Bringing Transparency to an Emerging Asset Class:
S&P Cryptocurrency Indices

EXECUTIVE SUMMARY

● S&P Dow Jones Indices has developed a series of cryptocurrency indices to measure this new emerging asset class.
● The S&P Cryptocurrency Indices are designed to have broad coverage since cryptocurrencies are not homogenous, and the level of activity beyond Bitcoin and Ethereum reflects a dynamic and evolving ecosystem.
● The goods and services provided by the projects (applications, protocols, and products created) in the ecosystem may add to the value of individual coins.
● There is no global regulatory body for cryptocurrencies, nor is there consensus among regulators as to a response to these new innovations.
● The S&P Cryptocurrency Indices have historically experienced high annualized returns accompanied by significant volatility and downside risk.
● Indexing aims to bring accessibility and transparency to the digital assets market.

INTRODUCTION

Because digital assets are an emerging asset class, it is helpful to discuss what cryptocurrencies (also referred to as “coins” in this document) are, how the asset class has grown, and how they are regulated. As cryptocurrencies are not identical in terms of what they offer, it is also important to understand how they can be used, along with some of the real and perceived challenges related to the asset class. This background helps to provide added context to the need for indexing to bring accessibility and transparency to this new market. The S&P Cryptocurrency Indices aim to meet these challenges. The indices are designed to serve as benchmarks for the performance of a selection of cryptocurrencies that are listed on recognized, open exchanges while meeting liquidity and market capitalization criteria.¹

¹ See Glossary for terms that are unique to digital assets.
BACKGROUND

Cryptocurrencies are a new, emerging asset class with almost USD 2.1 trillion in market cap as of Aug. 31, 2021. While 12-year-old Bitcoin is the largest and most well-known cryptocurrency, there are currently over 10,000 different cryptocurrencies, and more are continually being launched. These coins are not identical—while many may serve as a store of value, many may be used as a medium of exchange (i.e., to acquire various goods or services). These goods and services, in turn, may add to the coin’s value as an asset. While many countries do not recognize cryptocurrencies as legal tender nor as financial instruments, market participants have pursued these assets, nonetheless.

While initially the domain of retail investors, institutional investor interest in cryptocurrencies has grown exponentially over the past two years. For example, MicroStrategy, PayPal, and other firms have started to hold Bitcoin in their treasury; large global banks (BNY Mellon) have launched custody services; new fund administration services (State Street Global Advisors) have emerged; trading desks (Goldman Sachs) have been developed; traditional exchanges (CME, ICE) have released new offerings; and fund inflows into cryptocurrency hedge funds have reached record levels.

Cryptocurrencies may provide a new risk-based profile and uncorrelated returns, and some financial institutions are recommending investors hold some cryptocurrencies to provide diversification to a traditional 60/40 portfolio.

S&P Dow Jones Indices’ (S&P DJI) entrance into the cryptocurrency space reflects its perception that the asset class is gathering broad appeal among market participants.

The scope of this paper is limited to cryptocurrencies, a subset of digital assets, and excludes other types of digital assets such as non-fungible tokens (NFTs) and corporate coins (e.g., JPM Coin). Pegged currencies, such as stablecoins (e.g., USDC or Tether), state-sponsored digital currencies, and digital asset securities are also out of scope.

---


3 This document includes tokens in its description of cryptocurrencies. The biggest differentiation between the two is that cryptocurrencies have their own blockchains, whereas crypto tokens are built on an existing blockchain. [https://www.gemini.com/cryptopedia/cryptocurrencies-vs-tokens-difference](https://www.gemini.com/cryptopedia/cryptocurrencies-vs-tokens-difference).

THE CASE FOR CRYPTOCURRENCIES

Cryptocurrencies and the ecosystem around them represent a generational shift in how financial assets can be created and used. These new digital assets are generally issued and transferred on a blockchain network that is:

- **Decentralized**: There is no central administrator, no centralized data storage, and no single party that controls the data;
- **Censor-proof**: Most are not issued by a central authority and as such immune to government intervention but not regulation;
- **Technologically secure**: Cryptography makes it nearly impossible to counterfeit or double spend but not immune from theft; and
- **Immutable**: No single entity can alter or reverse a cryptocurrency transaction due to the consensus mechanism and verifiable, permanent distributed ledger.

