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EXECUTIVE SUMMARY

The Fed and the markets are at last beginning to show some alignment after some aggressive jawboning in the past week.

The strong jobs report on Friday highlighted the concern the Fed has with continued inflation in the economy, and although officials are not calling it a recession yet, we analyse exactly the three key metrics that will help them decide. In summary: consumption is up, but income is declining, employment is elevated, but industrial production is slowing. Expect continued interest rate hikes. In addition, the money supply is also slowing as another indicator of the economic sloth.

The traditional markets seem to have received the message. Fed Funds futures prices for April 2023 have traded at over 3.6%, and the yield curve inversion between the two and 10-year treasuries heightened.

In the crypto markets, Ether and alt-coin prices continue to rise, propelled by increasing certainty of the timing of The Merge. The number of daily addresses on Ethereum breached its all-time high, and ETH options volumes overtook Bitcoin options for the first time.

Long Term Holders and whales have also been exploiting the market-wide relief. They have been selling.

Last week saw another hack, with the Nomad bridge collapsing. Coinbase announced a Blackrock partnership while Instagram prepares to roll out NFT features to further mainstream adoption for crypto.

In this week's *Learning Section*, we focus on the Metaverse, defining what it is, where it comes from, what are the key components of this emerging industry and assess its future.

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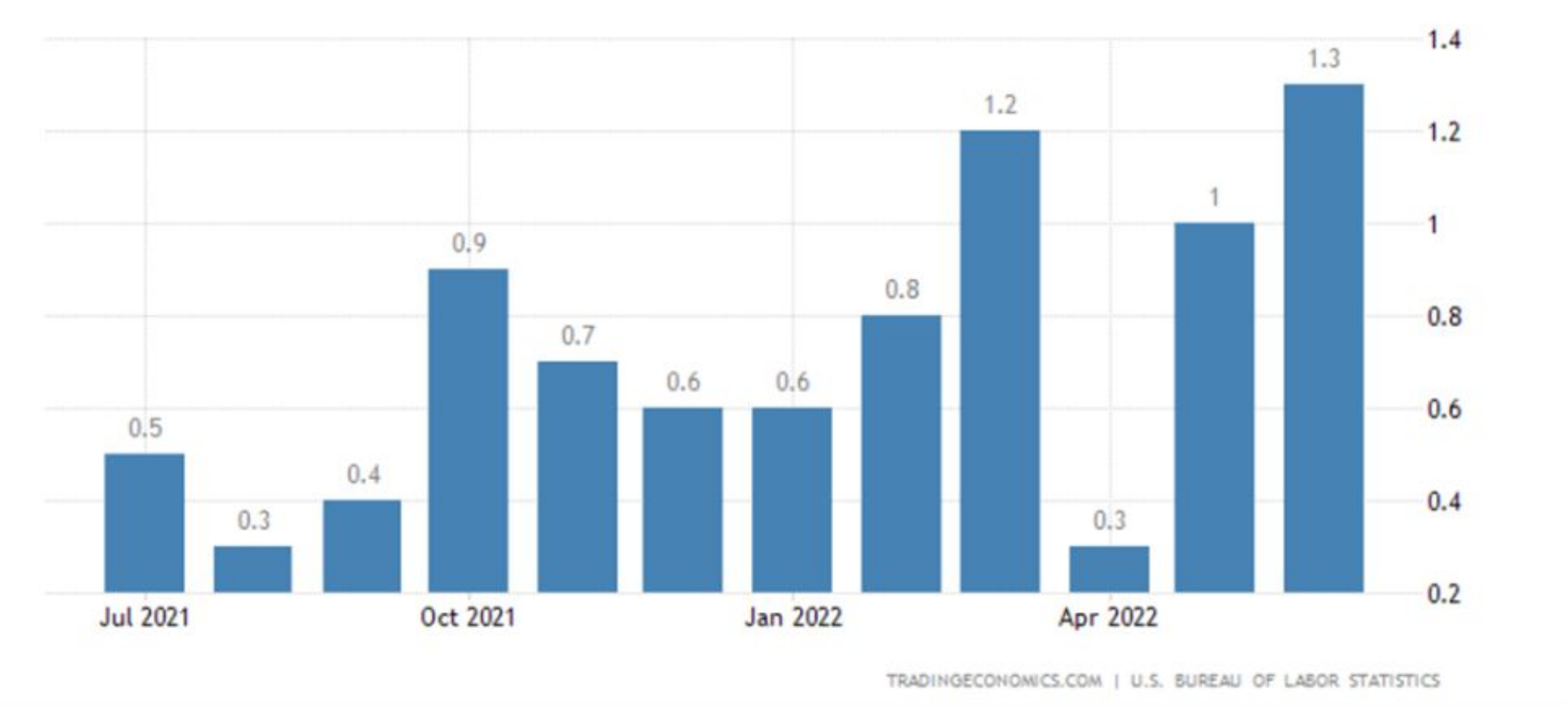
GENERAL MARKET UPDATE

The mood of the Fed is resolutely hawkish and asset prices have been responding accordingly. After the 75bps hike in rates at end-July was followed by a rally in stocks and Bitcoin, officials have been keen to dampen any over excitement that rate tightening would be short lived. Last week's strong jobs report only reinforces this, and with bonds, stocks and Bitcoin all down, it will have brought some solace to policy makers that the message to markets is getting through.

San Francisco Fed President Mary Daily said that the US economy is "nowhere near wrapping up the war on inflation." Meanwhile, Cleveland Fed President Loretta Mester said that the Fed needs "compelling evidence that inflation is moving down," adding that "we have not seen that yet.

Mester clarified last Tuesday that she also wants to see evidence that inflation is moving down on month-on-month. The consumer price index in the US has increased by 1.3%, month-over-month (MOM) in June, higher than the forecast of 1.1%. This was the highest MOM increase since September 2005. The increase was driven by gasoline (11.2%), housing (0.6%), and food (1%), according to the Bureau of Labor Statistics.



Calendar	GMT	Reference	Actual	Previous	Consensus	TEForecast
2022-06-10	12:30 PM	May	1%	0.3%	0.7%	0.6%
2022-07-13	12:30 PM	Jun	1.3%	1%	1.1%	1.1%
2022-08-10	12:30 PM	Jul		1.3%	0.3%	0.4%

Figure 1. Month-Over-Month Consumer Price Index; Source; Bureau of Labor Statistics

Inflation in services (which includes everything from rents to personal services) is picking up at a fast rate, and is unlikely to cool down quickly. Rapid nominal wage growth is also contributing to inflation growth.

Figure 2. Consumer Price Index, Percent Change from Year Ago (Left) & Average Earnings of all employees (right)

With 528,000 jobs added in July, more than double the 250,000 forecast, wages are continuing to rise. As firms absorb wage growth along with decreasing consumer demand, the associated costs linked to wage growth are passed on to prices of goods and services, which eventually means more persistent inflation.

James Bullard, another voting member on the rate-setting FOMC, confirmed that he sees more hikes coming but continues to remain adamant that the US is not in a recession.

Also, The National Bureau of Economic Research (NBER) rejects the notion that two-quarters of negative GDP defines a recession, as covered in our previous edition (link: https://bit.ly/BfxAlpha15). According to NBER, recession requires consideration of multiple indicators including consumption, the condition of the job market, and industrial activity.

NBER monitors the following metrics to track whether a country is in a recession.

A. Consumer Income & Consumption

Figure 3. Real Personal Income Excluding Current Transfer Receipts

Tangible personal income excluding transfer receipts fell in June by 0.3% after two months of positive growth. Current transfer receipts are benefits received for no direct services performed like social security, Medicare & Medicaid and other benefits, mainly from the government. The chart above shows that real personal income has slowed, but it is not showing the level of decline usually seen during recessions since the 1970s.

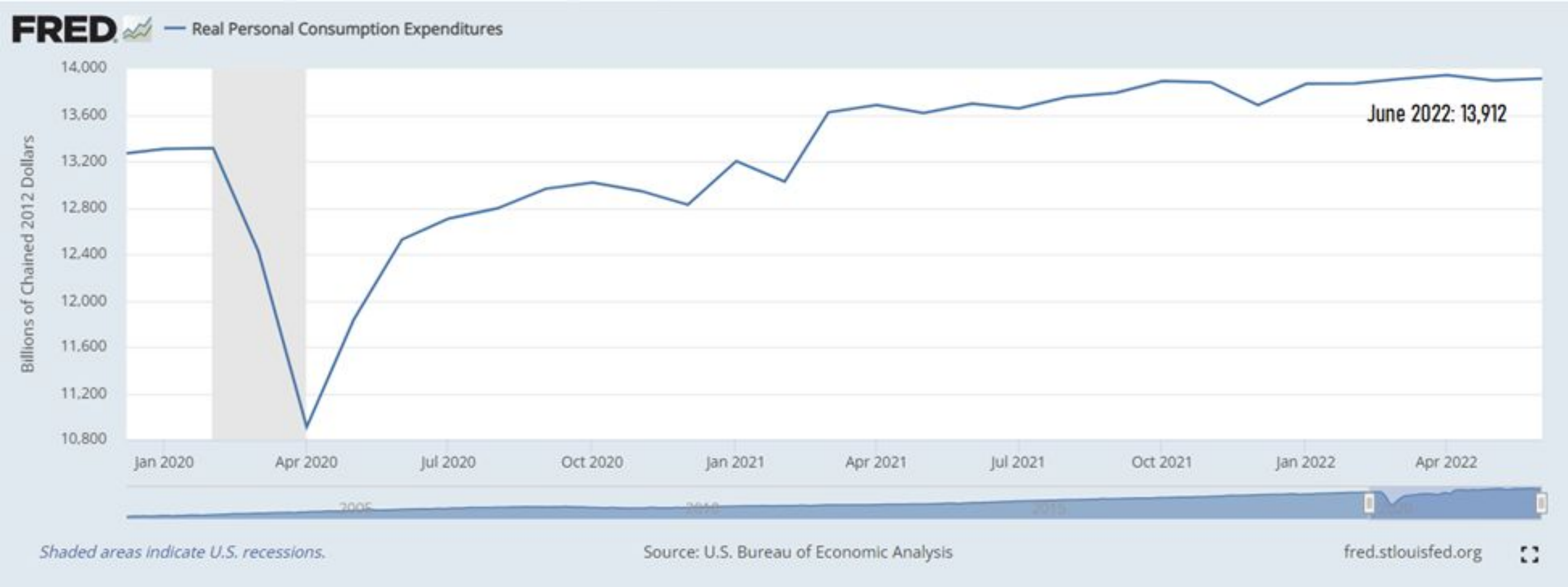


Figure 4. Real Personal Consumption Expenditures

Consumer spending accounts for about 70% of the US economy, hence it is an important key driver for inflation. Despite inflation, personal consumption has continued to increase this year. Though the rate of increase of consumer spending is somewhat flattening, it has not shown any signs of decline yet.

