

Bitwise®

Crypto Equities: A Picks and Shovels Approach to Investing in Bitcoin and Crypto

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BITWISE ASSET MANAGEMENT

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Past performance does not predict or guarantee future results. Nothing contained herein is intended to predict the performance of any investment. There can be no assurance that actual outcomes will match the assumptions or that actual returns will match any expected returns. Historical performance of sample portfolios has been generated and maximized with the benefit of hindsight. The returns do not represent the returns of an actual account and do not include the fees and expenses charged by funds.

I. Executive Summary

Once or twice a decade an industry-defining company goes public.

The Netscape IPO in 1995 is widely considered a milestone in the development of the internet as a consumer technology. In 2002, the Chicago Mercantile Exchange (CME) became the first U.S. exchange to go public, marking a new era in finance. And in 2011, LinkedIn was the first social media platform to launch an IPO, followed by Facebook in the following year.

These companies are not necessarily the long-term winners in a space, but they are the ones that signal to both investors and the broader public that something utterly new is about to happen: for their investment portfolios, their industry, or even the economy as a whole.

Crypto reached this milestone in April 2021 with the direct listing of Coinbase, the world's largest regulated crypto exchange.

Coming to market with an \$86 billion market capitalization — a level surpassed by only 11 U.S. financial institutions at the time — Coinbase announced crypto as a new force to be reckoned with in both finance and technology.

Coinbase, however, is only the best-known example of a broader trend: Over the past two years, an increasing number of new crypto-focused companies have come to market, including crypto miners, crypto mining equipment manufacturers, crypto-focused asset managers, and more. Dozens more are in the queue, with multiple billion-dollar-plus startups readying their businesses for IPOs in the next couple of years (see Appendix I).

For investors, these companies are often seen as a way to gain indirect exposure to cryptoassets like bitcoin. While track records are short, the data we have so far supports this narrative: Correlations between crypto equities listed for over six months and cryptoassets have typically been in the 0.50 to 0.75 range.

But there is a more interesting way to view these companies: as some of the fastest-growing and most profitable companies on the market in any industry.

The cryptomarket is unique in that reputational, regulatory and other concerns have prevented traditional financial services companies from entering the market in a major way. This dynamic has shielded early movers like Coinbase from natural and well-funded competitors for long periods of time, allowing them to build unique competitive positions.

Interestingly enough, these positive dynamics are not yet reflected in current valuation multiples.

As the table below shows, pure-play crypto equities — as represented by the Tier 1 constituents of the Bitwise Crypto Innovators 30 Index — trade at a similar price-to-earnings multiple as the S&P 500 as a whole, but are growing roughly 27x faster. Even compared to exchange-traded funds focused on disruptive technology, such as the ARK Innovation ETF (ticker: ARKK), the median crypto stock grows top line revenue 8x faster, has higher net margins, and trades at one-third the 2021 price-to-earnings multiple.

In this paper, we examine the case for allocating to crypto equities, both as a proxy for cryptoasset exposure and as unique stand-alone investments in their own right.

Crypto equities are some of the fastest-growing and most profitable companies on the market in any industry.

CRYPTO EQUITIES EXHIBIT ROBUST FUNDAMENTALS*

| METRICS | BITWISE CRYPTO INNOVATORS 30 INDEX | S&P 500 | ARKK |
|-------------------------------|------------------------------------|---------|-------|
| 2021 Median Revenue Growth | 371.0% | 11.9% | 40.4% |
| 2021 Median Net Income Margin | 37.5% | 14.9% | -9.4% |
| 2021 Median Estimated P/E | 22.3x | 21.2x | 78.7x |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.
Note: Estimates based on analyst consensus estimates from FactSet.

*Companies that did not have analyst estimates available were excluded from the sample (6 for the Bitwise Crypto Innovators 30 Index, 1 for the S&P 500 Index, and 3 for the ARK Innovation ETF). Also, companies that are expected to report net losses in 2021 were excluded from the sample (2 for the Bitwise Crypto Innovators 30 Index, 17 for the S&P 500 Index, and 29 for the ARK Innovation ETF).

II. What Are Crypto Equities?



The crypto industry is supported by a growing array of publicly traded companies that build and maintain the infrastructure that allows the ecosystem to thrive. These include crypto mining companies, mining equipment manufacturers, exchanges, custodians, and others.

This section examines the key equity subsectors of the crypto equity market.



CRYPTO MINERS

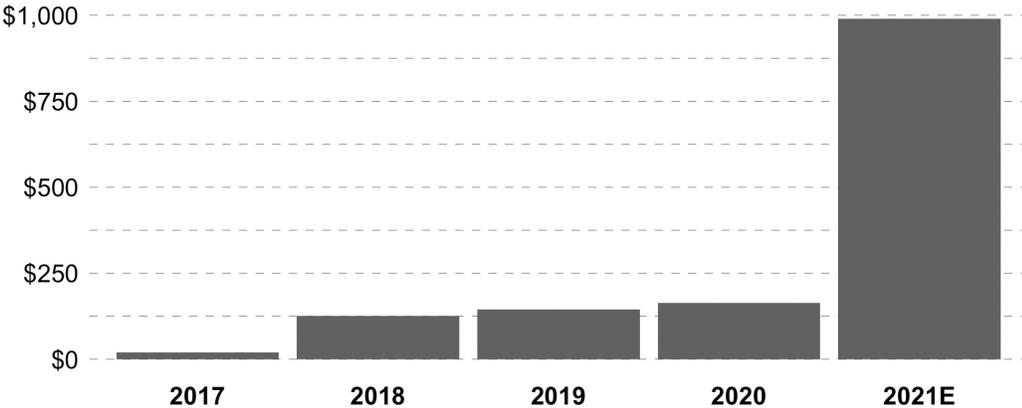
Crypto miners form a critical piece of the crypto ecosystem infrastructure. Miners help process transactions and contribute power to secure blockchain databases, including the Bitcoin blockchain. Miners are rewarded through the issuance of newly minted cryptoassets and the payment of transaction fees by users of each blockchain.

In recent years, mining has evolved from homemade setups to industrial-scale operations that require heavy investments in specialized hardware, electricity contracts, and more. The capital-intensive nature of these activities made this one of the first subsectors within crypto to tap into public capital markets for funding. It is also the subsector with the highest number of publicly traded pure-play companies, at seven.¹

Publicly traded crypto miners are expected to reach aggregate revenues of approximately \$1 billion in 2021, up from \$163 million in 2020.² This increase is driven by higher crypto prices and increased investments in computational power by these firms.

MINER REVENUES ARE EXPECTED TO REACH \$1 BILLION IN 2021

Aggregate annual miner revenues between 2017 and 2021 in USD millions. 2021 data based on FactSet analyst consensus estimates.



Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

Mining constituents include: Argo Blockchain (ARB LN), Bit Digital (BTBT), Bitfarms (BITF CN), HIVE Blockchain (HIVE CN), Hut 8 Mining (HUT CN), Marathon Digital Holdings (MARA), Riot Blockchain (RIOT).



Crypto miners help process transactions and secure blockchain databases.

1 This paper leverages the Bitwise Crypto Innovators 30 Index to capture the universe of publicly traded "pure-play" crypto equities. The index features the 20 largest pure-play crypto companies, with pure-play defined as companies that derive at least 75% of their revenue from the crypto sector, or hold more than 75% of their corporate treasury in liquid cryptoassets like bitcoin. It also features 10 diversified businesses that have one or more business lines focused on crypto. In conducting this research, the authors focused on the 20 pure-play companies that together represent more than 95% of the available market capitalization of publicly traded pure-play companies.

2 Only six of the seven pure-play constituents in the market segment have formal analyst coverage and, therefore, 2021 revenue estimates.

SELECT METRICS OF MINING CONSTITUENTS IN THE BITWISE CRYPTO INNOVATORS 30 INDEX

Constituents displayed represent pure-play crypto companies.

| NAME | TICKER | MARKET CAP (USD MILLIONS) | 2021 ESTIMATES | | | RETURNS | | | |
|-------------------------------------|---------|---------------------------------|------------------------------|-------------------|-------------------------|---------|----------|---------|----------|
| | | | REVENUE (USD MILLIONS) | REVENUE GROWTH | NET INCOME MARGIN | 1 MONTH | 3 MONTHS | YTD | 1 YEAR |
| Marathon Digital Holdings | MARA | \$4,044.0 | \$234.0 | 5214.40% | 22.56% | 18.51% | 66.42% | 288.79% | 1842.11% |
| Riot Blockchain | RIOT | \$3,581.0 | \$204.0 | 1598.33% | 37.54% | 6.72% | 29.49% | 119.66% | 1100.00% |
| HIVE Blockchain Technologies | HIVE CN | \$1,152.0 | \$143.0 | 167.01% | 37.62% | 4.49% | 31.85% | 68.73% | 877.00% |
| Hut 8 Mining | HUT CN | \$1,126.0 | \$136.0 | 322.83% | 32.49% | 33.28% | 101.56% | 186.28% | 960.54% |
| Bitfarms | BITF CN | \$988.0 | \$164.0 | 372.93% | 42.06% | -0.74% | 30.56% | 199.63% | 1877.65% |
| Argo Blockchain | ARB LN | \$741.0 | \$109.0 | 317.37% | 48.42% | 6.83% | 7.85% | 330.18% | 2571.26% |
| Bit Digital | BTBT | \$705.0 | N/A | N/A | N/A | -26.95% | 58.66% | -41.49% | 178.39% |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.



MINING EQUIPMENT MANUFACTURERS

Crypto mining companies purchase hardware from crypto mining equipment manufacturers. Just as Intel and AMD provide semiconductors to the PC market, these companies provide the specialized hardware — called Application-Specific Integrated Circuits (ASICs) — that powers crypto miners' operations.

Data center providers provide hosting services to crypto mining operations. These companies invest to optimize the mining performance of their partners by incorporating top-of-the-line technology such as sophisticated cooling and insulation techniques, monitoring the operation uptime, and providing quick maintenance for faulty machines.

Due to long contracting times, equipment manufacturers and data center providers tend to be less exposed to the daily price fluctuations of crypto prices and more exposed to long-term industry trends.

There currently are three publicly traded firms in this category.

Mining equipment manufacturers provide the specialized hardware that powers crypto miners' operations.

SELECT METRICS OF MINING EQUIPMENT MANUFACTURING CONSTITUENTS IN THE BITWISE CRYPTO INNOVATORS 30 INDEX

Constituents displayed represent pure-play crypto companies.

| NAME | TICKER | MARKET CAP (USD MILLIONS) | 2021 ESTIMATES | | | RETURNS | | | |
|-------------------------------------|--------|---------------------------------|------------------------------|-------------------|-------------------------|---------|----------|---------|---------|
| | | | REVENUE (USD MILLIONS) | REVENUE GROWTH | NET INCOME MARGIN | 1 MONTH | 3 MONTHS | YTD | 1 YEAR |
| Canaan | CAN | \$1,613.0 | N/A | N/A | N/A | 4.44% | -6.56% | 58.52% | 389.58% |
| Northern Data AG | NB2 GR | \$1,429.0 | \$504.0 | 246.40% | 22.10% | 15.80% | -17.49% | -7.78% | 13.30% |
| Ebang International Holdings | EBON | \$476.0 | N/A | N/A | N/A | -0.39% | -22.66% | -57.83% | -65.59% |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.



EXCHANGES AND CUSTODIANS

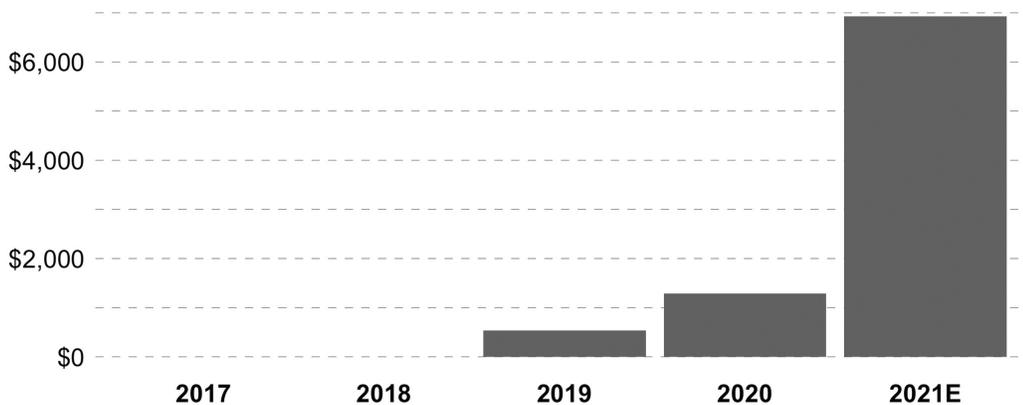
Exchanges and custody companies provide the on- and off-ramps that facilitate the trading and secure storage of cryptoassets. The exchange model earns fees primarily from transactional volumes, with the potential for additional revenue from services such as staking, borrowing and lending, and more. Custodians typically earn fees on a percentage-of-assets basis.

The Bitwise Crypto Innovators 30 Index currently has four pure-play crypto exchange and custody companies, headlined by Coinbase. Publicly traded crypto exchanges and brokerage firms are expected to reach aggregate revenues of approximately \$6.9 billion in 2021, up from \$1.3 billion in 2020, driven by rising trading volumes and customer demand.

Exchanges and custody companies provide the on- and off-ramps that facilitate the trading and secure storage of cryptoassets.