The technology behind these assets (predominantly blockchain) solves the challenge of how to establish trust between unrelated parties ("trustless," in that they allow for peer-to-peer cryptocurrency transactions to take place without the need for an intermediary institution) over a network. While this paper will not focus on the technology breakthroughs, it is worth noting that the breakthroughs are substantial and merit further reading.\(^5\)

**Institutional Interest**

Media coverage has contributed to institutions viewing cryptocurrencies as an entirely new and important asset class. Concepts like Bitcoin being referred to as "digital gold," its inflation hedging potential, and its importance as a potential diversifier to a traditional 60/40 portfolio have been discussed widely in the press. This media coverage, plus the unique concepts of trust, transparency, and security that are core properties of cryptocurrencies, has helped to accelerate institutional interest over the past few years, particularly for Bitcoin.

Key metrics illustrate increased institutional activity in the space, particularly with respect to Bitcoin. These include record inflows of USD 5.8 billion into cryptocurrency funds, most notably Grayscale (USD 2.4 billion YTD).\(^6\) Approximately 20% of hedge funds overall are investing in digital assets.\(^7\) In addition, corporations are buying Bitcoin to hold on their balance sheet (e.g., MicroStrategy, Square, Tesla\(^8\)), and there is a surge in open interest in CME Bitcoin futures, amounting to 9.6% of global total

---

open interest (USD 1.7 billion, of an aggregate USD 17.8 billion, as of Aug. 23, 2021).  

REGULATIONS

Because cryptocurrencies are both emerging and borderless, there is no consensus among regulators as to a response to these new innovations. There is no global regulatory body for these assets, and most local and national laws and regulations are not tailored specifically to cryptocurrencies and their unique characteristics. We will touch on some examples here. While they are not exhaustive, they are representative of the various regulatory approaches to cryptocurrencies today.

Globally, in 2020, the international Financial Action Task Force (FATF) issued additional detailed guidance on the application of a corollary to the travel rule to virtual asset service providers (VASPs) who facilitate transactions in cryptocurrencies. The travel rule is a provision of the U.S. Bank Secrecy Act that aims to require all originators and beneficiaries of fund transfers to exchange certain identifying information, and the FATF guidance recommends that member jurisdictions impose a similar rule on VASPs operating in their jurisdictions. FATF member jurisdictions are now in various stages of implementing this guidance. As of June 2021, 37 countries have implemented the standards, essentially eliminating the pseudonymous aspect of Bitcoin and other cryptocurrencies with respect to transactions occurring through VASPs subject to compliance with the standards in these countries.

More recently, the FATF released an update to its guidance with respect to cryptocurrencies and VASPs. This guidance is currently open for public comment and is expected to be finalized by November 2021. The revisions to the FATF guidance interpret the definition of a VASP broadly to include “a central party with some measure of involvement” with a decentralized application. Such an interpretation would potentially bring many different participants within the ambit of the guidance and subject them to compliance with anti-money laundering and counter-terrorism financing (AML/CFT) laws in jurisdictions that adopt this interpretation of the VASP definition.

In Asia, perhaps due to strong retail investor interest in cryptocurrencies, regulations are advanced, and regulators have been active. In China, there has been a renewed focus to shut down mining in five regions, as well as a
As of the end of July 2021, European cryptocurrency ETPs had surpassed EUR 4.6 billion in AUM.

The European Commission proposed recommendations for a MiCA regime with the primary goal of enabling innovation while mitigating risk.

The Ontario Securities Commission approved the first Bitcoin ETF in Canada in February 2021.