B. Employment

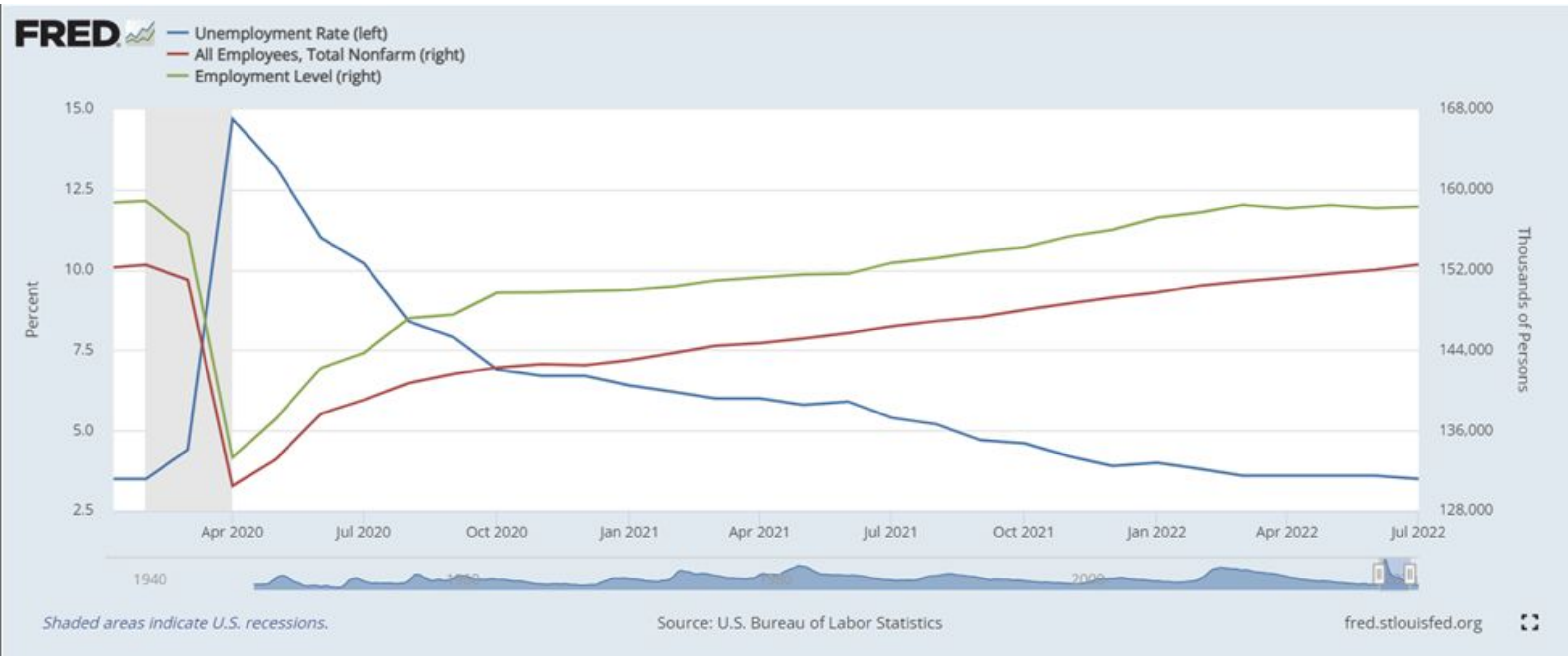


Figure 5. US Bureau of Labor Statistics Job Report

Nonfarm payrolls, the measure of the number of US workers in the economy (excluding proprietors, private household employees, unpaid volunteers, farm employees and self-employed workers) is growing and has climbed to its pre-pandemic levels. The growth in the payroll, however, appears to have been slowing down over the past three months. Despite this, it continues to indicate that employment rates are staying strong amidst significant rate hikes by the Fed.

The unemployment rate dropped from 3.6% to 3.5% in July and the strong labour market is perhaps the Fed's most potent argument that the US economy is not in a recession.

While the monthly employment data comes from businesses, a separate household survey provides another perspective as it only counts a person with multiple jobs once. The household survey counts the number of employed individuals, while the payroll survey counts the number of jobs. Household employment was positive in the first quarter of 2022 and has continued to plateau since.

The labour force participation rate, a metric trending lower this year, fell further by a hundred basis points in July and now stands at 62.1%. The weaker participation rate is one reason the labour market continues to show strength.

C. Manufacturing & Trade

Figure 6. Real Manufacturing and Trade Industries Sales

Even though the manufacturing industry represents only a tiny fraction of the economy, economists keep close track of these measures because of their sensitivity to the economy's overall health. Factories and trading companies are being squeezed out by lower demand caused by inflation and high energy prices. The supply chain difficulties have also worsened the impact on industry, caused primarily by China's strict Covid restrictions.

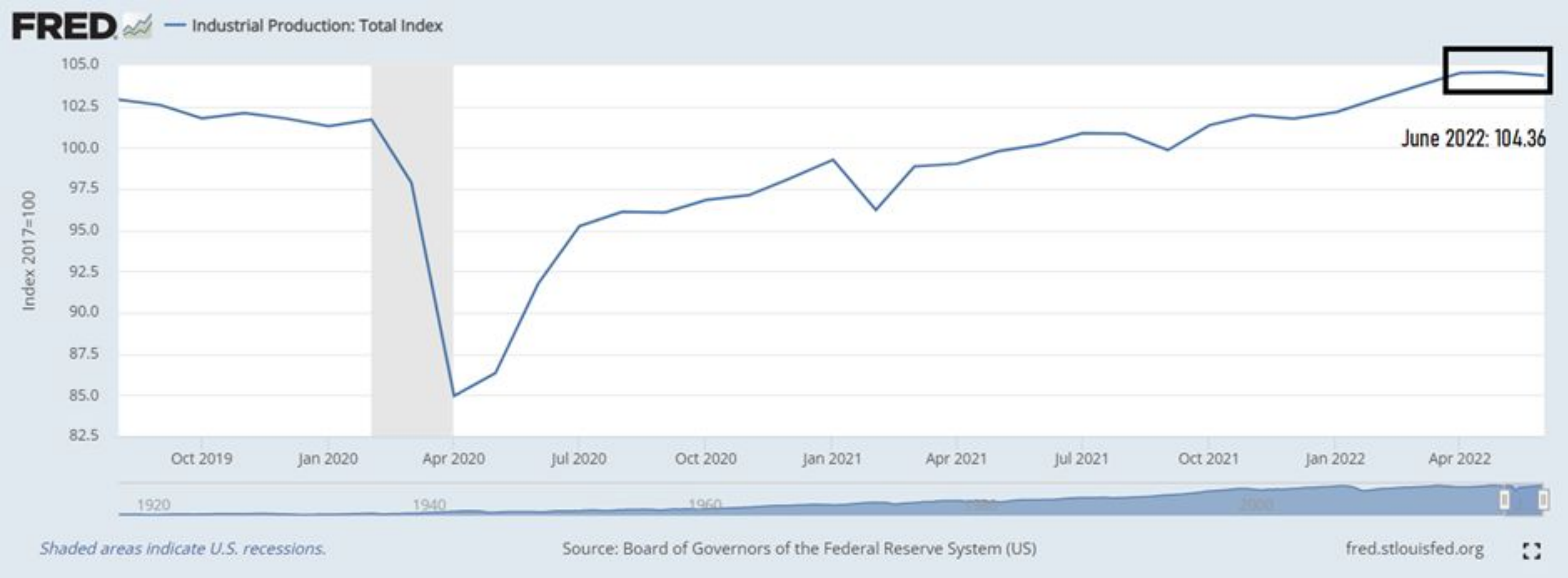


Figure 7. Industrial Production: Total Index

Industrial production had been climbing in the first few months of the year but now has flattened out in recent months and even showed a slight decline in June. The Industrial Production Total Index is an economic indicator that measures actual output for all facilities in the United States manufacturing, mining, electric, and gas utilities sector. This data coincides with the Institute of Supply Management's (ISM) Purchasing Manager's index (PMI). This diffusion index summarises the US manufacturing sector's economic activity, based on a survey of manufacturing supply executives.

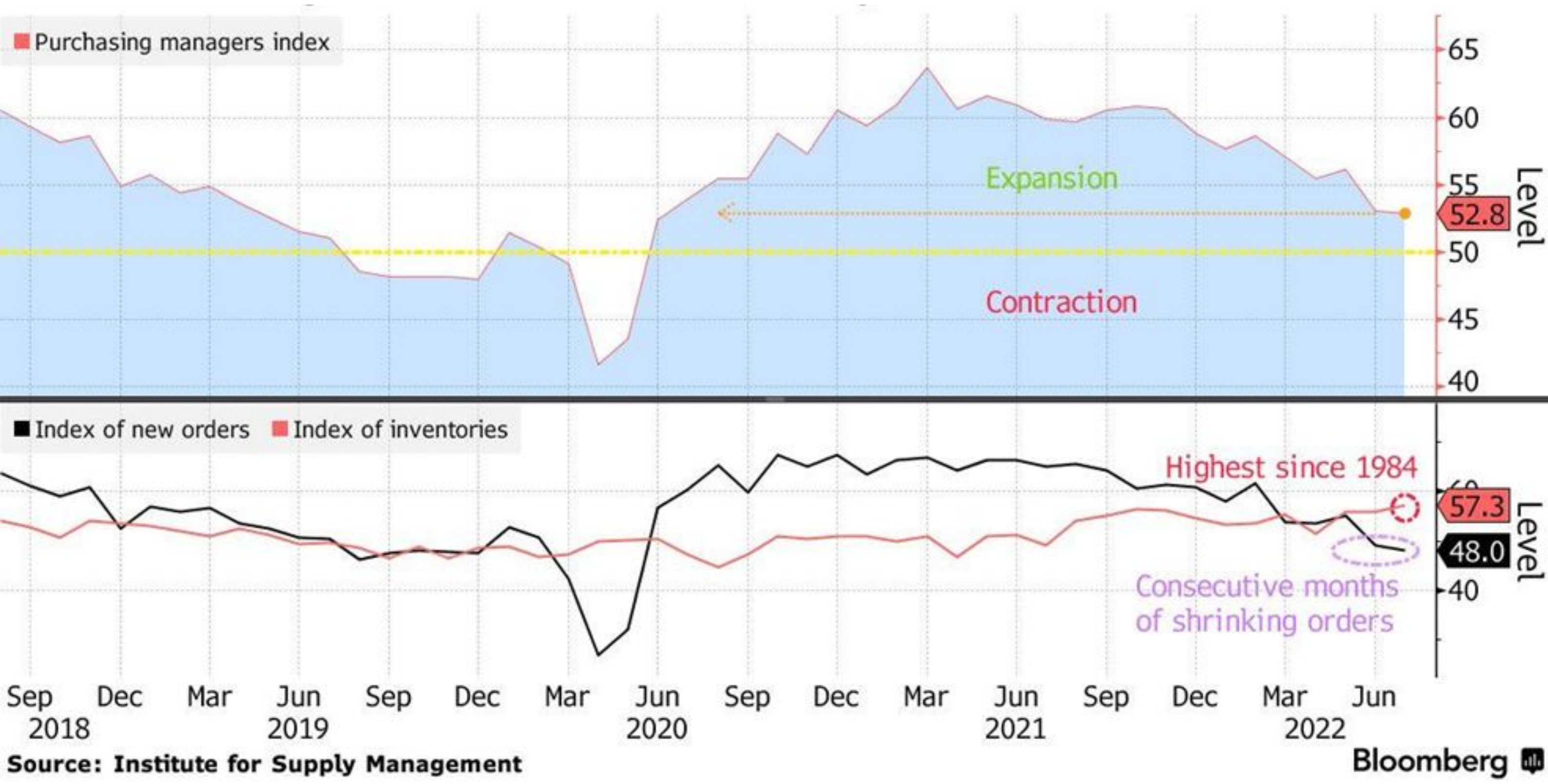


Figure 8. Purchasing Managers Index & Index of New Inventories (Source: Institute for Supply Management)

The PMI (Purchasing Managers Index) is a leading indicator for economic trends in official data such as GDP, industrial production & employment and the Consumer Price Index. The chart shows that the PMI started to decline in the second quarter of 2022, while Industrial Production Index was continuously rising.

ISM factory inventories have risen to 57.3, the highest since 1984, suggesting that factories are stockpiling inventories. Though manufacturers may be adding stocks in case of supply-chain disruptions, a continuous decline in demand will also be contributing to this increase, and eventually hurt company earnings.

Conclusion

The NBER committee defines a recession as "a significant decline in economic activity spread across the economy, and that lasts more than a few months."

To meet the criteria for recession, the committee will look for significant weaknesses in all of these indicators. However, with the recent job market report, it appears that the economy has not slowed down significantly enough to meet NBER's definition of recession, which may strengthen the Fed's confidence to implement further hikes.

