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Analyst Retrospective March 2022

DeFi liquidity ignored in market valuations

Looking at token prices of Decentralised Finance protocols is particularly scary with some down over 80% in value since their peak. Is the fad dead? It's a complicated question to answer. In this analyst retrospective, Copper looks at growth, decline and utilisation across popular protocols to assess whether or not there is more than meets the eye.

It's no secret that DeFi lending protocols have primarily been used by traders looking to take a position in markets, long or short. With interest rates now less appealing than they used to be, although still multiples higher than what we can see in the traditional finance sector, total value locked (TVL) sitting on these protocols have plummeted by over 50%.

However, longtime readers of Copper's research know well that this team is not one to settle for such a simplistic metric such as TVL (read report). As such, we revisit some of the metrics developed by our team to assess valuations and utilisation across protocols and how they line up against similar competing platforms.

On lending

Copper asserts that at the most basic level, DeFi lending protocols should be measured by outstanding debt. The simple reality is that injecting liquidity into these markets is a fairly easy task. Liquidity providers are earning interest and tokens for their parked capital and technological risk.

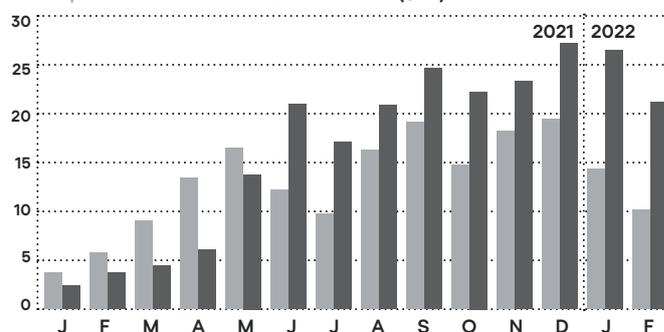
But it's ultimately the borrowers who define the attractiveness of the product and overall market demand of these platforms as they're the ones paying for it.

Compound and Aave have taken massive valuation hits versus what was seen last year. At peak, markets had valued Compound at over \$4bn. At the start of March 2022, this was under \$1bn. And with fairly good reason too. At peak, utilisation of liquidity, meaning outstanding debt-to-liquidity was 41%.

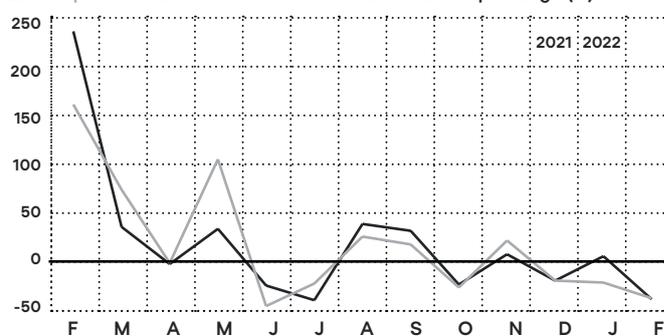
Locked value on Aave is nearly double that seen on Compound with the latter catering to multiple blockchains (see chart 1). Yet, market valuations changes have been nearly identical (see chart 2). Clearly, increased liquidity and the larger audience isn't being factored into how markets are valuing the protocols.

Which begs the question, what are markets valuing?

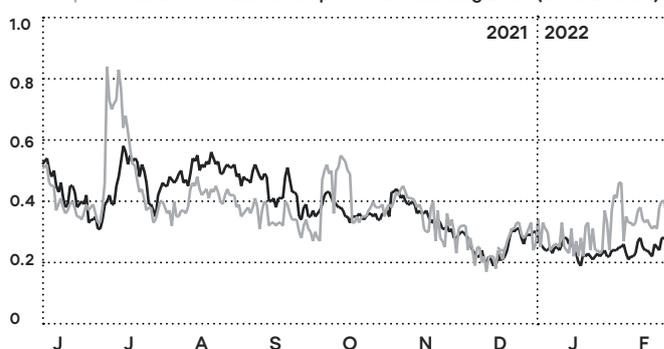
1: Compound and Aave Total Locked Value (\$bn)



2: Compound and Aave month-on-month market cap change (%)



3: Compound and Aave Market Cap-to-Outstanding Debt (MCOD Ratio)



Despite significant market cap differences, participants are clearly valuing these two competing lending protocols in tandem. With Aave having nearly \$10bn more residing on its books of available supply, token prices aren't reflective on this dynamic.