As a result, many miners have relocated outside China, and exchanges have stopped trading certain products. In September 2021, China’s central bank declared all transactions involving Bitcoin and other virtual currencies illegal, which may result in additional relocation of mining and crypto activity. In addition, Hong Kong’s Securities and Futures Commission, which operates separately from China, has licensed its first virtual asset trading platforms under comprehensive new standards. South Korea’s Financial Services Commission announced restrictions on privacy coins and new guidelines for exchanges, including a requirement to partner with a domestic bank and register by September 2021. Laws in Japan are generally supportive of blockchains and cryptocurrencies.

Over the past few years in Europe, financial regulators in Germany and Switzerland approved the listing of ETNs backed by cryptocurrency assets, and as of the end of July 2021, European cryptocurrency ETPs had surpassed EUR 4.6 billion in AUM. Now, over 100 cryptocurrency ETPs are listed, including four issuers that launched cryptocurrency ETPs on Euronext Paris and Amsterdam in June 2021. In addition, the European Commission has proposed recommendations for a Markets in Crypto-Assets (MiCA) regime, with the primary goal of enabling innovation while mitigating risk.

Within North America, the Ontario Securities Commission (OSC) approved the first Bitcoin ETF in Canada in February 2021. Since then, two additional ETFs have launched. However, the OSC has sought to regulate cryptocurrency trading platforms as dealers of securities and recently took action against unregistered exchanges. In the U.S., few formal laws and rules specific to cryptocurrency have been introduced. That said, activities involving cryptocurrencies can touch upon a variety of U.S.

---

regulatory regimes including securities, commodities, and money transmission laws and regulations, depending on the circumstances. With respect to the latter, the Financial Crimes Enforcement Network (FinCEN) has provided detailed guidance regarding the application of the Bank Secrecy Act and related regulations to activities involving cryptocurrency, focusing on a variety of issues including the use of privacy coins in money transmitter businesses. In New York, the BitLicense is a strong, detailed framework for businesses looking to engage in virtual currency business activities in the state or with New York residents. With respect to securities regulatory issues, the U.S. Securities and Exchange Commission (SEC) has made a number of recent public statements indicating a renewed focus on digital assets and their use in a variety of different contexts that may implicate the securities laws. One area of focus has been with respect to cryptocurrency ETFs, none of which have received SEC approval at this point, although many players have filed (17 with direct exposure to Bitcoin and Bitcoin futures, as of Aug. 12, 2021). In June 2021, the SEC announced it would delay its decision on ETFs a second time, Finally, the U.S. Senate’s approval of the Infrastructure Bill in August 2021, which requires reporting by a range of players within the crypto ecosystem, may dampen growth within the U.S.

CHALLENGES OF INVESTING IN CRYPTOCURRENCIES

One of the biggest challenges for the industry has been the allegation that Bitcoin and other cryptocurrencies have been used for illicit activities. Suspicions like these, which have come from government agencies globally and major media outlets, continue today and have the potential to resonate worldwide.

However, because the technology allows the review of on-chain data (i.e., data immutably recorded on the native blockchain network providing transaction size, type, IP address, and more), whether Bitcoin or other cryptocurrencies are primarily used for illicit financing can be verified. According to respected chain data provider Chainalysis, the total cryptocurrency value sent and received by known illicit entities in 2020 was less than 1% of all cryptocurrency activity and less than USD 10 billion in volume (see Exhibit 1). By contrast, the UN estimates that between 2%

---


26 Bloomberg


Bringing Transparency to an Emerging Asset Class: S&P Cryptocurrency Indices

October 2021

INDEX EDUCATION | Digital Assets
For use with institutions only, not for use with retail investors.

and 5% of global GDP (USD 1.6-USD 4 trillion) annually is connected with illicit activity.31

Exhibit 1: Total Illicit Cryptocurrency Activity versus Total Cryptocurrency Activity

Because the technology allows the review of on-chain data, whether cryptocurrencies are primarily used for illicit financing can be verified.

According to Chainalysis, the total cryptocurrency value sent and received by known illicit entities in 2020 was less than 1% of all cryptocurrency activity.