Money Supply

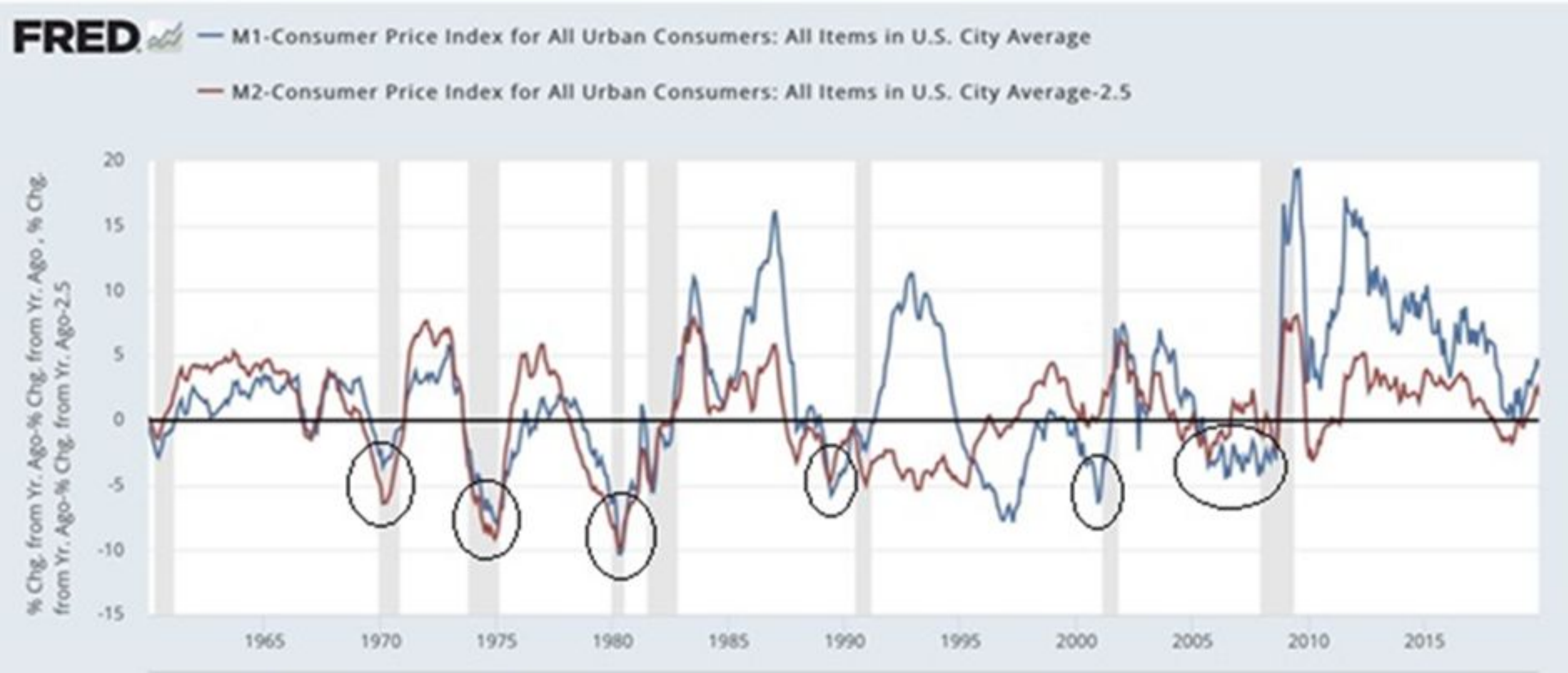


Figure 9. M1 and M2 Money Supply with past recessions marked out.

In addition to the above mentioned economic indicators, it is worth looking at the money supply as it can often be a useful measure of economic activity. In almost all recessions since the 1970s, the year-on-year change in M1 turned negative, and the year-on-year change in M2 fell under 2.5%.

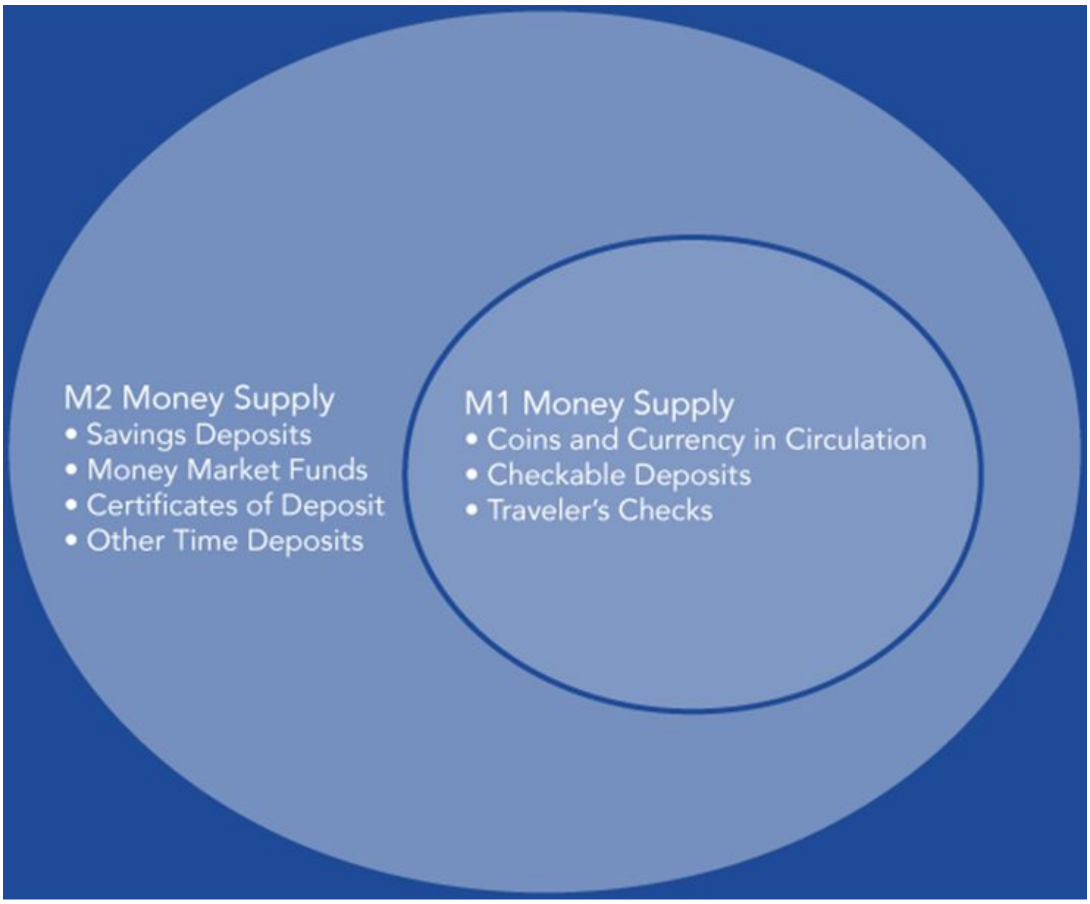


Figure 10. An illustration of Money Supply Measurement Based on Liquidity

M1 money supply includes very liquid elements such as cash, checkable (demand) deposits, and traveller's checks. The M2 money supply is less liquid and includes M1 plus savings and time deposits, certificates of deposits and money market funds.

During periods of economic boom, the money supply tends to proliferate as the economy encourages more borrowing from commercial banks. Recessions, on the other hand, tend to be preceded by slowing rates of money supply growth. Money supply growth has dropped significantly in the last three months, with the first contraction reported in April this year - the first since 2010.

To rein in inflation, the Fed will need to take back the money it printed out of the system, implying bringing interest rates ABOVE the inflation rate. It is apparent from data, stretching as far back as the 1960s, that interest rates have had to go higher than inflation to push prices back down.

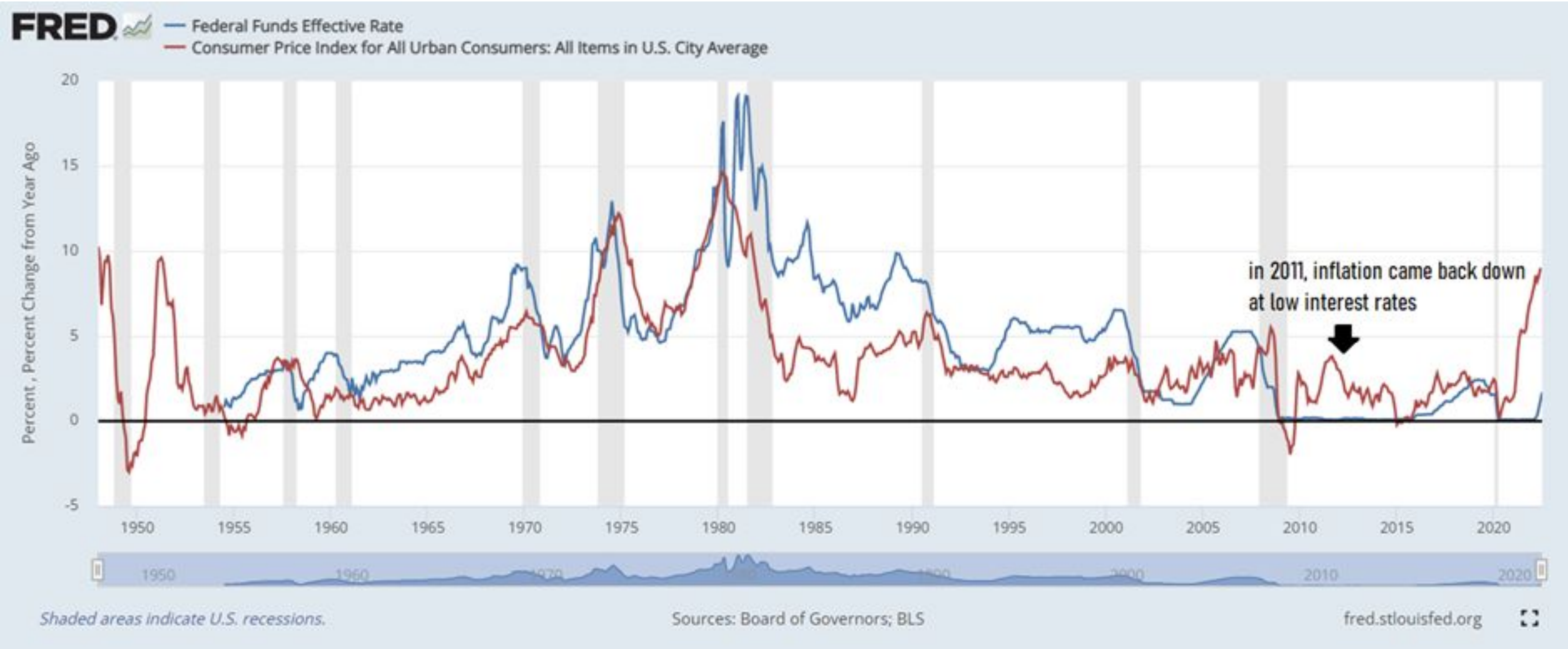


Figure 11. Federal Funds Effective Rate and Consumer Price Index

An outlier was 2011 when the inflation rate came back down without having to implement an interest rate hike. This fairly recent period is evidence for the Fed that interest rates might not need to be hiked to bring the prices back down.

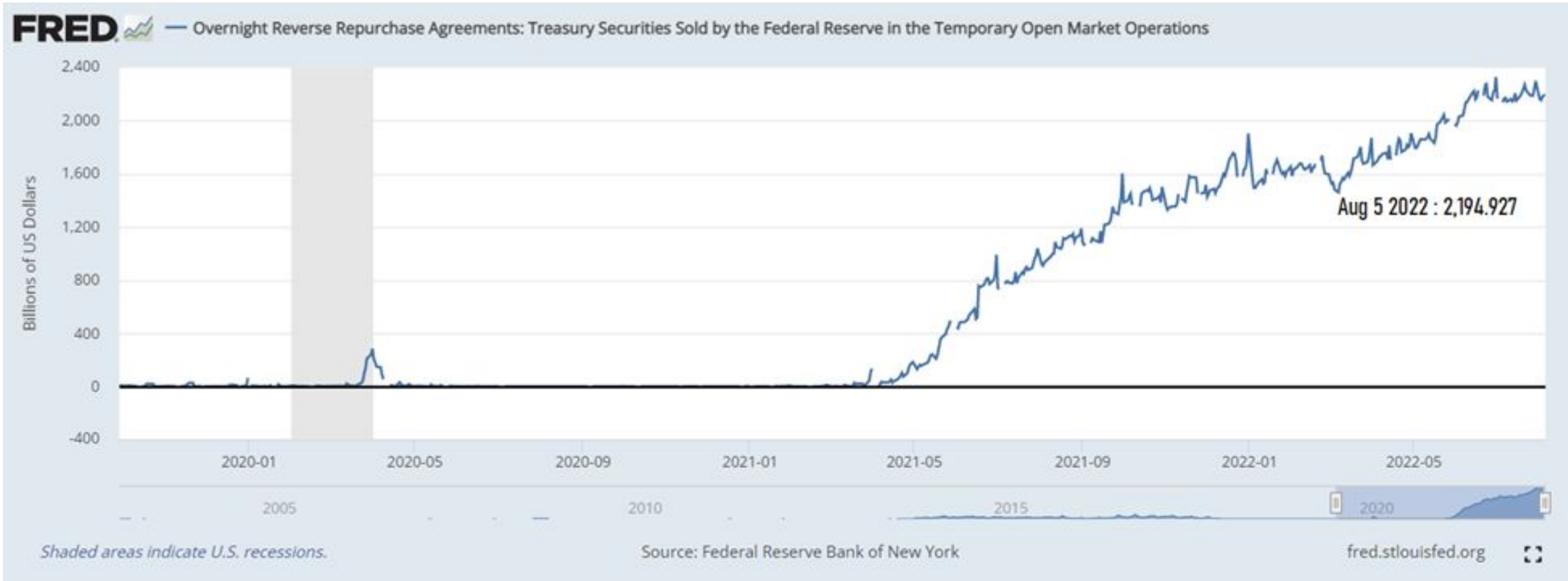


Figure 12: Overnight Repo market

Another metric worth analysing is the liquidity build-up in the Reverse Repurchase Agreements (reverse repo) market. The Fed offers reverse repo agreements that allow banks and other financial institutions to exchange their cash for treasuries. In 2021, we saw a spike in the reverse repo as banks try to get hold of more assets. Reverse repo liquidity exceeded $2T in May for the first time in history and continues to rise, now sitting at $2.3T as of June.