A closer look at the utilisation of liquidity tells a more important story as to what markets are really seeing. Market cap-to-outstanding debt shows that valuations changes will be made based on demand rather than the supply (see chart 3).

This ratio, which appears to travel together, discounts the liquidity gap and boils down the market valuation to the most significant form: demand.



On Exchanges

Decentralised exchange (DEX) Uniswap has simply outclassed not only every competing protocol but has also seen the largest market share grab in the whole DeFi space (see chart 4).

At the end of February, Uniswap was responsible for nearly 80% of all traded volume on DEXs. Its market cap on the other hand has gone exactly the opposite direction with its token being valued at an 80% reduction from its all-time-high.

Markets might be over discounting relative to historical utilisation and very much disregarding that Uniswap has cornered the market, with competing protocols being stagnant.

Now, granted, circulating supply has increased significantly since 2021. But exchange supplies have been moving sideways. And trading volume, the protocol's selling point, has traded above 2021 average so far this year.

Relative to historical traded volumes, Uniswap's token is trading at levels seen when the protocol was only half its size. And that's without considering the market share either (see chart 5).

As far as use case and demand, the protocol might possibly be well undervalued in this latest market correction.

On Asset Management

One of the more interesting protocols in DeFi is Enzyme Finance, a project we've mentioned previously in our *Under the Radar* series that allows funds to spin up operations fairly quickly and cost-effectively.

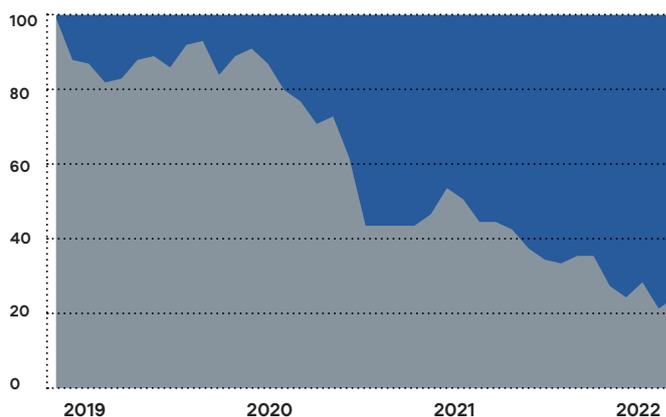
As the potential for digital assets and tokenisation grows, Enzyme has virtually no competitor in its class, although there are a few such as dHedge gunning for market share in this niche space.

Despite several market downturns in the past year, the protocol's AuM, it's very core competency, has grown over 10-fold (see chart 6). Its token, which reduces in supply the more the platform gets used, is nearly 80% down from a year ago.

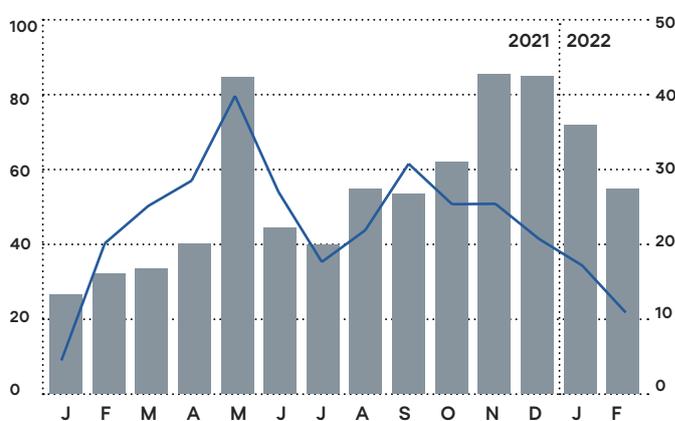
Mismatched valuations

Markets have significantly discounted cryptocurrency tokens since the massive DeFi craze of 2021. But the reality of actual usage is starkly different when looking at key platforms utilisation of their core competency. Although general soundings on DeFi have become lackluster, demand is higher than the start of 2021.