Cryptocurrencies are not without risks, however. A short list includes the potential for fraud (e.g., financial crimes such as money laundering or tax avoidance, Ponzi schemes, and scam offerings such as certain initial coin offerings (ICO) and pump and dump schemes32), price manipulation, market manipulation, risk of being hacked, and violation of local or national regulatory or other laws. These risks are demonstrated by the number of criminal and civil charges that have been raised against executives from various exchanges and market participants globally.

Market Structure

To investors familiar with traditional financial markets, it is worth discussing some of the attributes of the cryptocurrency market structure, its trading venues, and how it is different from other more mature financial markets.

Within the growing cryptocurrency ecosystem, there are currently over 300 spot exchanges and over 30 derivatives exchanges for trading cryptocurrencies.33 What this means is that there is not a definitive market price nor the concept of a “consolidated tape.” Additionally, the quality of exchanges varies widely—in terms of operational aspects, the regulations to which they are subject and their conformity with them, their governance.


33 “Cryptocurrency Fraud.” Constantine Cannon.

In addition to spot and derivatives, there are over 70 decentralized exchanges, in the fast growing DeFi space. Source: https://coinmarketcap.com/rankings/exchanges/.
practices, the security and robustness of their platforms, and the overall robustness of their trading volume, liquidity, pricing, and breadth of instruments on offer.

To that end, several cryptocurrency price aggregator platforms have emerged to address the challenge of obtaining a unique indication of price from these exchanges. Of course, these aggregators vary in their approach to which exchanges they select for their pricing (this can range from one to all), as well as in the type of pricing they offer. Among price aggregators, volume-weighted average pricing (VWAP), time-weighted average pricing (TWAP), variations using medians, and fair market value (FMV) pricing are all available.

Finally, because there is not a standard identifier (ticker) for each asset across exchanges, price aggregators must have a robust solution for addressing the data challenges.

Exhibit 2 illustrates the difference between traditional and crypto market structure. Besides one being centralized and the other decentralized, it is important to note the difference in key participants—central intermediaries such as the Depository Trust & Clearing Corporation (DTCC), conventional exchanges, and broker dealers do not play a critical role in cryptocurrency markets.34

Exhibit 2: Traditional and Crypto Market Structures

As with any market evolving this quickly, the infrastructure is also maturing to confront the issues previously mentioned—such as evolving regulations, emerging technology, unfamiliar risks (potential for hacks, lost keys, etc.), the need for security (operational and technological), and the interface between centralized and decentralized systems. Today, the infrastructure

34 Source: Lukka, “Navigating the world of crypto asset tax reporting,” p. 6.
is diverse and complex. One particular logistical industry challenge is cryptocurrency custody.

For financial institutions that do want to hold cryptocurrencies directly, the most frequent approach is to integrate with digital native custodians (e.g., firms that were created specifically to service the blockchain infrastructure). This may allow traditional firms to manage operational complexities, navigate regulatory grey areas, and to get to market more quickly. For example, BNY Mellon is planning to use Fireblocks for digital custody. Deutsche Börse recently acquired a stake in Crypto Finance AG to boost its regulated digital custody. Other known digital custodians include Anchorage, BitGo (being acquired by Galaxy Digital), and Kingdom Trust, and some of the largest digital exchanges such as Coinbase and Gemini also offer custody services.

**ASSET-LEVEL CHARACTERISTICS**

Cryptocurrencies are not identical in terms of what they offer. Many coins have features that provide utility beyond being a store of value. In general, a number of coins may be used to pay fees on a platform or network and given out as rewards for the operation of a network. These features, in addition to potential momentum created by investor interest, may add to their value as an asset. While these coins are not equity, holding them may allow a user to participate in the growth of a platform. Here are a few examples.

**Bitcoin, Ether, and Financial Applications**

Today, many people think of Bitcoin only as a store of value—likely because it is the most highly valued cryptocurrency, and the media portrays it as “digital gold.” However, Bitcoin was originally designed as a medium of exchange, offering peer-to-peer transactions in an otherwise “trustless” environment. This means someone can buy, sell, or exchange Bitcoin directly without needing an intermediary.