Even if money supply growth has slowed, trillions in liquidity go to the reverse repo market, and no money is available to bolster the equities and the crypto market. Hence, the current slowing in US money supply is not supportive of a bull market unless the Fed pivots from its tightened monetary policy.

Bonds

When the Fed reiterated its need for rate rises after the FOMC meeting, the bond market had already priced in too much optimism about the shift of monetary policy as covered in our previous issue. The two-year treasuries surged by almost 20 basis points last Tuesday, which took the short-term bonds on a round trip to levels from a week before. Last Friday, the dovish dream was killed by the stronger-than-expected labour market report.

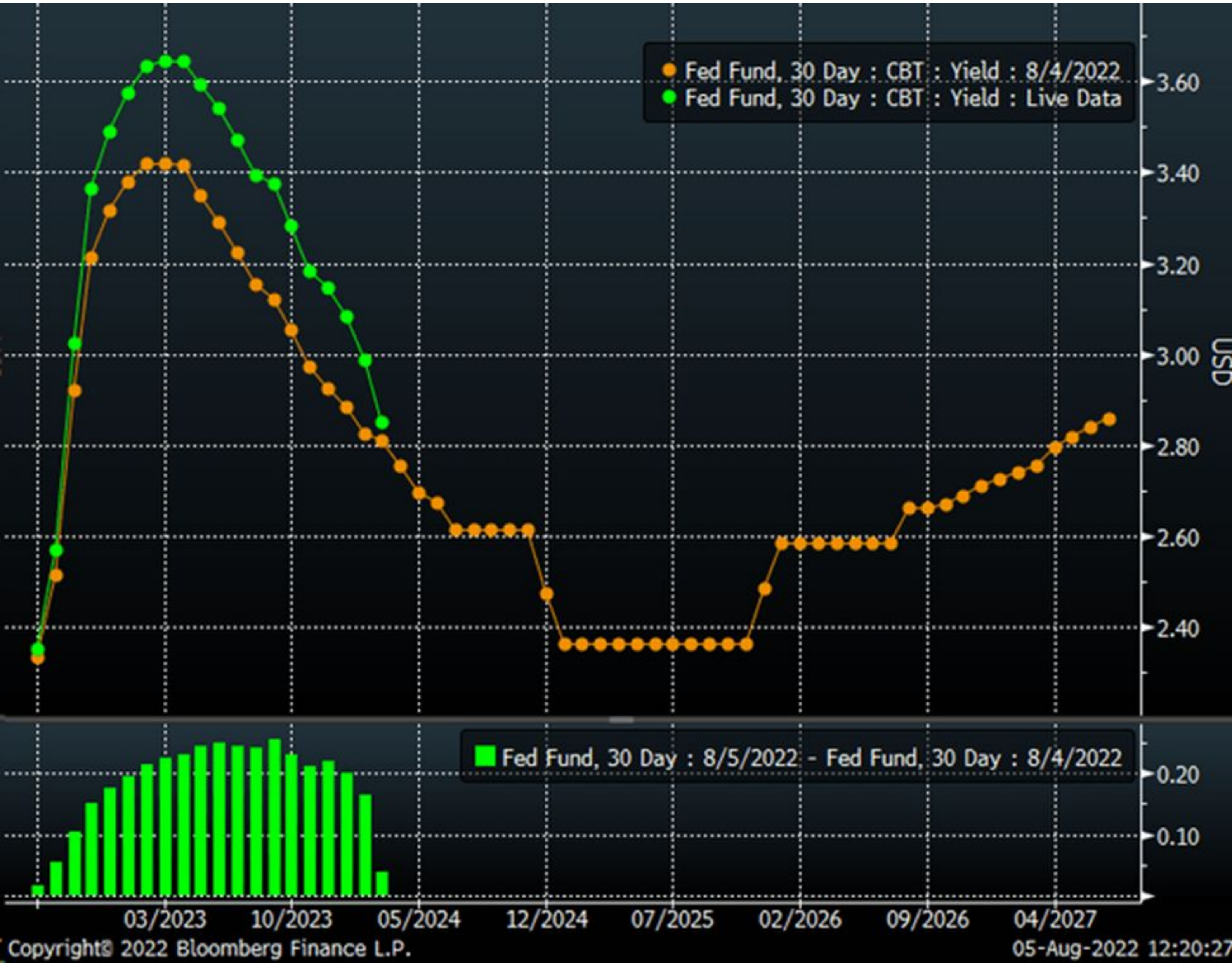


Figure 13: Fed Funds Future

The April 2023 Fed Funds Futures contract was up to 3.66%, 240 basis points higher than before the release of the job reports. Fed Funds Futures prices reflect the market's expectations of the Federal funds rate changes based on the Fed's target.

Figure 14. US Government 2-Year Treasury Bond

The adjustment in Fed Funds Futures pushed bond yields higher almost instantly. The two-year rate quickly climbed above technical resistance to 3.25%. It would not be a surprise if this rose further to 3.5% now, with the December 2022 Fed Futures contract trading at 3.5% on Friday. The bond market has historically been the fastest to react to updates in the macro environment or important news.

Figure 15. 10-Year minus 2-year Government Treasury Bond Yields

A closely watched recession harbinger, yield inversion reached a new extreme on Friday. The 10-year and 2-year treasury notes hit their deepest inversion since 2000, at -40 basis points, and continue to flash a warning about the economy.

Weekly Takeaways:

- The market was too quick to be optimistic about a dovish Fed by September after the July FOMC meeting. However, Fed speakers pushed back this narrative as they reiterated their stance on more hikes in the future. The dovish speculation was further beaten back by the recent labour market report. The next CPI report will be released this week, and any significant increase will make any Fed pivot to looser monetary policy very unlikely.

- Indicators used by decision-makers at NBER to determine a recession have shown that the economy is far from bulletproof, with signs of a slow down across multiple measures. However, while other metrics indicate a decline in growth, the job market remains strong, strengthening the government's conviction that the US is not in a recession. The current economic scenario is strikingly different from past economic headwinds.

- The latest job report increases the odds that the Fed will further raise interest rates by 75 basis points for a third straight meeting in mid-September to fight soaring inflation, supported by its confidence in a strong labour market.

- Fed Funds Futures set two-year bond yields instantly higher, further deepening the yield curve inversion, a historically reliable recession harbinger.

- The trillions in liquidity in the reverse repo market and decline in money supply growth tell us that unless the Fed reverses its hawkish policy, there is no money available to prop the equities and crypto market.

WHAT'S ON-CHAIN THIS WEEK?

Ethereum And Altcoins Continue to Soar

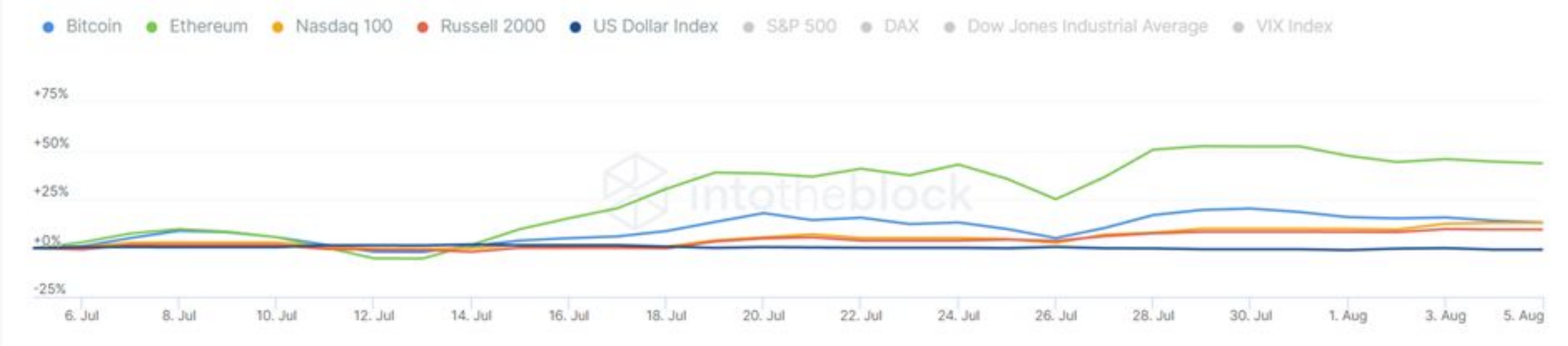


Figure 16. Performance of ETH vs other major asset classes since July. (source: intotheblock)

Since legacy markets bottomed on June 16th, ETH has significantly outperformed BTC and other major asset classes. While BTC gained 14%, ETH has bounced nearly 60% as developers announce a definite timeline for The Merge. Last week, Ethereum continued to outperform Bitcoin and the NASDAQ 100.

Indeed, the whole market ex-BTC and ETH have experienced a resurgence. The Total 3 Index (https://www.tradingview.com/symbols/CRYPTOCAP-TOTAL3/), which measures crypto market cap (excluding BTC and ETH) is up 23.58% since the 26th of July.

The Merge is one of the most anticipated events in crypto's history. For the first time, aggregate open interest in ETH-based options has surpassed that of BTC-based options.

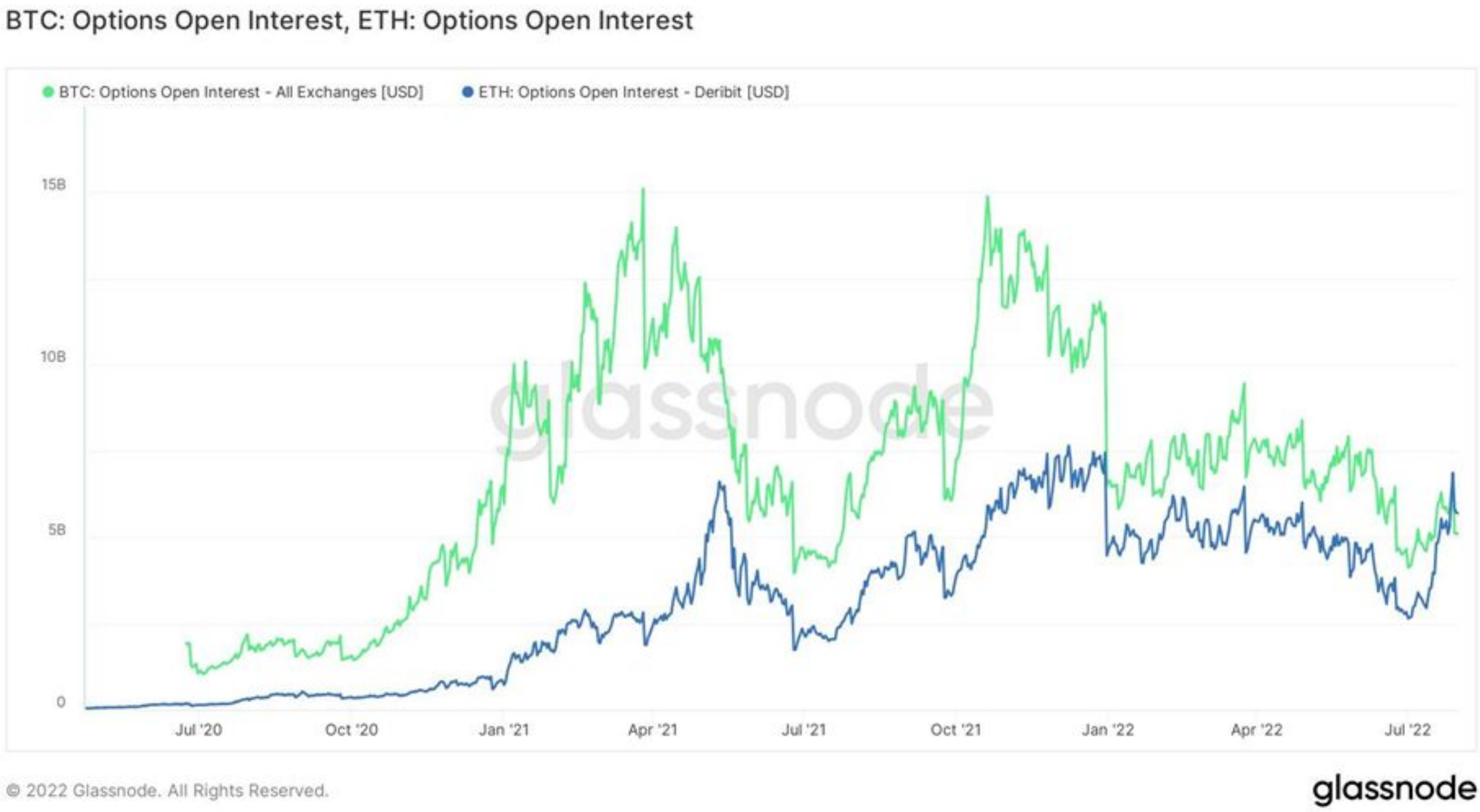


Figure 17. Ethereum vs Bitcoin options Open Interest. (source: glassnode)

Ether options, with a value of $5.6 billion, exceeded the Open Interest ('OI') of Bitcoin options worth $4.6 billion by 32%. Data from *Deribit* highlights that most of the OI in ETH options are calls, with a put/call ratio of 0.26. The ETH Put/Call ratio has hit a new yearly low as the Merge date nears.

It will be interesting to see if ETH can keep control of this narrative and continue decoupling from BTC after it goes live. Currently, developers are forecasting a tentative date of Sept 19th for the final Merge. We covered the Merge and Ethereum's evolution plans in our previous issue. (link: https://bit.ly/BfxAlpha16).

Are Long Term Holders (LTH) Selling?

Despite uncertain and somewhat bearish conditions in the macro landscape, all risk assets in general and the crypto market in particular, have seen some relief throughout the end of July heading into August. In such a scenario, we investigate if Long Term Holders or LTHs are using this opportunity to offload their Bitcoin either above or close to their cost basis.

Bitcoin prices have reclaimed two psychologically significant levels, including Long-Term Holders' Cost Basis (LTH-Cost Basis) and Market Averaged Cost Basis (Realized Price), briefly touching the ~24k level.

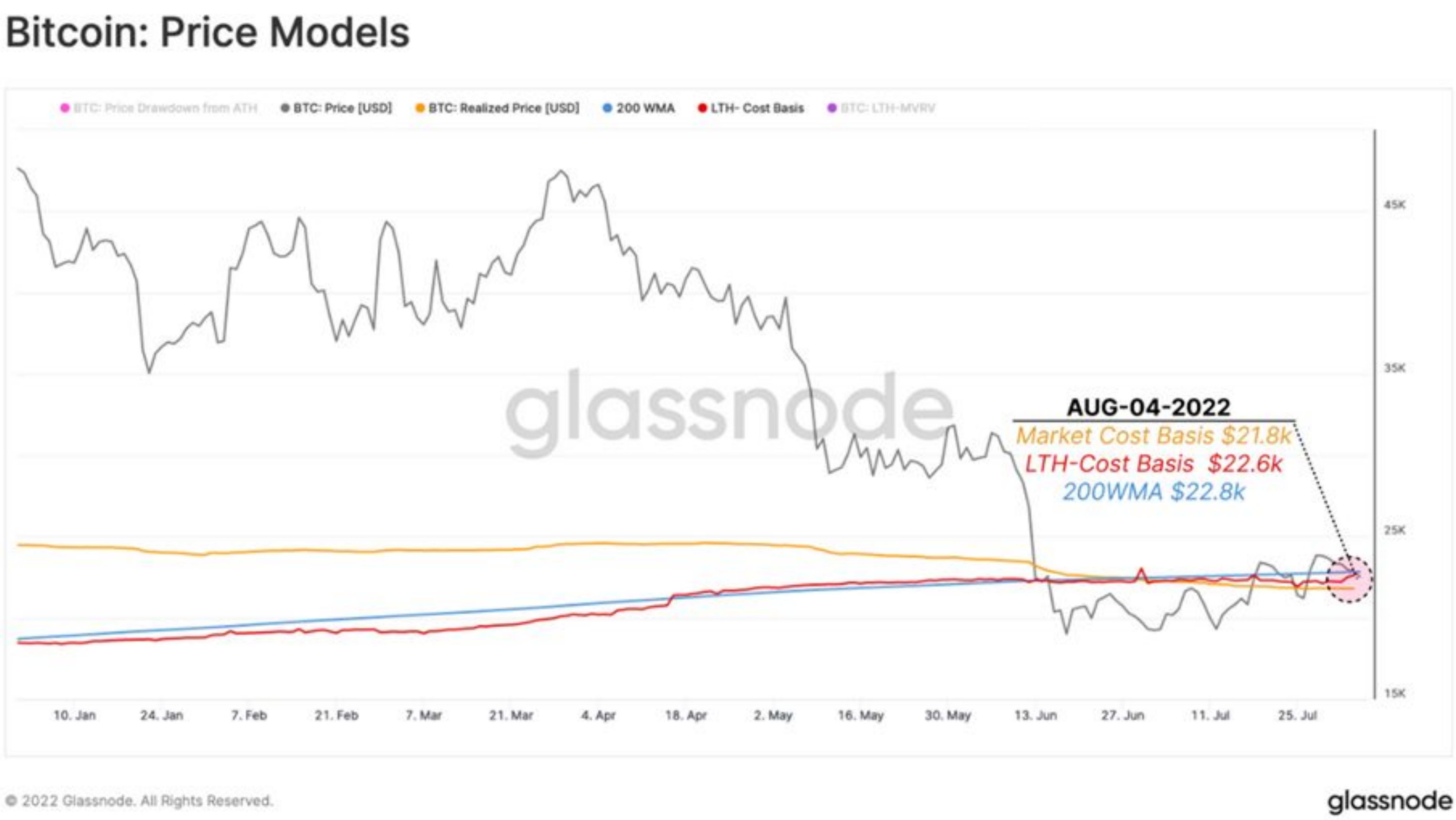


Figure 18. LTH and Market Averaged cost basis on Bitcoin. (source: glassnode)

The price models on *glassnode* illustrate how LTHs had an opportunity to exit some spot positions above their cost basis, under weakening macro-economic conditions.

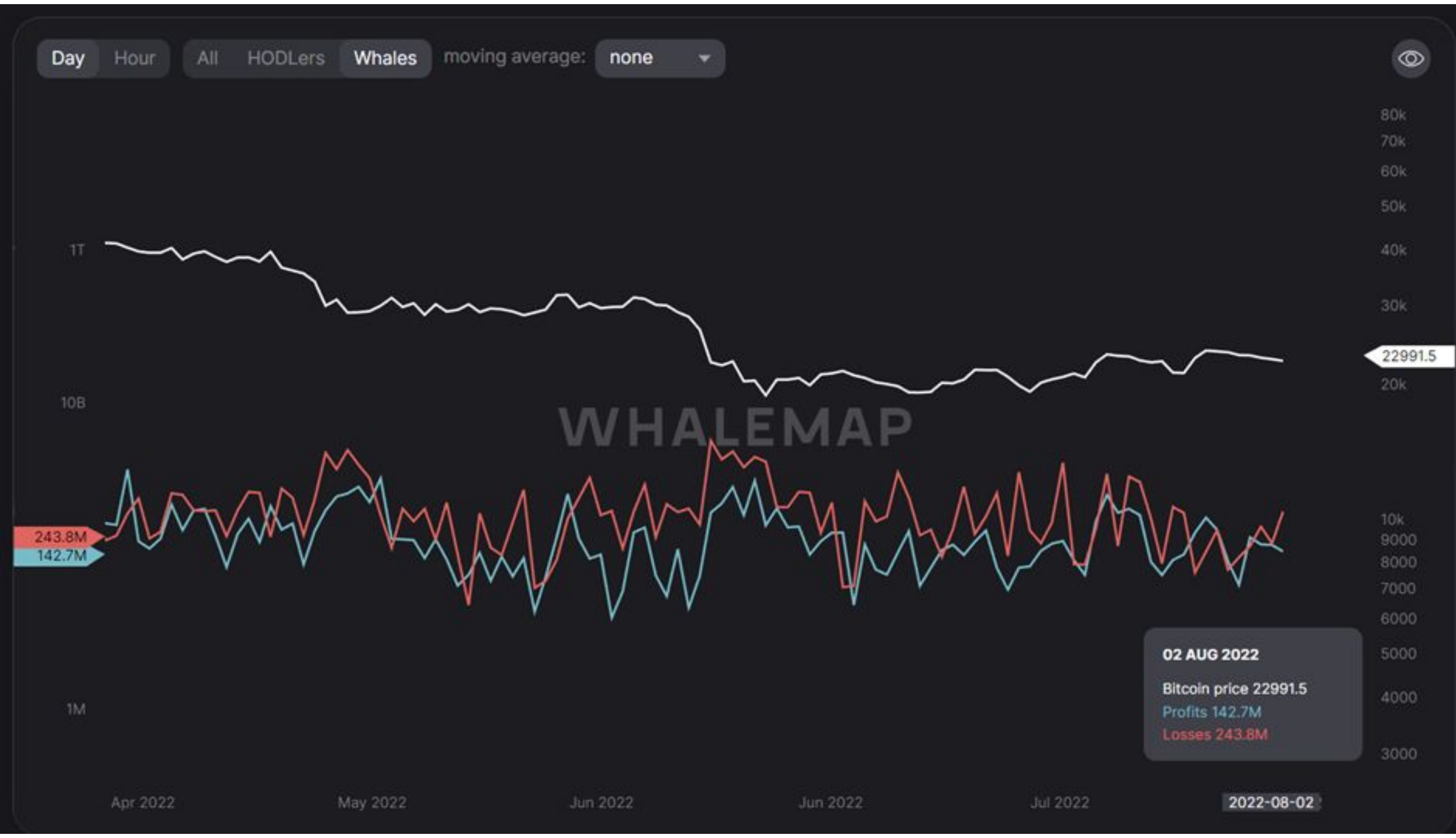


Figure 19. Moving Profit And Loss for whales (source: whalemaps)

The Moving Profit and Loss or MPL indicator visualises if investors are selling their Bitcoin at a profit or a loss. High volumes of losses moving on-chain indicate panic, as can be seen by the losses (red in the chart) dominating throughout April-July. During the last week of July, we see realised profits (blue in the chart) exceed the losses for whales. This indicates the recent general trend of minimising losses and exposure (reducing market exposure above cost basis) by both LTHs and whales, as the two categories often overlap.

In the context of recent whale behaviour, investors continue to realise a larger magnitude of losses compared to the profits on spent coins. The latest daily values show Realised Losses at $382.2M/day and Realised Profits at $115.5M/day. However, as it stands, there is still a meaningful degree of expenditure by both the aggregate market and particularly by Long-Term Holders, who seem to be taking what exit liquidity the market offers them.