4: Uniswap's growing market share of DEX trading volumes (%)



5: Uniswap trading volume (\$bn) vs token price USD (RH-Axis)



6: Enzyme Finance Assets-under-managements (\$mn)



Correlations will inevitably break from markets painting all protocols with a single brush. Some of the platforms mentioned in this report continue to make valid business sense, despite market valuations. Add to the fact that stablecoins continue to find their way into the ecosystem, and new participants entering every day, DeFi tokens will likely have a second coming with investors taking note of core competency and valuations made as with any traditional business.

Slow power gen additions, tight energy markets to minimise inefficient US miners

Bitcoin miners face challenges as energy markets try and find a supply and demand balance. Following geopolitical pressures after Russia's invasion of the Ukraine, oil and gas prices hit new records amid sanctions. Data shows that the US continues to gain a strong foothold as a preferred location for mining farms.

But as wholesale electricity prices will be affected by gas supplies diverted to more profitable European markets, inefficient mining farms, or at least older mining equipment, will have a difficult time breaking-even. Meanwhile, the majority of planned US electric generating capacity in 2022, mostly coming from renewables, are unlikely to come online before the second half of the year making Coinbase rewards expensive in upcoming months. Those with enough cash-flow are unlikely to sell the newly minted coins unless prices recover to the point that would allow for further investment in efficient equipment to keep them in the running.

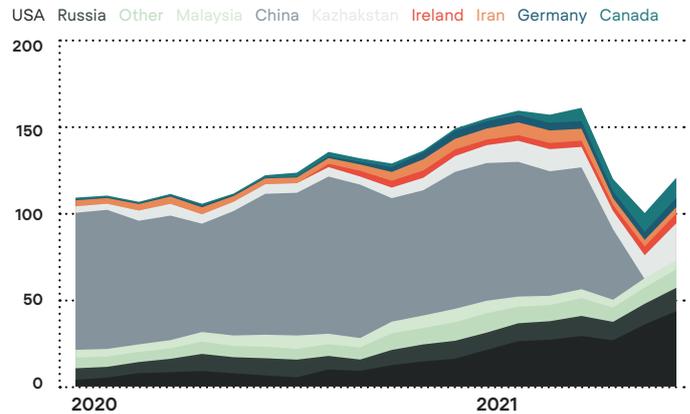
Hashrate is the major component in Proof of Work (PoW) miner economics, and the primary means of competition. In the last 12 months, Bitcoin's hashrate was volatile due to dependence on both micro factors like Bitcoin's price, cost per TeraHash, and macro factors like energy costs and regulatory direction still stuck in the proverbial twilight zone due to resource demand.

Hashrate has proven to be extremely mobile and very responsive to local pressures – only a full scale ban can displace miners permanently. Since the start of 2020 up until October 2021, the most recent dataset study on country distribution of hashpower by Cambridge, shows that the USA now computes over 35% of the total hashpower of Bitcoin's network (see chart 1). Other large market share grabs with China's exit came from oil and gas producing countries, such as Russia and Canada.

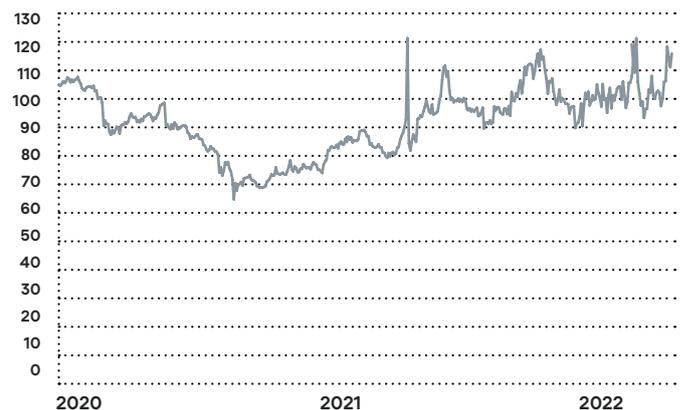
Efficient PoW machines continue to be created due to competition amongst miners. Still, access to energy and stable policies, for now at least, are pushing hashrate to concentrate in the US, mainly in Texas, whose wholesale electricity prices and taxes on commercial use is vastly more favourable than those seen in other states. Texas, an electricity-only state forgoes the costs of maintain generation capacity resulting in lower energy prices. August electricity futures, during peak demand, have now hit a new high, double that seen at the start of 2021 (see chart 2).

Plans for increase in electricity generation coming from renewables are plenty, and Texas leads the charge with 28% of

1: Hashrate distribution by country (EH/s)



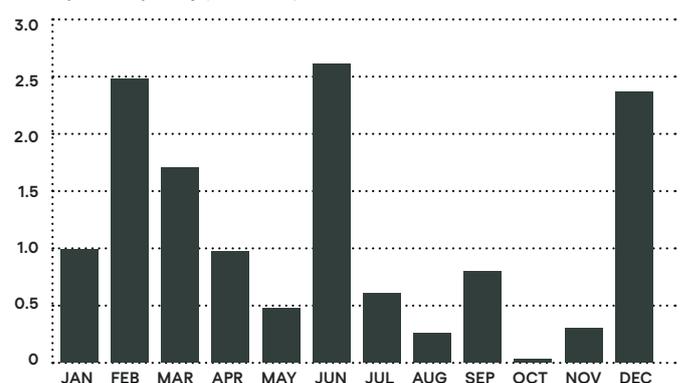
2: Aug-2022 ERCOT (Texas) North 345 KV HUB 5 MW Peak Futures (\$)



3: Texas Energy Mix (%) (As of Nov-2021, EIA)



4: 2022 Planned electricity generating capacity additions coming online Nameplate capacity ('000 MW)





the US total for the year (see chart 4). This, however, will unlikely alleviate price pressures as the additional generation will merely offset some of the more expensive gas generated power which still accounts for nearly half of the red state's power gen (see chart 3). Add to the fact that the majority power gen additions will come during peak demand season.

The price increases will have a severe knock-on effect on inefficient mining equipment whose wholesale price of electricity will make mining unprofitable. March 2022 commercial electricity rates was just over 8 cents kWh in Texas, nearly 30% lower than the national average. But older Application-Specific Integrated Circuit (ASIC) miners, such as Bitmain's Antminer S9, would in essence be unprofitable to continue powering (see table) despite the nationwide discount.

Coupled with the inevitable increase in forward delivery contract prices of energy that will come into effect, even other mining equipment will struggle to maintain their effectiveness. And this is only considering gross cash flows, not running and capex costs.

First in, first out

Despite hashpower dropping 50% in June, miners have deployed enough machinery returning competition to previous trend levels (see chart 5). ASIC miner prices have been steady but have come down from historic highs making efficient mining less expensive from a capital expenditure (CAPEX) perspective.

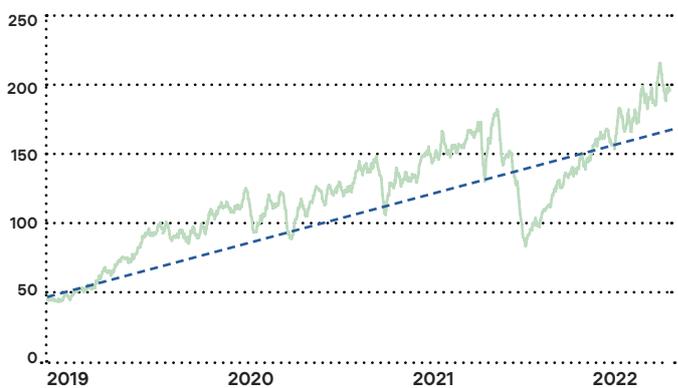
In effect, miners convert energy into bitcoins with cost per Hash and energy prices as their key considerations. Continued growth in Hashrates has led to the creation of more and more efficient ASICs. Increased competition among miners, however, has produced buyers for ASICs that are less efficient as supply-chain hurdles globally continue to plague most industries. Grouping ASICs based on energy efficiency we see that ASICs prices have not reached their pre-China ban levels (see chart 6). But with increased energy costs on the horizon, inefficient miners will likely boot their sub-optimal equipment out of the race.

This, in turn, will result in lower competition and efficient miners will be set to gain increasing revenues and thus further mining farm expansion. High energy prices result in a positive feedback loop increasing the network's efficiency. But it also means an increase of concentration by operations with better economies of scale.

And the costs of gaining market share is no longer small fry. The cost of competition has increased five-fold since the last halvening alone (see table next page).

Hardware Model	Break Even Price (USD/kWh)	Energy Category/Efficiency
[Bitmain] Antminer S9	0.09	Low / Above 68 Joules/TH
[Bitmain] Antminer S17	0.16	Medium / 38 - 68 Joules/TH
[MicroBT] Whatsminer M21S	0.12	Medium / 38 - 68 Joules/TH
[MicroBT] Whatsminer M20S	0.15	Medium / 38 - 68 Joules/TH
[MicroBT] Whatsminer M31S	0.17	High / Under 38 Joules/TH
[Bitmain] Antminer T19	0.20	High / Under 38 Joules/TH
[MicroBT] Whatsminer M30S	0.19	High / Under 38 Joules/TH
[Bitmain] Antminer S19	0.21	High / Under 38 Joules/TH
[MicroBT] Whatsminer M30S+	0.22	High / Under 38 Joules/TH
[Bitmain] Antminer S19 Pro	0.25	High / Under 38 Joules/TH

5: Bitcoin Mining Hashrate (EH/s)



6: ASIC Price per hash (\$)

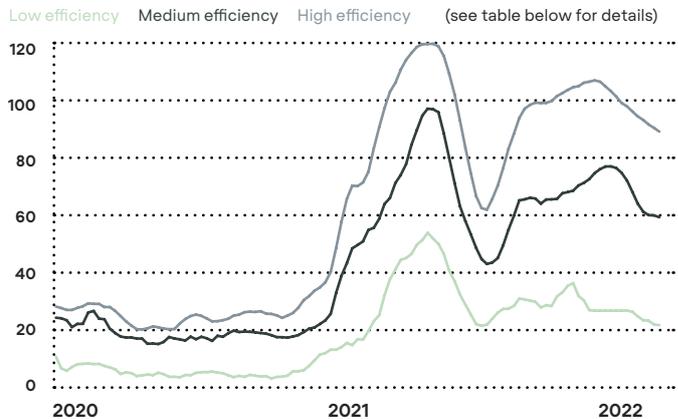


Table 2: ASICs costs and efficiency rankings

ASIC Hardware	Estimated Cost (in USD/TH)	Energy Consumed (in Joules/TH)	Example Devices
Low efficiency	25	Under 38	Bitmain's Antminer S9, T9, S11 and T15 series and MicroBT's Whatsminer M10 series
Medium efficiency	70	38 - 68	Bitmain's Antminer S17 and T17 series and MicroBT's Whatsminer M20, M21 and M32 series
High efficiency	100	Above 68	Bitmain's Antminer S19, S19j and S19 Pro units MicroBT's Whatsminer M30s, M30s+ and M30s++ models,



Table 3: How much would it cost to gain 1% of the hashpower?

Period	Date	Hashrate at Halvening (TH/s)	Miner	Miner Hashpower (TH/s)	Miner price at release	CAPEX for 1% Hashpower
1st Halvening	28-Nov-12	29	Avalon ASIC	0.06	\$1,300	\$6,500
2nd Halvening	09-Jul-16	1,654,866	Antiminer S9	14	\$2,100	\$2,484,300
3rd Halvening	11-May-20	121,037,812	Antiminer S17+	67	\$1,567	\$28,309,422
Current State	10-Mar-22	192,932,903	Bitcoin Miner S19j Pro	104	\$9,984	\$185,223,168

Table 4: Upcoming efficient equipment at a competitive discount....for now

Period	Miner	Miner Hashpower (TH/s)	Cost at release	CAPEX for 1% Hashpower
May-Sep 2022 Release	Bitcoin Miner S19 Pro+ Hyd.	198	\$15,048	\$146,642,760
Oct-2022 Release	Bitcoin Miner S19 XP	140	\$11,620	\$160,135,220

Pay up or shutter up

Bitcoin mining has become extremely expensive with capital injection requirements exceeding what most could have ever imagined. Just on equipment alone, 1% of the market share of the hashpower would cost, as of today, over \$185mn (see table 3).

New equipment in production by Bitmain, the largest manufacturer of ASIC miners would be much cheaper (see table 4). However, this is assuming that the hashpower doesn't increase from today till the time mining farms receive their new shiny equipment in 3Q22.

But with energy prices on the rise, and inefficient mining equipment unlikely to hold up, hashrate growth is unlikely to grow as fast as we've seen over the last few years. Especially considering miner supply constraints and the sheer amount of install costs.

All things considered...

The macro landscape for hashrates is limited by energy availability, legal stance of bitcoin and political awareness of the use of proof of work.

Bitcoin network hash rate took just under 300 days to recover from the mining ban in China, while smaller issues, like cut off from Kazakhstan, and a proposed ban of PoW in the EU resulted in very quick recoveries. This shows that mining bans are possible and effective, but only when they are properly enforced and permanent.

The second major component in Hashrates is cost of energy. Each rig comes with an estimated breakeven price and miners can decide to shut down or decrease hash capacity based on their energy costs. Given rising costs, and Bitcoin price slump, miners are likely going to be earmarking a good portion of returns to new efficient equipment. This means holding onto newly mined Bitcoin until the price can meet the increasing cost of competition.

Hashrate primer

Proof of Work chains require miners to include a nonce that when hashed with a block, meets a difficulty criteria. Miners in their effort to maximize blocks found, maximize their ability to generate hashes. The more hashes a miner can generate, faster, the better their chances of mining a block. So the race to create hashing capacity (proxy for mining capacity) starts. It is good to remember that independently, we can only estimate total hash rate from on chain data. To measure Hashrate exactly, one would have to work directly with miners.

Estimating Hashrates

Hashrate is a measure of how much effort has gone into mining a block. It is measured in number of hashes per unit time, currently measured in TeraHashes/Second
 $H = 2^{32} D / T$

The daily Hashrate for the bitcoin chain is estimated as number of blocks mined per day, multiplied by the difficulty parameter in hashes

$$\text{Hashrate} = [(\text{blocks solved over last 24 hrs}/144) * \text{difficulty} * 2^{32}] / 600$$

In the equation above

1. A regular 10 minute block time – While a 10 minute block time is a stated goal, blocks are found on an average every 10 minutes, and not exactly at 10 minutes
2. 144 is the number of 10 minute intervals in a day, and 600 seconds in 10 minutes. Fairly straightforward
3. To convert Difficulty factor into number of hashes, we multiply it by 2^{32}



New Bitcoin supply pressures muted with high-demand by retail investors

Sats are really beginning to add up on the retail front. So far in 2022, small on-chain holders have usurped the equivalent of 45% of the newly minted supply alone. Larger investors have also returned to the table. In this analysis, Copper takes a quick overview of what is happening with on-chain holdings for Bitcoin.

Towards the end of last year, addresses holding up to 1 Bitcoin breached the 1mn mark, just north of 5% of the total circulating supply. Year-to-date, 31k Bitcoins have made their way into these addresses, with only 69k Bitcoins having been minted. These investors have now returned to the table in bigger numbers registering the highest take since the start of 2021, and almost double Bitcoins added in 3Q21. On many days, these investors take in more than what is minted (see chart 2).

Meanwhile, miners have retained an additional 5% of the newly minted coins this year. These two investors bring the tally to 50% of new Bitcoins alone without any further consideration.

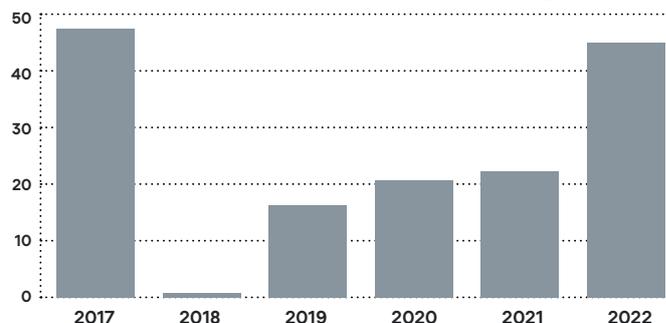
Addresses holding 1-10 Bitcoins have also come back in grand style. While these investors began selling at the start of the year, these wallets have since amassed an additional 18k Bitcoins, or the equivalent of 27% of the new supply. Last year, Bitcoin was trading at \$60k with similar holdings at these levels. And the accumulation was the fastest growth seen since the end of 2021, before markets rallied to new heights (see chart 3).

With 77% of new supply effectively moved into on-chain holdings, there isn't that much supply left that would add significant market pressures. Markets continue to hold despite downturns seen so far this year on the back of a Federal rate hike and global geopolitics.

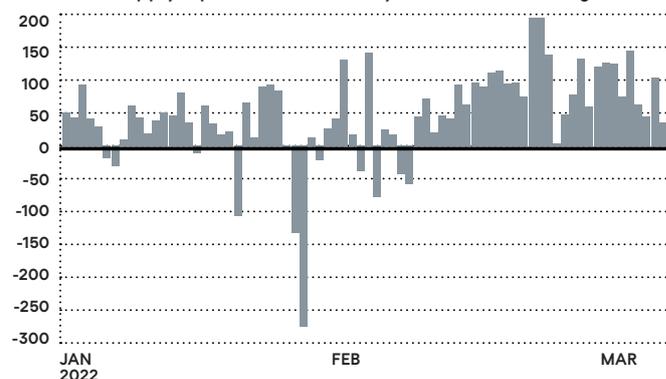
On-chain metrics hold the most valuable information for investors as it allows for very fast assessment of market dynamics of supply and demand.

As it stands, 66% of Bitcoin's circulating supply can be accounted for in a very simplistic manner (see chart 4). With a halving coming up in a few short years, price pressures will inevitably ensue with retail investors moving in at fast pace undeterred from the drawdown since Bitcoin's all-time-highs. At this rate and prices, large investors would cause a supply crunch.

1: % of new supply equivalent moved into addresses holding 0-1BTC

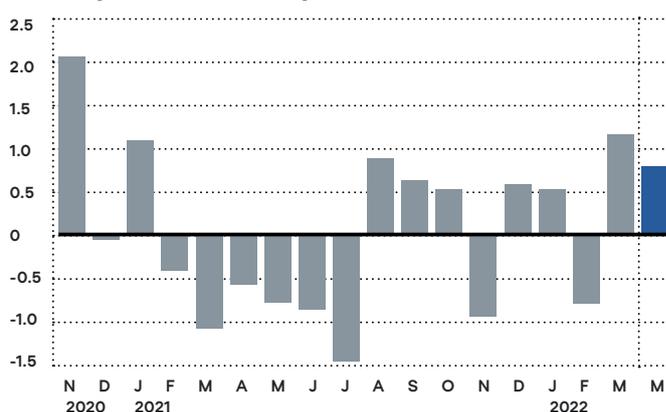


2: % of new supply equivalent moved daily to addresses holding 0-1BTC

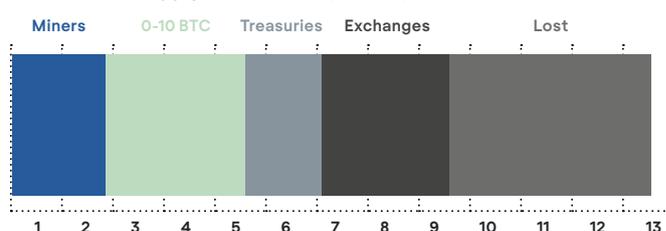


3: % change in addresses holding 1-10BTC

* 1-MAR vs 17-MAR



4: Known BTC supply distributions (mn BTC)





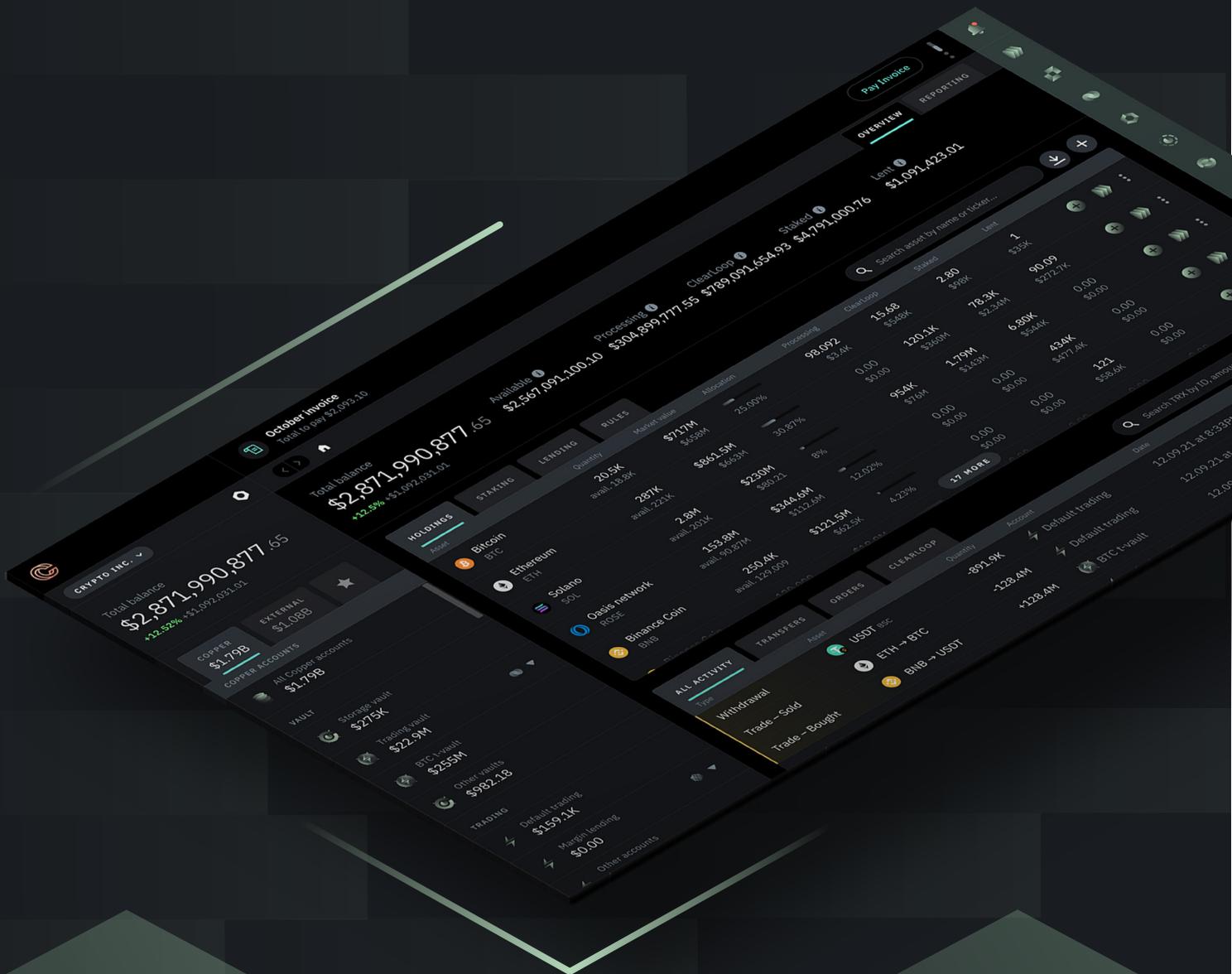
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