Ethereum has additional functionality—it uses smart contracts to run applications on its blockchain and has been central to the growth and development of decentralized finance (DeFi), which is a new alternative to traditional financial services. Instead of requiring large central intermediaries, it uses Ethereum and other blockchain platforms to create and offer financial products and services on a peer-to-peer basis, eliminating the middleman. One of the interesting applications of DeFi is its

ability to offer yield from lending as well as providing liquidity to earn token-based rewards (yield farming). DeFi is also one of the biggest sectors of cryptocurrency trading.

DeFi has recently experienced exponential growth. In the one-year period ending July 2021, total value locked (TVL) across DeFi platforms grew to USD 110 billion from USD 2 billion. TVL is a proxy for activity level and indicates the amount of assets that are staked in a protocol. Because many DeFi applications rely primarily on Ethereum smart contract capabilities, ether’s rise in price can be partially attributed to DeFi growth. The expansion of DeFi may also translate to a rise in price for other coins related to DeFi protocols.

The Bitcoin blockchain, due to its lack of smart contract capabilities, had been unable to participate in DeFi growth directly. However, in July 2021, Jack Dorsey, CEO of Twitter and Square, announced he is planning to add open-source capabilities to bring DeFi to Bitcoin as part of a new decentralized exchange from Square. The addition of smart contract capabilities integrated with the Bitcoin blockchain may result in Bitcoin benefiting from DeFi activity in the future.

Beyond Finance

Many coins perform non-financial functions as well. Due to the decentralized nature of these projects, governance capability is a key function. Governance coins, such as Uniswap’s UNI, allow holders to vote on proposals related to the future development of a protocol, such as those that propose new features or propose a means of distributing any profit. Governance coins also help power decentralized autonomous organizations (DAOs). ShapeShift, a crypto exchange and wallet, recently announced its transition to a DAO from a traditional corporate structure. In doing so, it added more governance functions to its FOX token.

Other projects focus on sectors beyond finance. Filecoin, for example, powers a decentralized file storage protocol. Miners can earn filecoin by storing and retrieving data for users. Other protocols (e.g., Polkadot) are intended to improve blockchain scalability and interoperability. The DOT token helps with the operations and governance of Polkadot. Finally, and not unexpectedly, gaming is a popular, growing, and profitable segment.

---

38 Total value locked represents the number of assets that are being staked in a specific DeFi protocol. For more information, see https://coinmarketcap.com/alexandria/glossary/total-value-locked-tvl.


40 To learn more about DeFi, visit the Ethereum website.

41 “ShapeShift Decentralizes: FOX Airdropped to 1M+ addresses.” ShapeShift.

42 Blockchain scalability—resulting in slow transaction speed, high energy consumption and high transaction costs—is a key problem that new blockchains or “layer two” solutions aim to solve. For Vitalik Buterin’s view, see his blog: https://vitalik.ca/general/2021/05/23/scaling.html
For example, the game Axie Infinity allows players to collect, breed, and trade NFT creatures, and the game is one of the highest grossing projects on the Ethereum blockchain.\textsuperscript{43} Axie Infinity’s AXS token is used for game governance, while a separate coin, SLP, is used for game earnings.

### Derivatives

One additional item worth noting is the proliferation of cryptocurrency derivatives. A study published in April 2021 indicated the traded volume of cryptocurrency derivatives was five times that of cryptocurrency spot markets.\textsuperscript{44} As mentioned earlier, aggregated open interest in Bitcoin futures was USD 17.8 billion as of Aug. 23, 2021. The top three crypto derivative exchanges—Binance, FTX, and Bybit—are all nascent digital exchanges.\textsuperscript{9} Among traditional exchanges, only CME Group, the fourth-largest exchange by open interest in Bitcoin futures, trades contracts at this volume. For Bitcoin options, Deribit, another nascent digital exchange, is the dominant player.\textsuperscript{45} