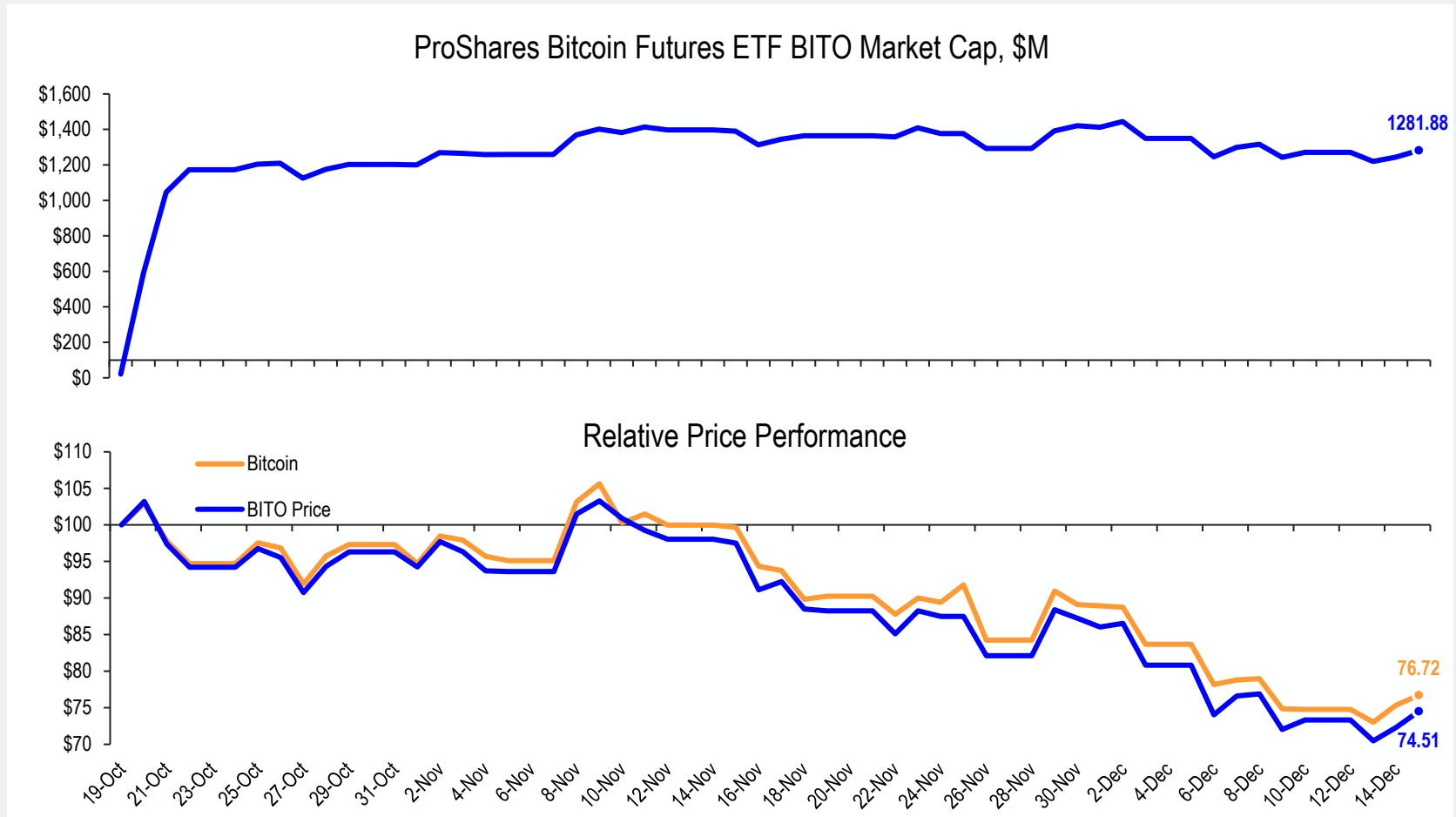


Figure: ProShares Bitcoin Strategy Futures ETF market cap and price performance compared to Bitcoin

Source: Bloomberg

CME Commitment of Traders 12/7 Open Interest Climbed

- The CME Bitcoin Commitment of Traders report shows that open interest increased slightly to 12/7
- Data shows 13,242 lots on 12/7, compared with 13,197 on 11/30/21
- Spreading positions increased, alongside asset managers
- Leveraged players increased their Net Short positions, while Commercial players reduced their net length significantly

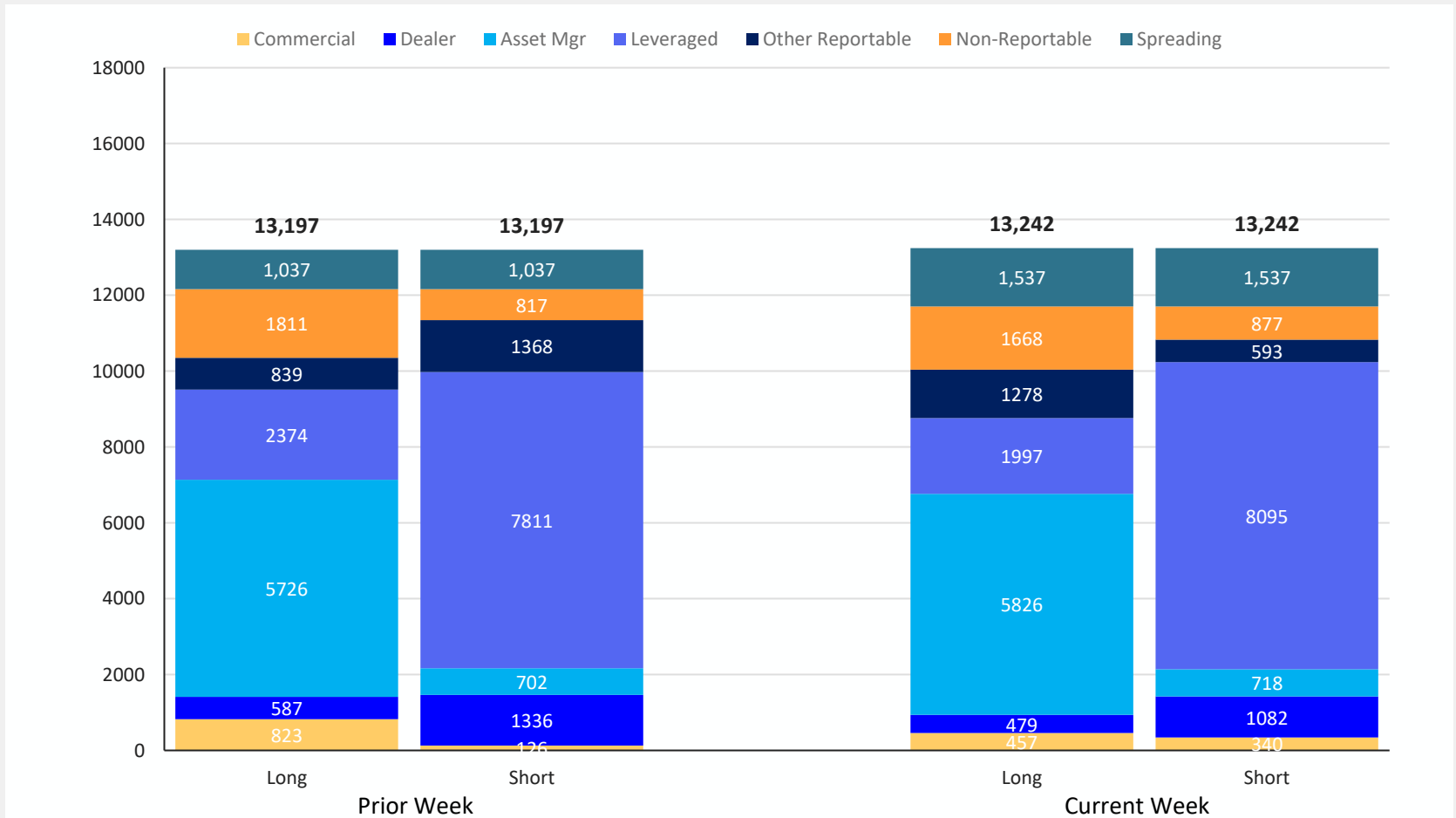


Figure: CME Bitcoin Commitment of Traders, 12/7/21 and 11/30/21

Source: Bloomberg





Non-Commercial Net Length Short 117 Lots

- Commercial Bitcoin players are not very active in the options space, participating mainly in the futures arena
- Commercial positioning has been largely long futures
- As a result, the net position for non-commercial market participants has been largely short
- The net length for non-commercial participants is now short 117 lots, a significant amount of short covering compared with the 729 year low three weeks ago

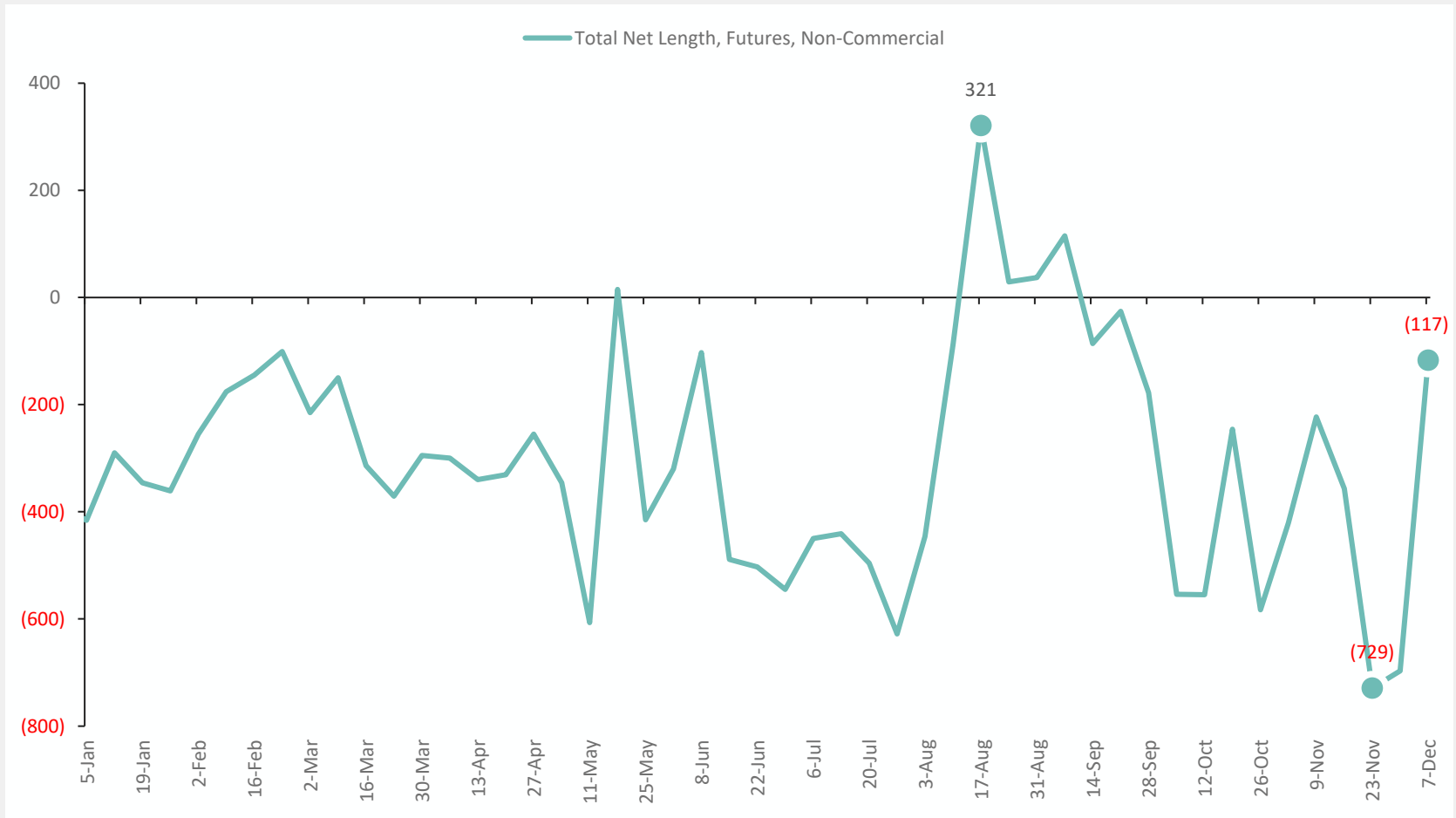


Figure: CME Bitcoin Future Non-Commercial Net Length, YTD

Source: Bloomberg

BitOoda Hash™ Dashboard

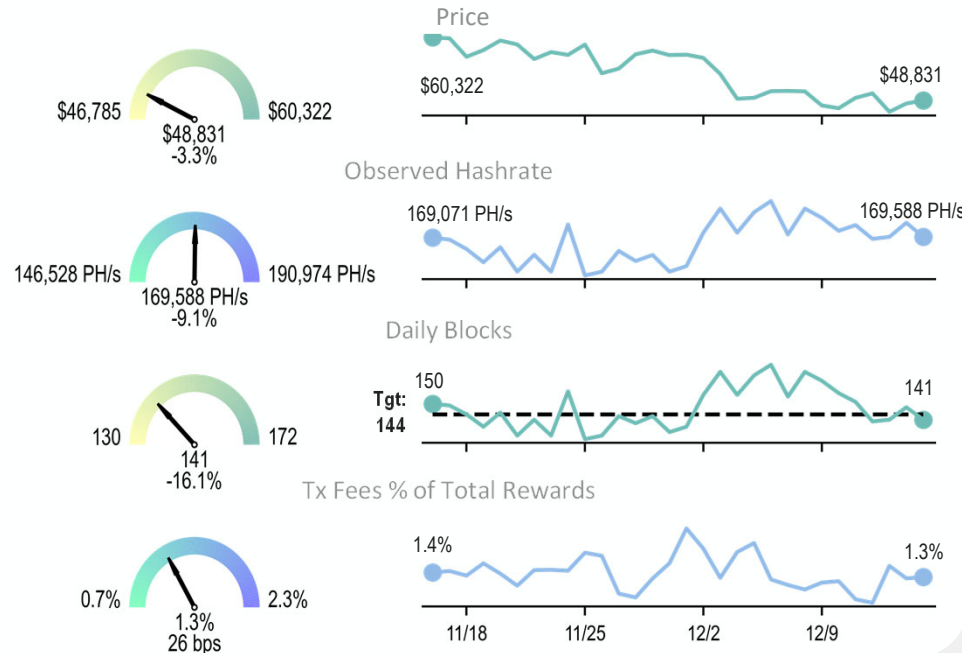
December 16, 2021

Definitions

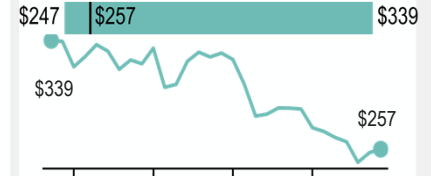
Hash Spread: the difference between the revenue per MWh from mining BTC and the weighted average cost of peak and off-peak power across 8 US zones. It is a quick measure of the profitability of US-based latest-generation mining rigs.