COINBASE IS EXPECTED TO LEAD REVENUE OF LISTED CRYPTO EXCHANGES PAST \$6 BILLION IN 2021

Aggregate annual revenues for exchange and custody constituents between 2017 and 2021 in USD millions. 2021 data based on FactSet analyst consensus estimates.



Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

Exchanges and Custody constituents include: BIGG Digital Assets (BIGG CN), Coinbase Global (COIN), Diginex Limited (EQOS), Voyager Digital (VYGR CN).

SELECT METRICS OF EXCHANGES AND CUSTODY CONSTITUENTS IN THE BITWISE CRYPTO INNOVATORS 30 INDEX

Constituents displayed represent pure-play crypto companies.

| NAME | TICKER | MARKET CAP (USD MILLIONS) | 2021 ESTIMATES | | | RETURNS | | | |
|---------------------|---------|---------------------------|------------------------|----------------|-------------------|---------|----------|---------|----------|
| | | | REVENUE (USD MILLIONS) | REVENUE GROWTH | NET INCOME MARGIN | 1 MONTH | 3 MONTHS | YTD | 1 YEAR |
| Coinbase Global | COIN | \$54,631.0 | \$6,731.0 | 427% | 44% | 0.29% | 11.90% | N/A | N/A |
| Voyager Digital | VYGR CN | \$2,136.0 | \$169.0 | 13801.15% | -24.02% | -11.38% | -19.11% | 277.06% | 1965.09% |
| BIGG Digital Assets | BIGG CN | \$222.0 | \$14.0 | 600% | -7% | -24.54% | -35.53% | 129.31% | 502.08% |
| Diginex Limited | EQOS | \$194.0 | \$18.0 | 6048% | -138% | -15.86% | -22.73% | -67.78% | -49.95% |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.



TRADING AND ASSET MANAGEMENT

Cryptoassets have provided exceptional returns over the past many years and still present compelling opportunities for investors. Not surprisingly, an array of trading and asset management firms have emerged that either trade proprietary capital or provide funds, services, and other tools that help investors access this space.

The Bitwise Crypto Innovators 30 Index currently has four pure-play trading and asset management firms, headlined by Galaxy Digital, which is expected to reach aggregate revenues over \$1 billion in 2021, driven by higher crypto prices and increased interest from professional and retail investors alike.

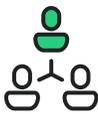
Trading and asset management firms either trade proprietary capital or provide tools that help investors access the crypto space.

SELECT METRICS OF TRADING AND ASSET MANAGEMENT CONSTITUENTS IN THE BITWISE CRYPTO INNOVATORS 30 INDEX

Constituents displayed represent pure-play crypto companies.

| NAME | TICKER | MARKET CAP (USD MILLIONS) | 2021 ESTIMATES | | | RETURNS | | | |
|--------------------------|-----------|---------------------------|------------------------|----------------|-------------------|---------|----------|---------|---------|
| | | | REVENUE (USD MILLIONS) | REVENUE GROWTH | NET INCOME MARGIN | 1 MONTH | 3 MONTHS | YTD | 1 YEAR |
| Galaxy Digital Holdings | GLXY CN | \$5,311.0 | \$1,067.0 | 289% | 99% | -12.29% | -4.73% | 94.24% | 526.42% |
| Coinshares International | COIN SS | \$677.0 | N/A | N/A | N/A | 32.99% | -13.55% | N/A | N/A |
| Bitcoin Group SE | ADE GR | \$218.0 | N/A | N/A | N/A | 2.04% | -14.38% | -50.28% | 53.73% |
| Arcane Crypto AB | ARCANE SS | \$218.0 | N/A | N/A | N/A | 5.82% | 28.11% | 45.45% | 136.14% |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.



SUPPORTING SERVICES

Silvergate Capital has carved out a niche as the premier crypto bank. It was among the first U.S. banks willing to provide services to the cryptomarket, and as a result, has a dominant share of the crypto banking market (with over 1,000 crypto-focused firms as customers).

Beyond traditional banking services, Silvergate's proprietary Silvergate Exchange Network (SEN) provides real-time, 24/7 USD-cryptocurrency transactions between institutional investors and crypto exchanges, reducing friction and counterparty risk in capital transfers. Transfer volume on the SEN has seen incredible year-over-year growth of 986%.³

Silvergate Capital has a dominant share of the crypto banking market.

SILVERGATE CAPITAL: THE LEADING CRYPTO BANK

Constituents displayed represent pure-play crypto companies.

| NAME | TICKER | MARKET CAP (USD MILLIONS) | 2021 ESTIMATES | | | RETURNS | | | |
|--------------------|--------|---------------------------|------------------------|----------------|-------------------|---------|----------|--------|---------|
| | | | REVENUE (USD MILLIONS) | REVENUE GROWTH | NET INCOME MARGIN | 1 MONTH | 3 MONTHS | YTD | 1 YEAR |
| Silvergate Capital | SI | \$2,996.0 | \$169.0 | 71% | 43% | -2.41% | -2.13% | 52.04% | 682.95% |

Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

³ Data from The Block, available at <https://www.theblockcrypto.com/data/crypto-markets/public-companies/sen-transfer-volume>.

III. How Good Are Crypto Equities as a Proxy for Cryptoasset Exposure?

The cryptomarket is one of the most exciting ... and volatile ... areas of global capital markets. It can also be intimidating for traditional investors.

Bitcoin, for instance — the largest, most-established, and best-known cryptoasset — has delivered spectacular returns, rising over 80x in price over the past five years. But it has also been volatile, experiencing ten drawdowns of over 20% during that period. Moreover, it presents logistical challenges: There are no bitcoin ETFs available in the U.S., and investors are left to sort through private funds, mobile apps, OTC-traded trusts and futures-based funds searching for exposure.

Faced with these concerns, many are considering investing in crypto equities as an alternative. But do crypto equities really provide good exposure to the boom taking place in the underlying cryptomarket?