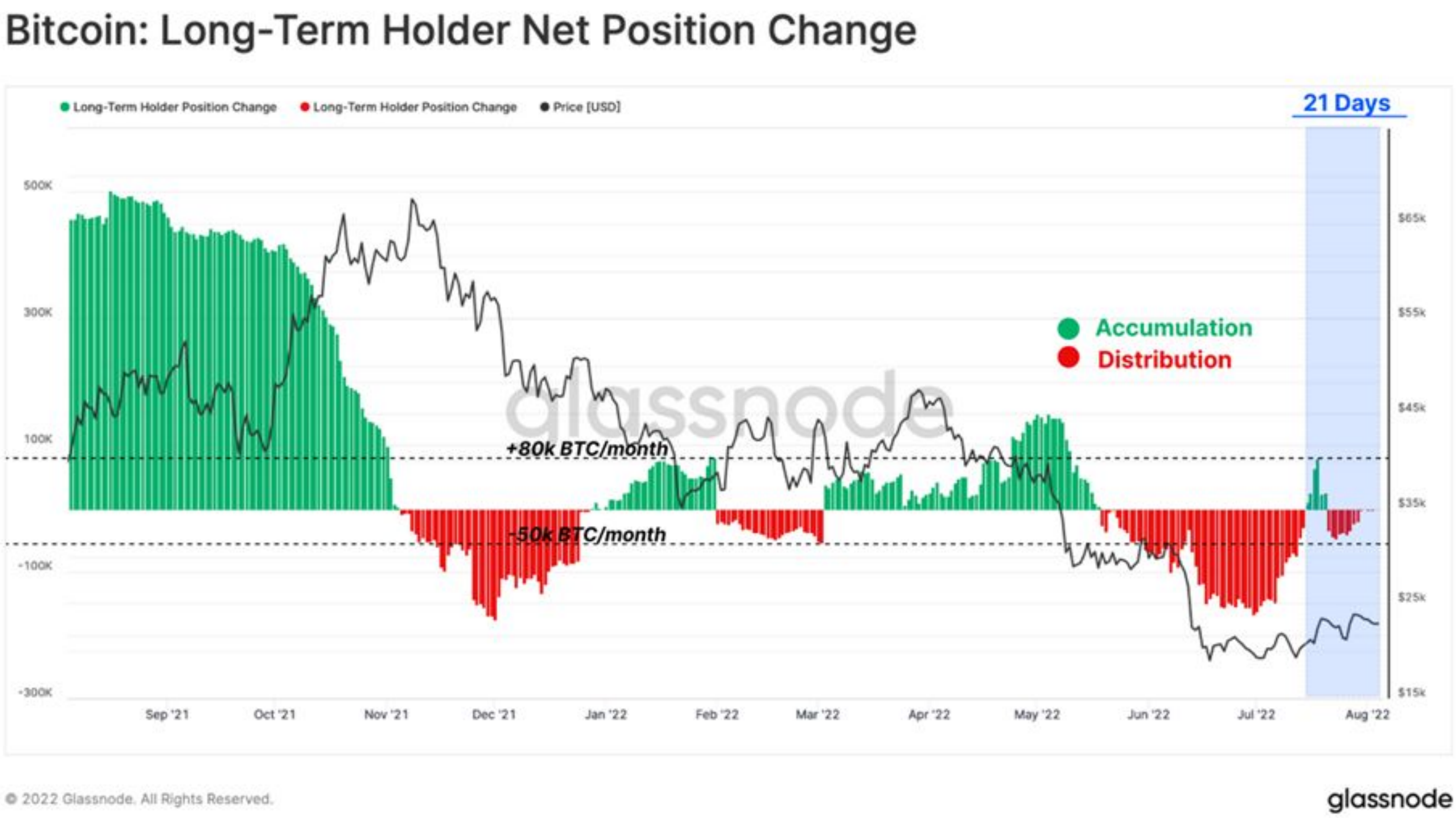


Figure 20. Net Position Change for LTHs (source: glassnode)

The aggregated behaviour of LTHs has changed from accumulating at a rate of 79k BTC/month from April till June to currently distributing up to 47k BTC/month. Remarkably, this cohort seized the opportunity of rallying prices and spent 41k BTC, or 0.3% of their supply, over the last 21 days. (Note that net spending is defined as Accumulation plus HODLing minus Distribution).

What are the potential takeaways from observing whales' and LTHs behaviour?

Long Terms Holders continue to realise more losses than profits even as the BTC price briefly surpassed their cost basis to the upside. The average loss realisation over the past three months has been 11%. The recent rally has given LTHs an opportunity to exit their positions at cost basis or close to it, but still, only a fraction of their holdings have been sold. However, a significant portion of the selling pressure comes from aforementioned LTHs exiting spot positions.

On-chain Activity For Bitcoin and Ethereum

As per an analysis of multiple networks aggregated by *glassnode,* the number of active Bitcoin addresses remains in a downtrend since the peak last November, with the exception of a couple of spikes which could primarily be forced liquidations or large entities exiting their positions at a loss during early 2022.

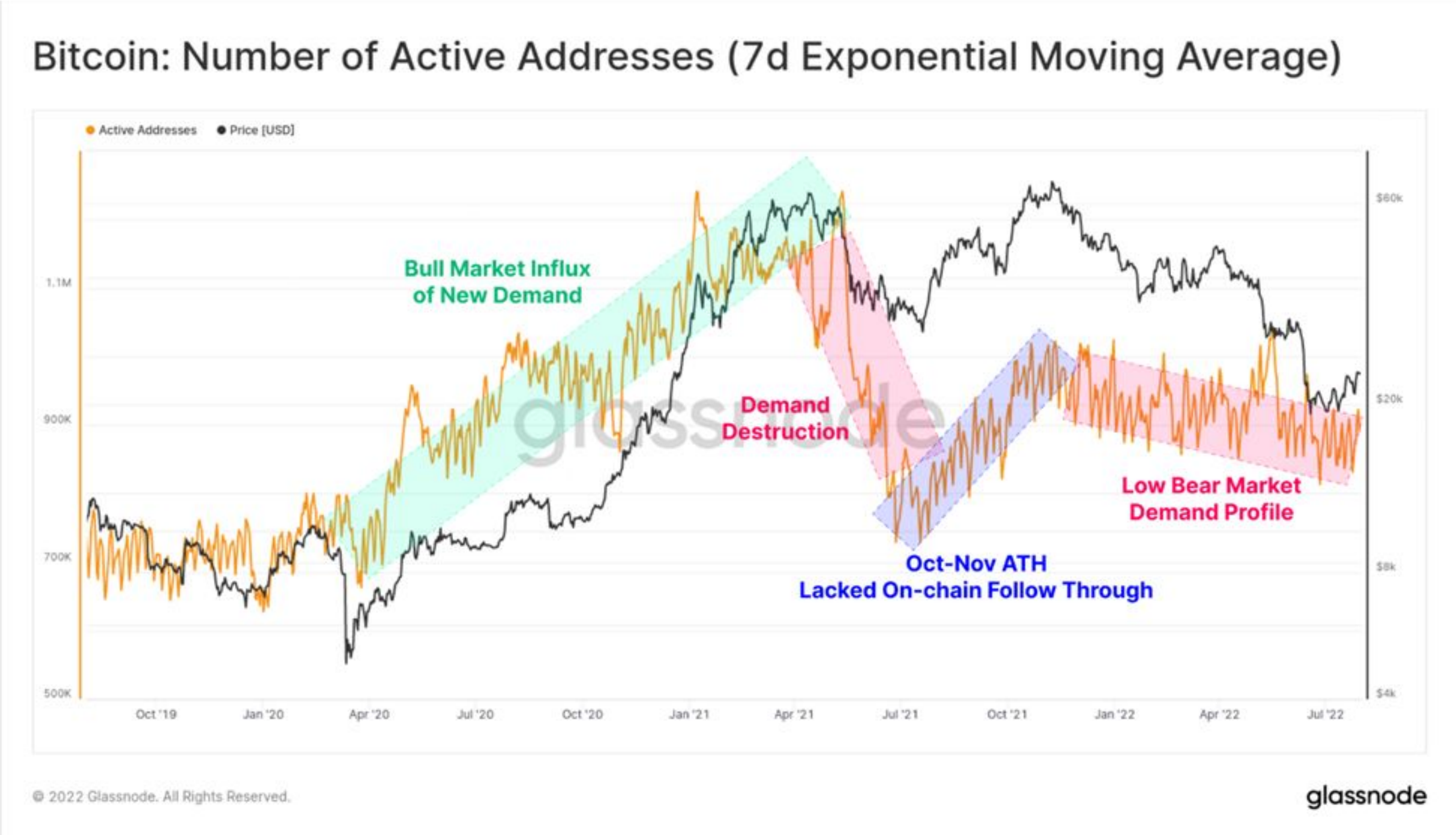


Figure 21. Number of Active Addresses for Bitcoin (source: glassnode)

Except for a few activity spikes during major capitulation events, network activity currently suggests that there is little influx of new demand. After significant demand destruction since May 2021, transactional demand has traded lower, and the number of transactions on the Bitcoin and Lightning networks have also seen sharp reductions since the 2021 peaks.

Figure 22. Number of Addresses in terms of wallet size (source: Whalemaps)

The number of addresses owning more than 1000 BTC or greater has also plateaued. Any short-term signs of accumulation evident at sub-20k levels have mild relevance now due to the offloading of spot positions as discussed above.

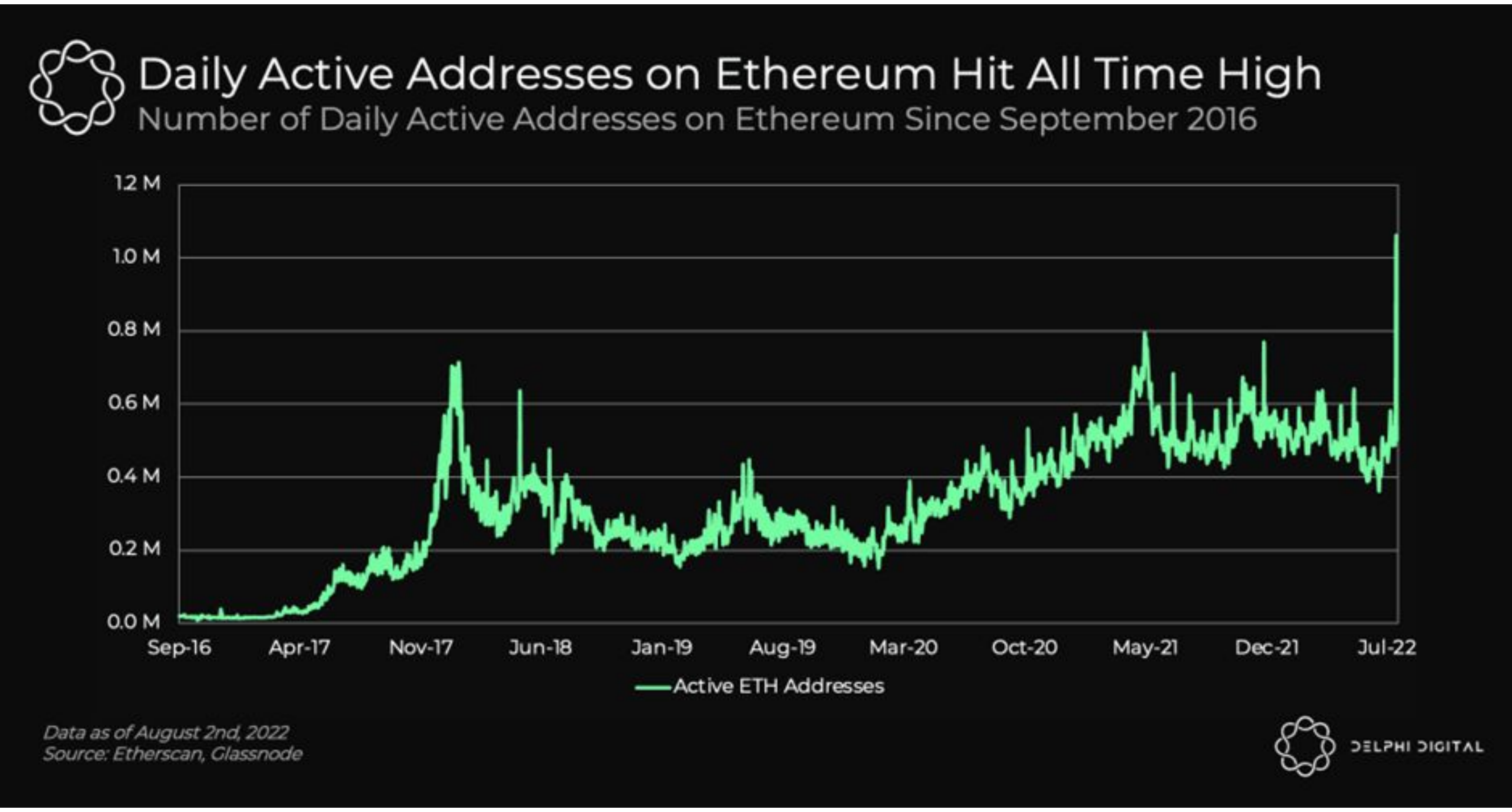


Figure 23. Daily Active Addresses on Ethereum (source: Delphi)

In contrast, the number of daily active Ethereum addresses broke its All-Time High on the 28th of July. The daily "active" addresses criteria is not so rigid as even a single transaction on the day qualifies a wallet. Regardless, the number of addresses breached one million for the first time.

A sharp increase in daily transactions in a low gas fee environment may indicate more smaller-sized transactions. When we see a lot of transactions during periods of low gas fees, it is most likely probable that they are basic send and receive token transfers.

NEWS FROM THE CRYPTO-SPHERE

Solana wallets drained in Nomad Hack:

Four out of the five largest hacks in crypto protocols occurred in bridges, resulting in over $1.75B in losses based on data from a *Rekt News'* leader board.

1. **Ronin Network - REKT** *Unaudited*
   $624,000,000 | 03/23/2022
2. **Poly Network - REKT** *Unaudited*
   $611,000,000 | 08/10/2021
3. **Wormhole - REKT** *Neodyme*
   $326,000,000 | 02/02/2022
4. **BitMart - REKT** *N/A*
   $196,000,000 | 12/04/2021
5. **Nomad Bridge - REKT** *N/A*
   $190,000,000 | 08/01/2022

Figure 24. Data regarding the largest documented exploits in crypto. (source: Rekt News)

While these hacks vary in nature - from poor private key management to smart contract bugs - the inherent complexity of bridges poses a severe threat that can be exploited. As such, cross-chain bridges continue to be a weak point for DeFi and a juicy target for exploiters, and when they do collapse, it's often a total collapse.

In the latest major hack of Nomad Bridge, $190 million was lost in an attack that lasted two and a half hours.

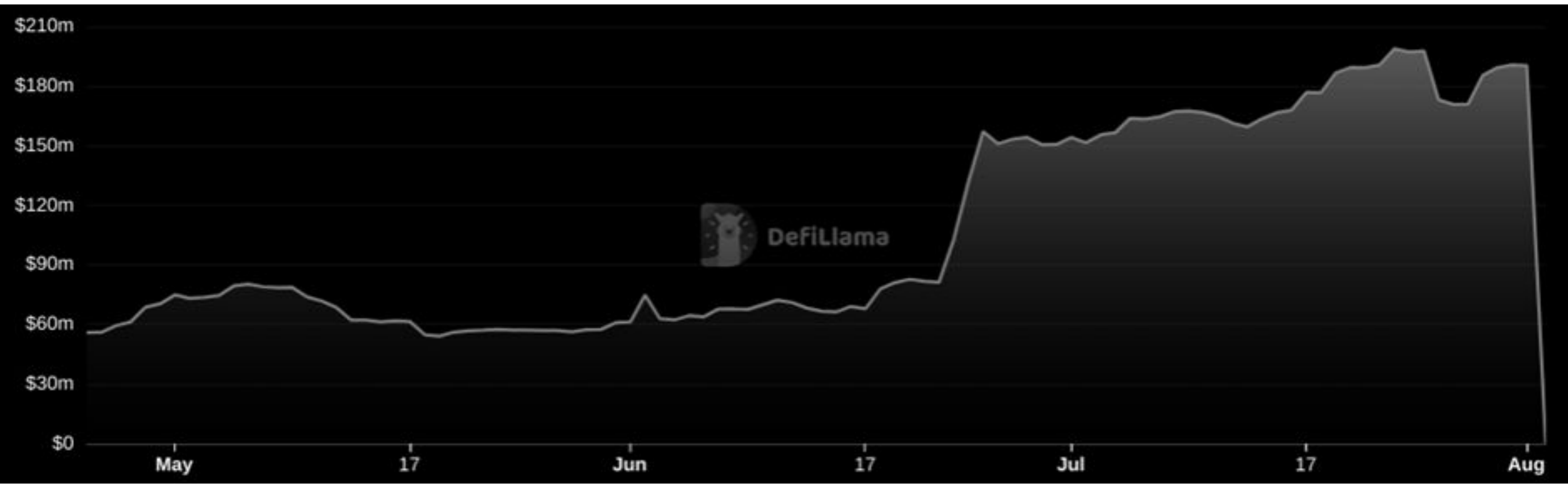


Figure 25. TVL for Nomad bridge. (source: DeFiLlama)

The exploit is distinct from previous cross-chain bridge hacks in its “every man for himself” nature instead of a coordinated attack. After Nomad's contracts underwent an upgrade in June, they were made vulnerable to a flaw that allowed addresses to perform bridge withdrawals without providing evidence of assets entering the other side of the bridge.

Hundreds of addresses began replicating the attacker's code to steal funds from other pools as soon as the initial attacker began taking advantage of this flaw in Nomad’s Wrapped BTC pool.

Thankfully, some of these attackers were whitehats who used the vulnerability but returned the funds. Nomad's official recovery address has received almost $20 million, with whitehat hackers receiving a 10% bounty in exchange for refraining from legal action.

Amongst persisting innovation and consistent growth in the crypto world, many touted cross-chain to be the future. However, such hacks are a reminder that we are still in the early stages even as a trillion-dollar industry. There remains a lot to be desired in terms of cross-chain portability and security.

Coinbase Announces Blackrock Partnership:

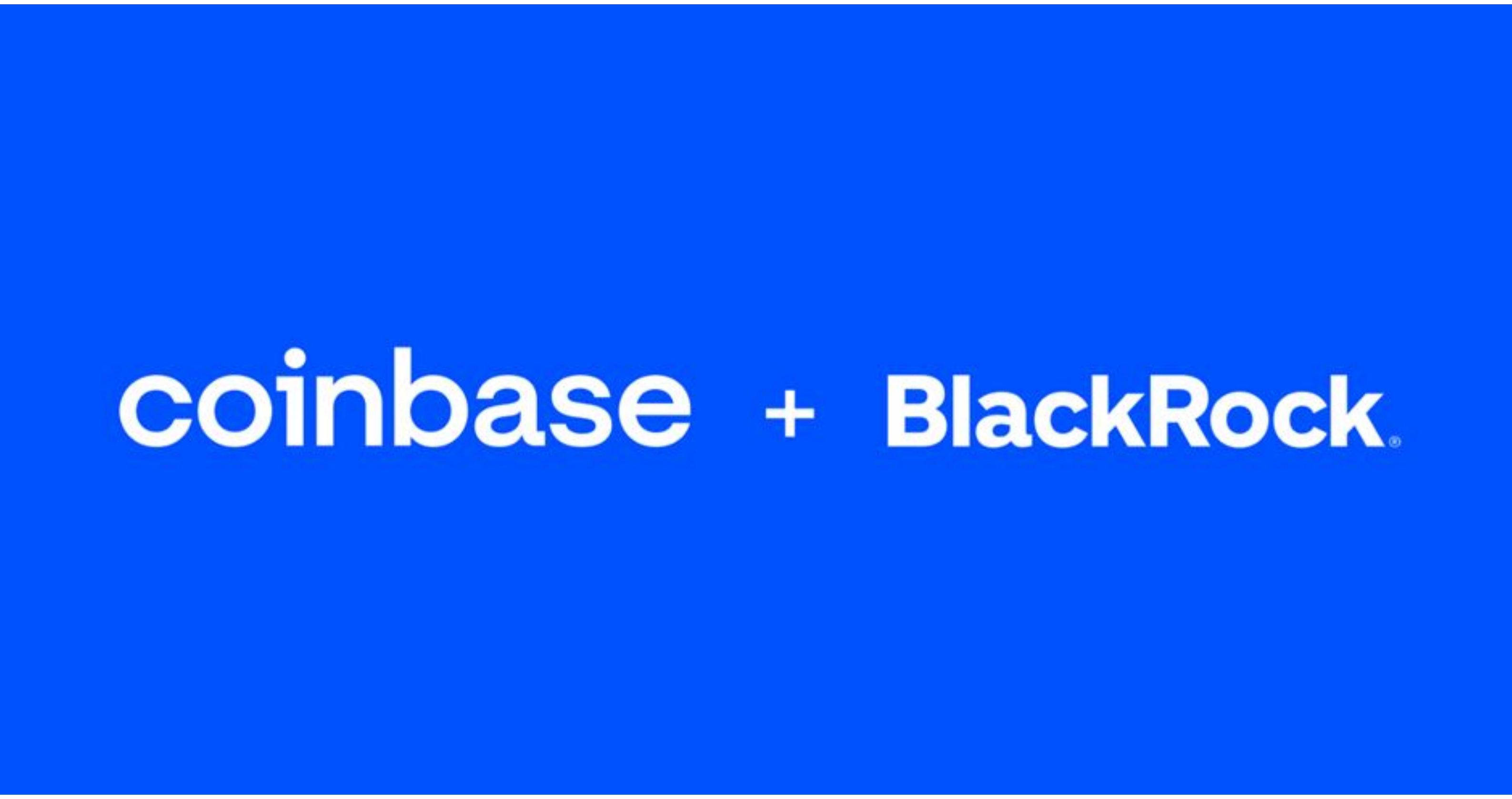


Figure 26. Coinbase is set to provide access to crypto trading and custody to Aladdin clients via Coinbase Prime

Coinbase is partnering with BlackRock, the world's largest asset manager, to provide institutional clients of Aladdin, BlackRock's end-to-end investment management platform, with direct access to crypto, starting with Bitcoin, through connectivity with Coinbase Prime. Coinbase Prime will provide crypto trading, custody, prime brokerage, and reporting capabilities to Aladdin's Institutional client base, who are also clients of Coinbase.

Coinbase shares rose sharply after the partnership was announced, up by more than 30%.

A plunge in cryptocurrency prices has prompted layoffs at Coinbase and some other crypto exchanges (though not *Bitfinex*). Coinbase is also facing an investigation from the Securities and Exchange Commission on whether it improperly allowed Americans to trade digital tokens that should have been registered as securities.

Meta begins rolling out NFTs across 100 countries on Instagram.

Figure 27. Following a series of testing phases, NFT integration is now live on Instagram across 100 countries.

In a significant step forward towards wider acceptance of NFTs, Instagram users will now be able to showcase their NFTs on the platform, following the completion of a successful testing phase in May. Mark Zuckerberg (CEO of Meta, which owns Instagram) announced the roll-out in a Facebook post. (link:https://bit.ly/3JygBX0).

Last month, Meta product manager Navdeep Singh said that testing was also underway on Facebook as it aimed to enable cross-platform posting involving NFTs.

Voyager receives the green light to initiate cash withdrawals

Figure 28. The company had frozen withdrawals and subsequently filed for Chapter 11 bankruptcy on 1st July.

On August 4, Voyager was permitted to honour cash withdrawals using money held under custody with Metropolitan Commercial Bank.

The firm announced that cash withdrawals will start processing on August 11.

Voyager has been advocating to honour cash withdrawals from its Metropolitan Commercial Bank (MCB) account as part of its Chapter 11 bankruptcy proceedings.

MCB holds $270 million in custody for Voyager customers.

According to Voyager, individuals with cash in their accounts will be able to withdraw up to $100,000 every 24 hours and should have their money within 5 to 10 days of making the request.

The ability to honour cash withdrawals is a step forward, though more than $1 billion (as reported by *The Block)* in crypto remains on the platform and in limbo. The federal bankruptcy court has approved a set of bidding procedures, which will lay out how other firms may place bids on the assets for the purpose of reorganisation.

FTX had earlier offered to purchase the firm but had their offer rejected. Voyager Digital has already received multiple bids to buy it that are higher than the one from the FTX exchange and its sister firm Alameda, Voyager's attorney said in court last Thursday, according to a *Bloomberg* report.

LEARNING SECTION

WHAT IS THE METAVERSE?

Figure 29.

What does a more immersive experience on the internet look like? The Tech industry calls it the Metaverse. It is the buzzword that offers the promise of immense possibilities of a new and improved internet. Like other technological breakthroughs such as electricity and the internet, no one can really predict the extent of its adoption in its early stages.

The Metaverse has always been associated with Web3. Do both have to exist and develop in parallel? How did metaverse come to be, and what will it be, in the future? In this week's learning section, we answer these questions as we take a deep dive into the Metaverse.

History

It’s hard to pinpoint the inception of the Metaverse, given how modern technology in general tends to evolve as a new layer is built on top of existing layers. However, we can chronologically identify critical breakthroughs from the past that have contributed to the concept of the Metaverse, as we know it today.

- In 1969, Myron Krueger, a computer artist, developed the early phases of the "artificial reality" experience using computers and video systems. The computer-generated environment responded to the people in it. Krueger is considered to be one of the first-generation virtual reality (VR) and augmented reality researchers.
- In 1977, MIT created the Aspen Movie Map that enabled users to explore Aspen City in Colorado much like Google Street View today using photographs from a car driving around the city. This was the first use of VR to virtually transport people to other places.
- In 1991, the internet was born. Timothy Berners-Lee invented the world wide web.
- In 2003, Second life was developed by Philip Rosedale and his team. It is an online virtual world that pioneered most of the concepts of Metaverse as we know it today.
- In 2009, Satoshi Nakamoto implemented the first public ledger for transactions using bitcoin on the blockchain. Blockchain technology would later provide the decentralised feature of the metaverse.
- In 2010, Palmer Luckey, an 18-year-old entrepreneur, and inventor created the Oculus Rift VR headset prototype. With its 90-degree field of vision and use of computer processing power, the revolutionary headset reignited interest in virtual reality.
- In 2014 The Ethereum blockchain went beyond the use of blockchain for digital currency and introduced smart contracts.
- In 2018, a Steven Spielberg Movie, Ready Player One, was released that introduced a new generation to the exciting concept of virtual reality.
- In 2015, Decentraland was introduced. It is the VR iteration that utilises a proof-of-work algorithm for virtual lands. Its idea became more widespread later on during the 2021 NFT boom.
- In 2017, Fortnite was released. opening people’s minds into what the metaverse would look like, incorporating blockchain technology.
- In 2020, the Covid Pandemic shook the world and limited people to online interaction. It also forced businesses to continue operations online through work-from-home set-ups. This new way of life has popularised the concept of the Metaverse, making the pandemic a "perfect storm" for its growth.

Definition

The challenge of the metaverse is its hazy idea. Matthew Ball, in his Book “Metaverse, and How it Will Revolutionize Everything” defined the Metaverse as follows:

“A massively scaled and interoperable network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence, and with continuity of data, such as identity, history, entitlements, objects, communications, and payments.”

His definition encompasses the essential elements of the metaverse. However, the author himself says that we should not expect a single, all-illuminating definition of the “Metaverse”, especially how early-stage the technology is. Because we have no definitive definition of what it is, we can determine what it is not.

- The Metaverse is not an exclusive product or a private-owned entity. As with the internet, it is a free-for-all space incorporating blockchain technology.
- The Metaverse is not Virtual Reality. Virtual Reality can be a way to experience the Metaverse and VR headsets are not necessary to access it. It is similar to how the internet is not google but we use google to navigate across the internet. Nevertheless, it is hard to imagine the internet now, without Google.
- The Metaverse is not a video game, though video games can be exciting elements of the Metaverse. The Metaverse is meant to broaden the virtual experience beyond video games and thus expand its participants.

How is the Metaverse related to Web3?

It is hard to have a discussion about the Metaverse without mentioning Web3, and many individuals perceive them as the same thing. Both are “in-process” concepts with a steep development curve that lies ahead.

The Web3 and Metaverse overlap in the use of blockchain technology. Web3 utilises decentralised protocols to facilitate permissionless transactions and execute smart contracts.

The Metaverse, on the other hand, is expected to be a core feature of Web3 that is focused on an immersive experience for work, learning, entertainment, and social connections. This is made possible by augmented reality, virtual reality and holographic projections. Because the metaverse is meant to become a digital equivalent of the real world, it should have mechanisms for monetary exchange and other economic activities. These virtual transactions are made possible through Non-Fungible Tokens (NFTs) and cryptocurrency; both built on blockchain technology.

Cryptocurrencies offer a primed platform for transacting and investing in the metaverse. It does not need the traditional entities of the economy like brokerages, banks, and governments.

Though Web3 and metaverse are fundamentally different in the scope of their application, they are related in the aforementioned ways. Both can boost each other to be greater than what they already are today.

Applications

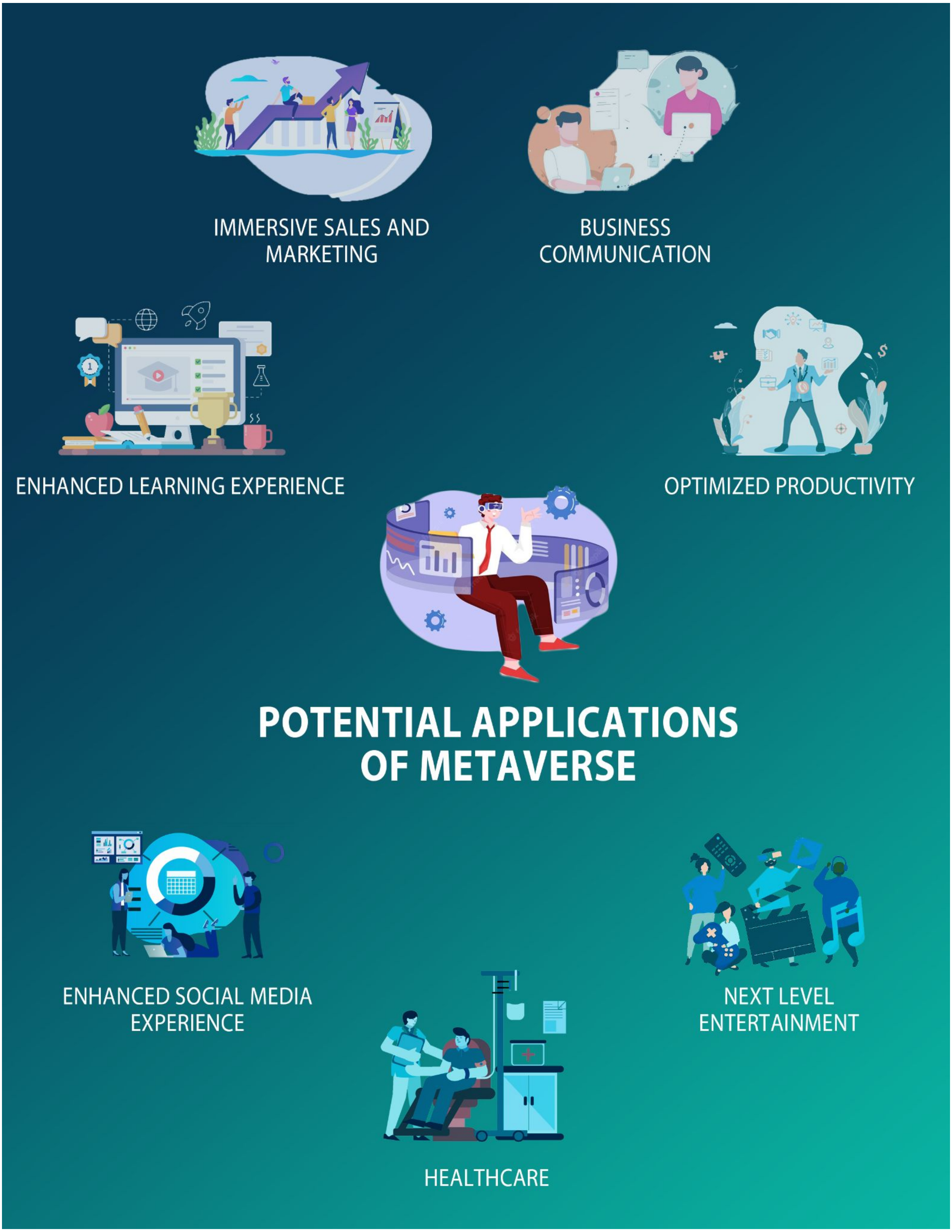


Figure 30.

1. Enhanced Social Media Experience

Mark Zuckerberg, founder of Facebook (Now Meta) described the social media aspect of the metaverse as the "Embodied Internet". He visualised the metaverse as a more immersive experience of social interactions powered by Augmented Reality and Virtual Reality.

2. Business Communication

Imagine a hologram-based, real-time version of Zoom, Microsoft Teams and Google meet – this will be possible in the Metaverse.

3. Optimized Productivity

Imagine conducting a real-time inspection in a manufacturing facility miles away in the comfort of your home. Or say, take guests on a realistic virtual tour to real estate projects to experience the space like an actual visit.

4. Enhanced Learning

The pandemic has forced us to kick-start a new medium of teaching and out-of-the-classroom learning. The metaverse can provide next-level representations of real-life objects to improve learning efficiency. Teaching a vocational skill like repairing a piece of equipment can be possible in the metaverse without the need to handle actual equipment.

5. Immersive Sales & Marketing

An immersive social media and business communication experience will transform the Sales and Marketing worlds. We can already see this unfold as businesses like Pepsi, McDonalds and many others are buying metaverse real estate. This will give businesses an improved consumer experience with their services and products.

6. Entertainment

Imagine a virtual concert of your favourite artist, attended by fellow fans all from the comfort of your home. Sports and games can also be arranged in the metaverse with commercial opportunities, such as integrated sports betting.

7. Healthcare

The provision of remote medical experiences has surged in popularity out of necessity during the early stages of the Covid-19 pandemic. Health care providers are more efficient in conducting routine monitoring without needing physical interaction. This experience can be significantly improved through the Metaverse. Telemedicine can be enhanced to "Tele-presence" as the VR experiences provide a greater sense of "being there" for doctors to their patients.

What Will Take Us Forward?

The full version of the Metaverse as we imagine and foresee now may be years away and numerous technological advancements are necessary to thrust us forward. Innovations in these key areas, according to Matthew Balls, are necessary for tracking the emergence of the Metaverse.

1. Hardware.

Tech industries are focusing on solutions to the current limitations of virtual reality headsets, by using sensors and increasing immersion with 3D touch, or haptic technology. Haptic technology allows users to experience touch through the application of forces, vibrations or motions to enhance to traditional visual-only experience.

2. Networking

To overcome the limitations of today's internet, that is, bandwidth, quality of service and network architecture will need to be improved for the Metaverse to become widespread.

3. Virtual Platforms

The development of immersive digital platforms need to be created, where users and businesses can engage.

4. Computing Power

Sufficient levels of computing power need to be able to support the metaverse and its functions such as Artificial intelligence, data reconciliation, synchronisation etc.

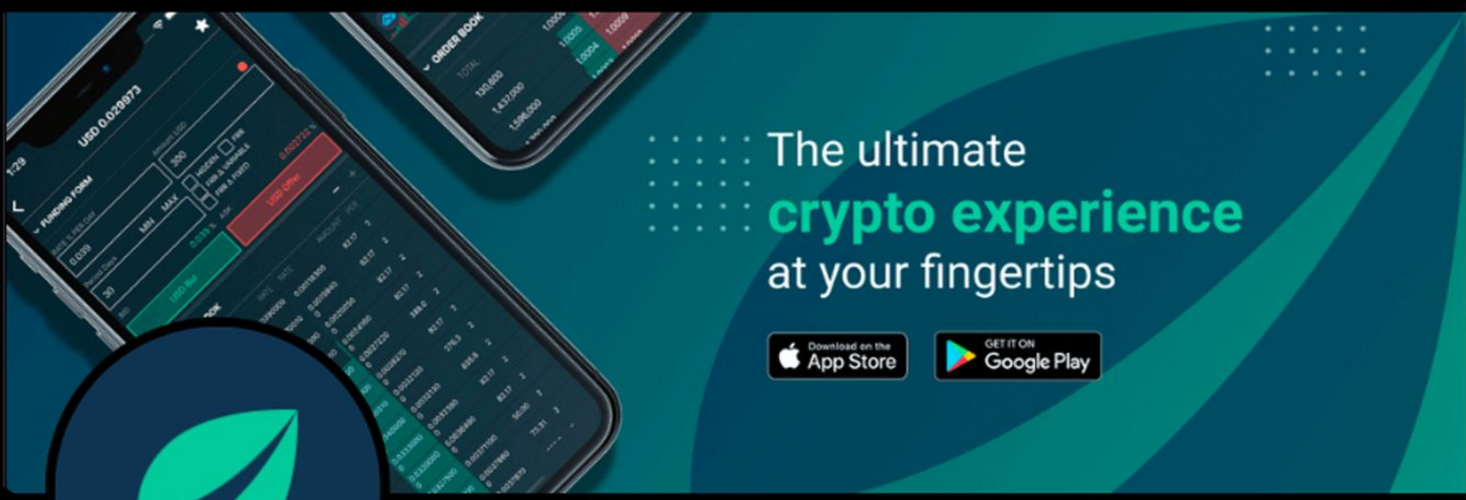
5. Interchange Tools and Standards

Metaverse needs de facto standards for interoperability that support activities such as rendering, artificial intelligence and import/export of virtual assets from one experience to another.

6. Payments

Though cryptocurrency payments are starting to gain popularity, further adoption and development will be needed to support the economics of the Metaverse.

With the Metaverse in its embryonic stages, it’s hard to set in stone a precise roadmap for it. However, we have advanced too far for any entity or parallel innovation to stop it. We have different versions of what it is and different visions of how it will revolutionise the future. There are doubters, and there are believers. However, one thing is certain, there is no other way but forward with the Metaverse, and it is unstoppable. Human beings are problem solvers; hence we can only anticipate innovations upon innovations in both the bizarre and exciting realms of the metaverse.



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