MWh: Megawatt hour
PH/s: Petahash per second
Tx Fees: Fees for BTC transactions

30 Day Range and 7-day % change



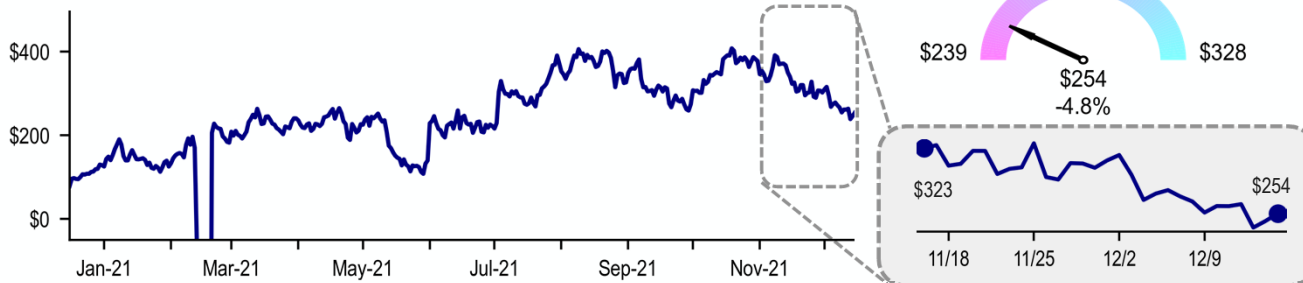
Daily Revenue per PH/s



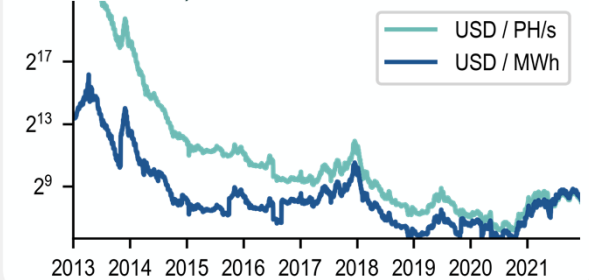
Revenue per MWh (\$19 Class)



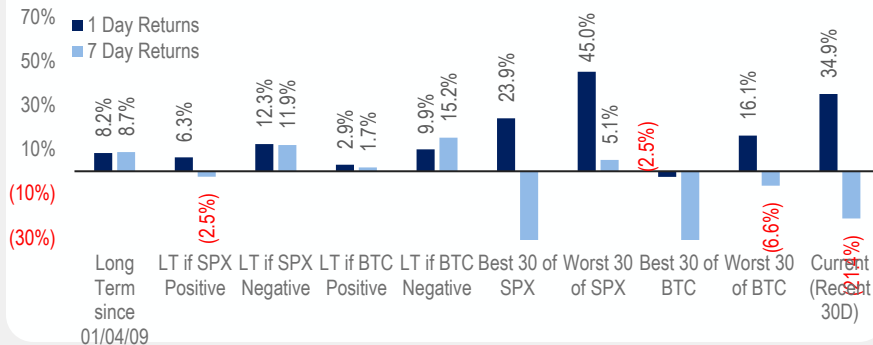
BitOoda North American Hash Spread™



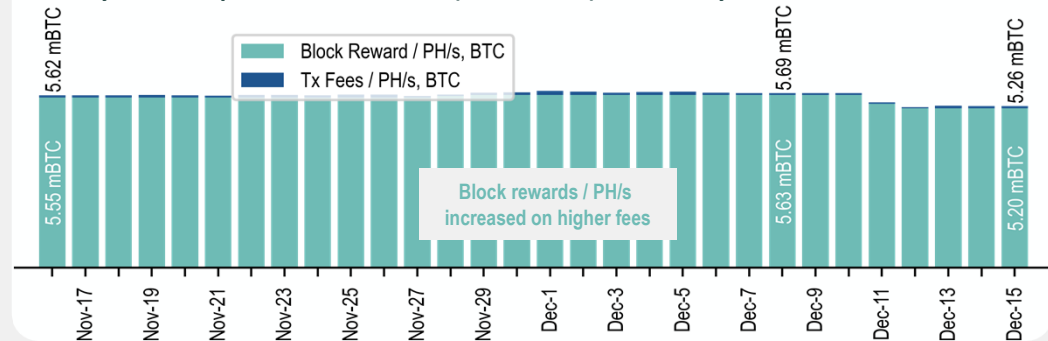
Revenue, since 2013



Historical BTC Correlation to S&P500



Daily Rewards per PH/s, in milliBTC (1/1000 BTC), last 30 days





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