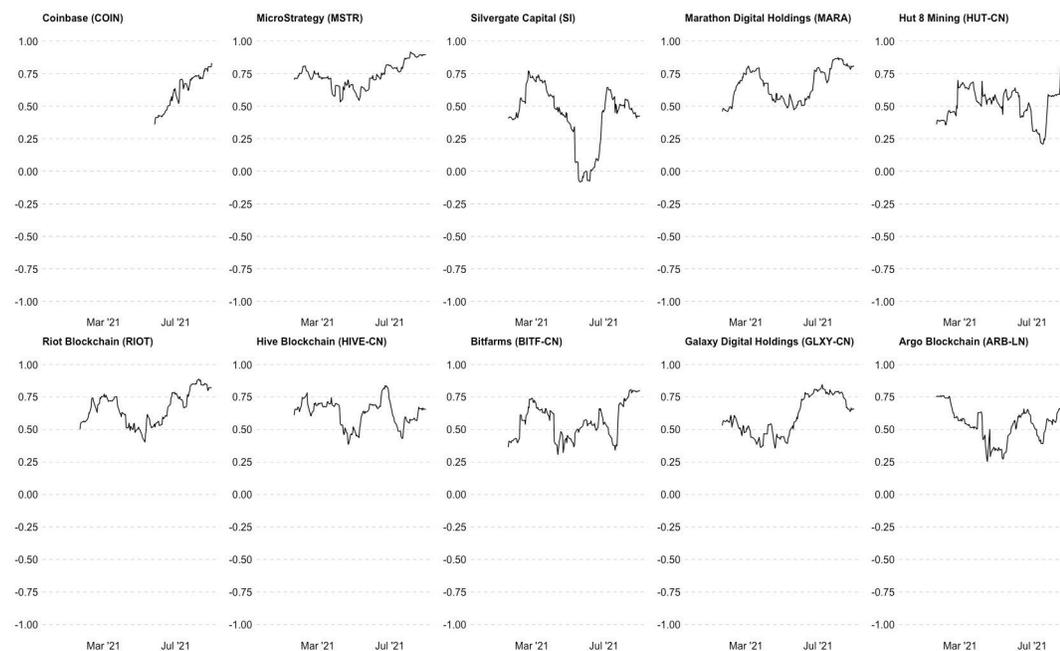
This section will show that, despite a relatively short trading history, the early data suggests that the answer is “yes.”

EXAMINING THE DATA

The charts below show correlations for the ten largest publicly traded pure-play crypto equities, against the Bitwise 10 Large Cap Crypto Index. The data covers the period from December 2020 to August 2021 with the exception of Coinbase, which only went public in April and therefore has less data.

CORRELATIONS BETWEEN CRYPTO EQUITIES AND CRYPTOASSETS TYPICALLY RANGE BETWEEN 0.50 AND 0.75

30-Day rolling correlations of daily returns between the top 10 constituents of the Bitwise Crypto Innovators 30 Index and the Bitwise 10 Large Cap Crypto Index.



Source: Bitwise Asset Management with data from IEX Cloud. Data from December 1, 2020 to August 31, 2021 for all companies except for Coinbase, for which data is available from April 14, 2021 to August 31, 2021.

Do crypto equities really provide good exposure to the boom taking place in the underlying cryptomarket? The early data suggests that the answer is “yes.”

The charts show that correlations between crypto equities and cryptoassets have typically ranged between moderate (0.50) and significant (0.75) throughout the bulk of this analysis.

The average correlation for each company over this time period ranges from 0.43 for Silvergate (SI) to 0.74 for MicroStrategy (MSTR). Silvergate (SI) is unique among these companies in that it is a traditional bank with non-crypto-related business lines, and therefore tends to have lower correlations with the cryptoasset market, as explored in the section below. MicroStrategy, on the other hand, is also unique in that most of its market capitalization comes from the bitcoin it holds on its balance sheet, which also explains why it enjoys the strongest correlation with cryptoasset prices.

In general, despite the relatively short track record, the data shows that partial exposure to cryptoassets can be obtained from crypto equities from a correlation standpoint.

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HOW LEVERAGED ARE CRYPTO EQUITIES TO CRYPTOASSET PRICE ACTION?

Commodity stocks tend to be leveraged plays on the underlying commodity price cycle: All things being equal, their profits tend to go up more than the price of the underlying commodity when the market is up and the reverse is true when the market is down.

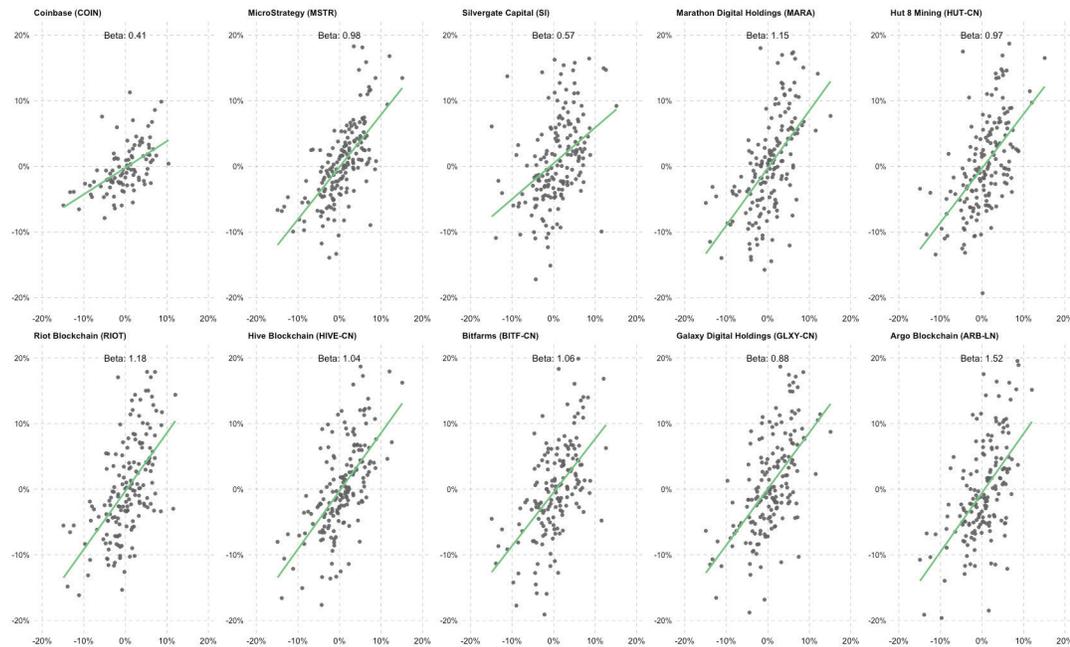
Crypto equities, on the other hand, share this relationship with the underlying cryptoasset prices to different degrees.

One way to look at this metric is to examine the slope derived from the regression of the returns of a crypto stock against its market reference (in this case, the broader cryptomarket as represented by the Bitwise 10 Large Cap Crypto Index). This relationship is known as the beta coefficient.

The charts below show these relationships for the same stocks depicted in the above charts, using the same nine months of data from December 2020 to August 2021, with the exception of Coinbase for which there is data only from April 2021 to August 2021.

CRYPTO EQUITIES ARE LEVERAGED TO CRYPTOASSET PRICES TO DIFFERENT DEGREES

Betas of the top 10 constituents of the Bitwise Crypto Innovators 30 Index (vertical axis) to the Bitwise 10 Large Cap Crypto Index (horizontal axis).



Source: Bitwise Asset Management with data from IEX Cloud. Data from December 1, 2020 to August 31, 2021 for all companies except for Coinbase, for which data is available from April 14, 2021 to August 31, 2021.

The results show that crypto equities have varying betas to crypto stocks, ranging from 0.41 for Coinbase to 1.52 for Argo Blockchain. This large dispersion suggests that while some stocks tend to exacerbate the underlying crypto price cycles, others tend to mitigate them.

This is intuitive considering that the subsectors within crypto equities are exposed to cryptoasset price cycles in different ways.

Crypto miners, for instance, tend to have significant operating leverage to crypto prices and therefore their share prices tend to exacerbate the crypto price cycles. Five of the six crypto miners in this evaluation — Riot Blockchain, Marathon Digital, HIVE, Bitfarms, and Argo Blockchain — have betas in excess of 1.00, indicating leveraged exposure to the price of crypto. The sixth miner is Hut 8, which has a beta of 0.97, approaching the 1.00 mark.

MicroStrategy, which derives a large part of its market capitalization from its bitcoin holdings, not surprisingly has a beta to crypto prices that closely approximates 1.00 (0.98 over our study). MicroStrategy's stock price is driven directly by its bitcoin exposure.

Other industry players, however, have valuation drivers that might be not entirely influenced by crypto prices. Exchanges are a prime example, as they derive their revenues from trading volume, which might not always move in tandem with crypto prices (and can even spike during short pullbacks), or from additional services that they can add on top of trading fees such as custody, staking, lending, and others. Coinbase (COIN) currently boasts the lowest beta to cryptoassets among the top 10 crypto stocks, at 0.41, but this can be taken with a grain of salt because Coinbase has a shorter trading history than the other nine companies.

HOW EXPOSED ARE CRYPTO EQUITIES TO THE DOWNSIDE VOLATILITY OF CRYPTOASSETS?

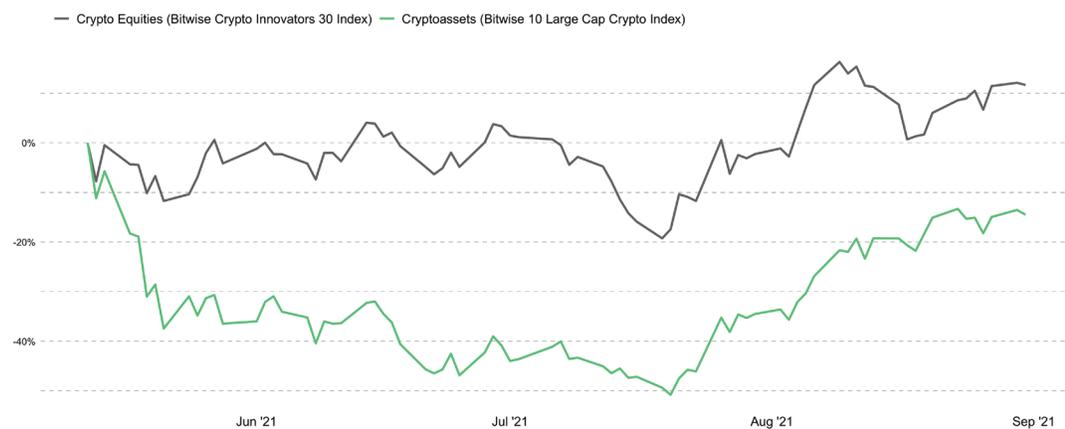
One common criticism leveled against cryptoassets is that they expose investors to significant downside volatility. Cryptoassets like bitcoin have experienced multiple drawdowns of over 50%, and are likely to experience significant drawdowns in the future as well.

Crypto equities are exposed to significant volatility as well, and are among the more volatile segments of the U.S. equity market. Nonetheless, there are early indications that crypto equities may have a different downside volatility profile than cryptoassets themselves, at least for short-lived corrections.

For instance, since the inception of the Bitwise Crypto Innovators 30 Index on May 12, 2021 until August 31, 2021, crypto equities did not fall more than 20.00%. In contrast, cryptoassets, as measured by the Bitwise 10 Large Cap Crypto Index, retracted 50.87% from peak to trough during the same period.

CRYPTO EQUITIES SHOWED DEFENSIVE BEHAVIOR IN THE LATEST CRYPTOASSET PRICE CORRECTION

Price performance comparison between crypto equities (represented by the Bitwise Crypto Innovators 30 Index) and cryptoassets (represented by the Bitwise 10 Large Cap Crypto Index) between May 12, 2021 and August 31, 2021.



Source: Bitwise Asset Management. Data as of August 31, 2021.

There are early indications that crypto equities may have a different downside volatility profile than cryptoassets themselves, at least for short-lived corrections.

The data is still limited and it will be important to further study this dynamic during future cryptoasset price drawdowns.

It does make intuitive sense, however. Although crypto equities are exposed, or maybe even leveraged to, cryptoasset price cycles, this may not be the case in the shorter term.

During the last correction, for example, exchanges did not see trading volumes go down along with prices and in some cases even saw them go up. Bitcoin miners, which are largely based in North America, greatly benefited from the Chinese government's decision to effectively ban industrial-scale mining in the country, which allowed them to expand their market share. On top of that, there are companies that do not derive all their revenues from crypto, which can prove defensive in such times.

SUMMARY RESULTS: DESPITE THE SHORT TRACK RECORD, THE DATA SUGGESTS COMPELLING TRENDS

As crypto is a new and dynamic industry, it is too early to draw strong conclusions regarding the relationship between crypto equities and cryptoasset prices. Crypto equities are an emerging subsector of the broader equity market, and there is limited data from which to draw statistical conclusions.

Nonetheless, early indicators suggest that crypto equities provide a compelling way for investors to gain exposure to the crypto economy, with significant correlations with cryptoasset prices, leveraged in different ways to those prices, and early indications of defensive behavior during sharp drawdowns.

Additional study is needed to confirm that these early trends hold water, but by and large they seem to make intuitive sense.



Early indicators suggest that crypto equities provide a compelling way for investors to gain exposure to the crypto economy, with significant correlations with cryptoasset prices, leveraged in different ways to those prices, and early indications of defensive behavior during sharp drawdowns.

IV. The Unique Combination of Fundamental Drivers That Crypto Equities Can Provide



The appeal of cryptoassets can go well beyond the partial exposure to cryptoasset prices that they tend to provide. Crypto equities have delivered unique financial performance derived from two factors that are rarely found together: exceptional top-line growth combined with high levels of profitability.

In this section, we examine those characteristics and explore why they may exist in this rapidly emerging space.

CRYPTO EQUITIES ARE AMONG THE FASTEST-GROWING SEGMENT OF THE PUBLIC EQUITY MARKETS

By leveraging their strong competitive positions in the fast-growing cryptomarket, crypto equities today boast some of the most vigorous top-line growth metrics among publicly traded companies.

The pure-play constituents of the Bitwise Crypto Innovators 30 Index are expected to deliver top-line growth between 71% and 13,801% in 2021, according to analyst consensus data. This translates into median revenue growth of 371.0% for the crypto equity segment as a whole.

By comparison, analysts estimate the median company in the S&P 500 index to grow revenues by 11.9% in 2021.

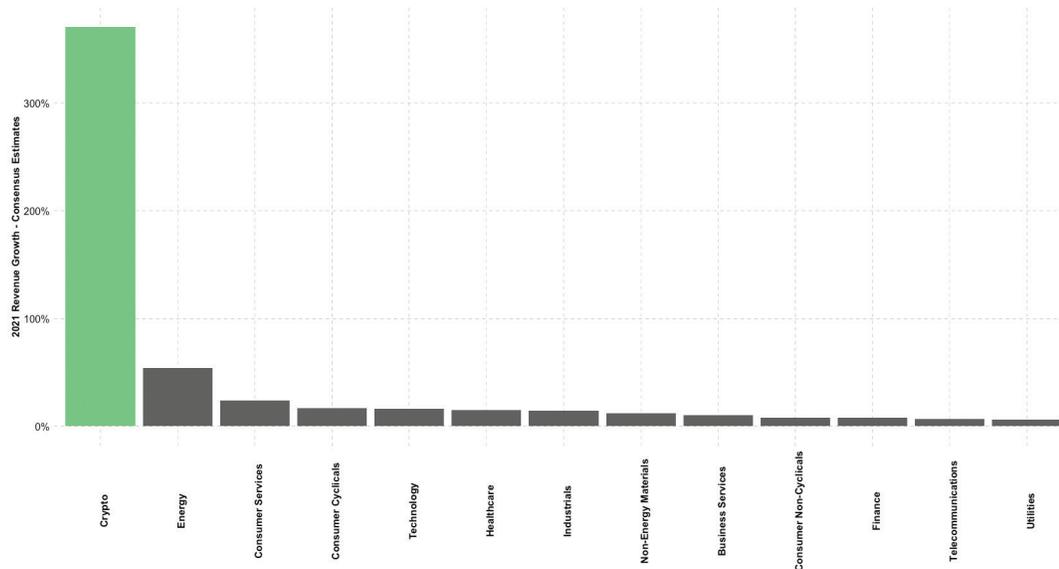


Crypto equities combine exceptional top-line growth with high levels of profitability.

The chart below shows the expected revenue growth for each sector of the S&P 500 compared with crypto equities. The sector-by-sector growth estimates range from 6.1% to 54.3%.

CRYPTO EXPECTED TO BE THE FASTEST-GROWING INDUSTRY IN THE PUBLIC EQUITIES MARKET

2021 median revenue growth estimates of crypto equities and S&P 500 industry groups.



Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

Note: Companies that did not have analyst estimates available were excluded from the sample (6 for the Bitwise Crypto Innovators 30 Index, 1 for the S&P 500 Index, and 3 for the ARK Innovation ETF). Industry classifications are based on FactSet Revere RBCIS/Economy classification.

This is an exceptional growth rate for an industry as a whole.

To put these numbers into context, consider this: Today, none of the 20 pure-play crypto equities included in the Bitwise Crypto Innovators 30 Index is a member of the S&P 500 index. If they were included, however, they would account for 9 of the top 10 companies ranked by top-line revenue growth for 2021. The non-crypto company in the top 10 would be Moderna, a manufacturer of a COVID vaccine.

Remarkably, this pattern persists even if you compare crypto-related equities with companies at the forefront of technological disruption. The constituents of the ARK Innovation ETF (ARKK), run by legendary investor Cathie Wood, are expected to post a median top-line growth in 2021 of 40.4%, which is much higher than the S&P 500.⁴ It pales, however, in comparison with the 371.0% expected growth for crypto equities.

If the crypto companies included here were members of the S&P 500, they would account for 9 of the top 10 companies ranked by top-line revenue growth for 2021.

CRYPTO EQUITIES ARE DISPROPORTIONATELY PROFITABLE FOR THE TOP-LINE GROWTH THEY GENERATE

The top-line growth rates achieved by crypto stocks are particularly noteworthy because they are accompanied by some of the highest profit margins among publicly traded companies.

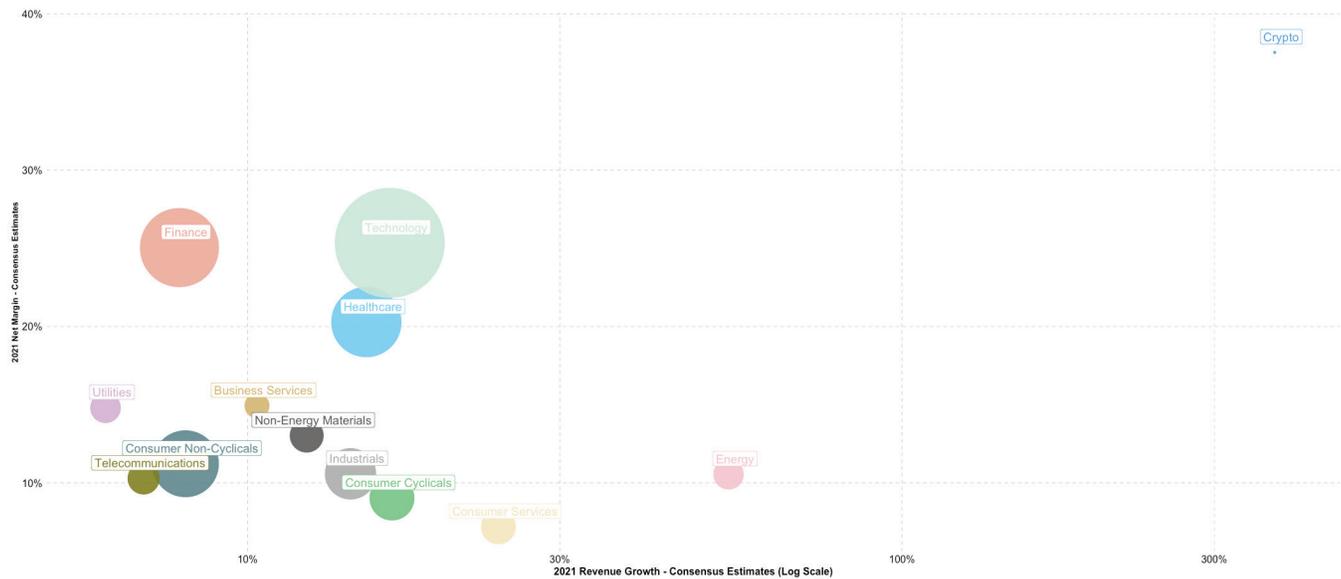
Crypto equities are expected to present a median net margin of 37.5% in 2021, per FactSet consensus analyst estimates. By comparison, S&P 500 sectors are expected to report profit levels between 7.2% and 25.4%, with a median of 14.9%.

The chart below depicts the median expected net margins and revenue growth for 2021 for all the S&P 500 industries and for crypto equities. The more to the right an industry is, the faster it is expected to grow; the higher that industry is on the chart, the more profitable it is. The size of each circle is proportional to the total market cap of each industry.

Crypto is the small blue dot in the far upper right corner.

CRYPTO EQUITIES STAND OUT IN TERMS OF THE PROFITABILITY GENERATED FROM THEIR TOP-LINE GROWTH

2021 median estimates of revenue growth versus profitability levels for crypto equities and S&P 500 industries (area of each circle is proportional to the total market capitalization of each industry).



Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

Note: Companies that did not have analyst estimates available were excluded from the sample (6 for the Bitwise Crypto Innovators 30 Index, 1 for the S&P 500 Index, and 3 for the ARK Innovation ETF). Industry classifications are based on FactSet Revere RBCIS/Economy classification.

This chart conveys two main messages.

First, it shows just how unique the combination of growth and profitability that crypto companies are achieving is. It simply has no parallel in the broader equity market. To emphasize this, note that the horizontal axis, which represents expected top-line growth, is scaled logarithmically; were it not, crypto equities would be so far to the right that it would be hard to distinguish the other industries.

Second, the chart shows how small crypto still is as an industry in the broader market perspective. At \$83 billion dollars in total market capitalization, crypto is roughly 1/8th the size of the smallest industry of the S&P 500 (business services) and less than 1% the size of the largest industry of the S&P 500 (technology).

For added perspective, crypto's combination of high growth and high profits is even more remarkable in comparison to the broader technology disruption space, as captured by the ARK Innovation ETF (ARKK). Analysts expect the constituents of ARKK to report a median net margin in 2021 of -9.4%, compared to 37.5% for crypto equities.

Investors are used to seeing fast-growing companies lose money as they invest in their growth, but the story is different with crypto equities.

FAVORABLE GROWTH AND PROFITABILITY DYNAMICS ARE NOT REFLECTED IN 2021 P/E MULTIPLES

As a new sector, crypto equities still have scant market coverage compared to other more established industries in the broader equity market.

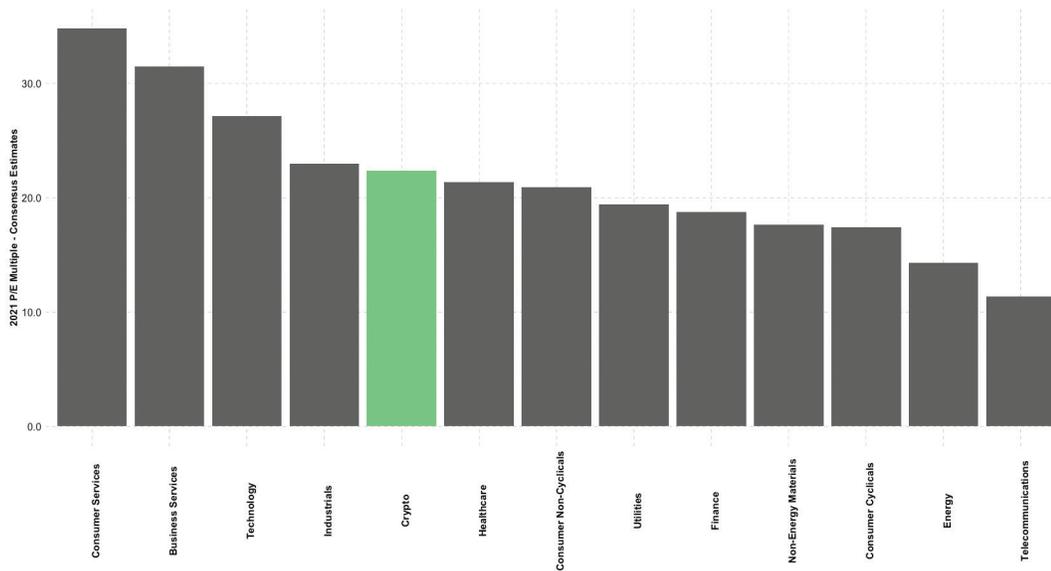
This might help explain why, despite their better growth and profitability prospects, crypto equities currently boast valuation multiples that are more or less in line with other more established industries, despite boasting much better dynamics.

Based on analyst consensus estimates, crypto equities currently trade at a median 2021 price-to-earnings ratio (P/E) of 22.3x. For comparison, that puts crypto equities in the middle of the pack compared against the sectors of the S&P 500, which range between 11.4x and 34.8x, for an index aggregate median of 21.2x.

The combination of growth and profitability that crypto companies are achieving simply has no parallel in the broader equity market.

CRYPTO EQUITIES ARE IN THE MIDDLE OF THE PACK VS. OTHER INDUSTRIES AS MEASURED BY THE MEDIAN 2021 P/E MULTIPLE

2021 median P/E multiples of crypto equities versus the industries of the S&P 500 Index.



Source: Bitwise Asset Management with data from FactSet. Data as of August 31, 2021.

Note: Companies that are expected to report net losses in 2021 were excluded from the sample (2 for the Bitwise Crypto Innovators 30 Index, 17 for the S&P 500 Index, and 29 for the Ark Innovation ETF) for the median 2021 P/E multiple. Industry classifications are based on FactSet Revere RBCIS/ Economy classification.

Focusing only on technology disruption stocks would make crypto equities even more attractive in relative terms. Despite its lower growth and significantly lower profitability levels, the median 2021 P/E ratio for the ARK Innovation ETF (ARKK) currently stands at a whopping 78.7x, more than three times the 22.3x ratio for crypto equities.

One potential reason, however, why these multiples are relatively low is that crypto price cycles are extremely hard to forecast and the growth, profitability, and valuation expectations for crypto equities are likely to follow the cryptoasset long-term cycle outlook. As cyclical stocks tend to trade at lower multiples than their non-cyclical peers due to this uncertainty, a potential re-rating of valuation multiples might only take place once investors are more comfortable with cryptoasset price cycles.

SUMMARY RESULTS: DRIVERS OF CRYPTO EQUITIES' UNIQUE POSITIONING

The crypto equity space stands out for its unique combination of exceptionally high growth, solid profitability margins, and restrained 2021 P/E multiples.

In large part, this combination is driven by the extraordinary growth taking place in the cryptoasset market as a whole. Crypto has been one of the best-performing asset classes in the world over the last 10 years, and crypto equities have been riding this trend alongside the assets themselves.

But the crypto equity market may be benefitting from a sustained reluctance from mainstream competitors to enter the cryptomarket, whether for regulatory, reputational, or other factors. Many well-established companies that could theoretically compete with crypto-focused companies have been reluctant to do so, which is giving crypto equities time to mature, scale, and grow competitive moats.

As an example, the reluctance of traditional brokerage firms to enter the crypto brokerage space has allowed Coinbase to accumulate more customers than Charles Schwab, TD Ameritrade, E*Trade and Interactive Brokers combined: 68 million customers vs. an aggregate 50 million, based on the latest available data.

This regulatory and reputational moat will not continue forever, and there already are many recent examples of mainstream companies moving into the space. But the sector has been able to grow larger and longer without mainstream competitors than other disruptive markets, which may contribute to explaining the unusual combination of positive financial results.

V. Risk Factors

Although crypto stocks can be more or less exposed to short- and medium-term swings in cryptoasset prices, the investment cases supporting them ultimately all rely on a positive outlook for crypto over the long run.

As a result, all risk factors that have the potential to significantly affect the long-term outlook for cryptoasset prices are likely to also impact crypto equities. Those can relate to regulation, market infrastructure, critical technical developments, and general user adoption, among other concerns.

This can be reflected in the difficulty of deriving estimates for crypto companies over longer time horizons. As an example, 2022 analyst estimates for Coinbase, the best-covered crypto stock, are extremely wide. Revenue expectations range between \$3.1 billion and \$9.4 billion, while net income estimates vary between -\$1.4 billion and \$3.2 billion. For reference the company reported these two figures at \$3.6 billion and \$1.6 billion, respectively, for the first half of 2021.⁵

Investors should be aware that crypto is an emerging asset class. The exceptional returns posted over recent years in crypto were accompanied by many sharp corrections, some of which lasted for multiple quarters or even years. Since crypto equity stocks have a relatively short track record as publicly traded companies, it is uncertain how the industry would fare as a result of a sharper or more prolonged correction in cryptoasset prices.

Trends can also shift fast in crypto, and companies that fail to adapt to or capture new opportunities might end up disappointing investors' expectations.

Today some more recent trends include, but are not limited to: the rise of decentralized finance (DeFi) applications that might compete with activities that some listed companies undertake in a centralized fashion; the adoption of proof-of-stake consensus algorithms, which have starkly different mining dynamics from the traditional proof-of-work scheme that underpins bitcoin mining activity; and the entrance of mainstream companies as service providers in the crypto space.

All risk factors that have the potential to significantly affect the long-term outlook for cryptoasset prices are likely to also impact crypto equities.

⁴ Net income of \$1.6 billion in the first half of 2021 is adjusted by a \$770 non-recurring tax gain in Q2 2021; the unadjusted net income for the first half of 2021 was \$2.4 billion.

VI. Conclusion

Investing in crypto companies has traditionally been the domain of venture capital funds. Now that crypto has established itself as an asset class and a myriad of companies have achieved critical mass, these opportunities are available to public equity investors as well.

Coinbase, the largest regulated crypto exchange in the world, was the bellwether that brought crypto equities to the forefront of investor discussions. But the industry already counts many other companies with different exposures to crypto, such as crypto miners, equipment manufacturers, exchanges and custodians, and trading and asset management companies.

On top of that, the pipeline of companies ready to come to the market over the next 12-24 months is robust and expanding, as explored in Appendix I.

Despite the relatively short track record of publicly listed crypto companies, the data so far suggests that crypto equities offer material (albeit indirect) exposure to cryptoassets. Correlations between crypto equities and cryptoassets typically range between moderate (0.50) and significant (0.75). Betas are more scattered, as they depend on how each company is exposed or leveraged to the crypto price cycle, but many crypto companies have betas of 1 or more to the market. In addition, crypto equities may be less volatile during pullbacks in cryptoasset prices than the cryptoassets themselves, although there is limited data around this claim.

Beyond serving as a proxy for crypto exposure, however, crypto equities are compelling investments in and of themselves.

As one of the most vibrant industries in technology, the case for investing in crypto equities offers a unique combination of:

- **Exceptional top-line growth:**
The median 2021 top-line growth estimates suggest that crypto equities will grow 371.0%, which compares to 6.1% to 54.3% for the different sectors that comprise the S&P 500 index.
- **Healthy profitability:**
Contrary to most hyper-growth industries, crypto is generating strong profitability levels. The median 2021 net margin estimates for crypto stand at 37.5%, compared to 7.2% to 25.4% for the sectors that comprise the S&P 500 index.
- **Reasonable valuation multiples:**
Crypto equities currently trade at a median P/E ratio of 22.3x (for 2021), which is roughly in line with the S&P 500 as a whole (sectors in the S&P 500 trade between 11.4x and 34.8x per 2021 estimates). Crypto equities are valued at lower 2021 P/Es than many disruptive technology stocks.

Crypto has already gained its foothold among venture capitalists and global macro investors. As the asset class establishes itself, with numerous companies sustaining multi-billion-dollar valuations supporting and leveraging it, crypto has now arrived as an investable industry for global equity investors as well.

VII. Appendix I: Potential Public Crypto Companies

There is a robust pipeline of crypto companies that could enter the public markets.

These companies are coming to market in two modalities: Through traditional initial public offerings (IPOs) or through Special Purpose Acquisition Companies (SPACs).

The following companies are currently engaged in SPAC mergers that should bring them to public markets in the coming months:

- **Bakkt:** A crypto derivatives exchange, custodian, and service provider, currently engaged in a SPAC deal valued at \$2.1 billion
- **Bullish:** A cryptocurrency exchange, currently engaged in a SPAC deal valued at \$9 billion
- **Circle:** A crypto infrastructure provider and stablecoin issuer, currently engaged in a SPAC merger valued at \$4.5 billion
- **Core Scientific:** A crypto mining company, currently engaged in a SPAC merger valued at \$4.3 billion

In addition, the following list includes some of the largest privately held crypto companies, which are large enough to explore public listings if that is determined to be desirable:

- **Bitfury:** A crypto infrastructure company, most recently valued at \$1 billion (November 2018)
- **Bitmain:** The world's largest crypto mining equipment manufacturer, most recently valued at \$12 billion (August 2018)
- **Blockchain.com:** A crypto wallet and exchange company, most recently valued at \$5.2 billion (February 2021)
- **Chainalysis:** A crypto data and analytics system, most recently valued at \$2 billion (March 2021)
- **Dapper Labs:** A consumer-focused cryptocurrency company that builds blockchain games and supports digital collectables, most recently valued at \$2.6 billion (March 2021)
- **Fireblocks:** A crypto custodian, most recently valued at \$2.2 billion (July 2021)
- **FTX:** A crypto derivatives exchange, most recently valued at \$18 billion (July 2021)
- **Gemini:** A crypto custodian and service provider, valuation not disclosed
- **Kraken:** A crypto brokerage, most recently valued at \$4 billion (June 2019)

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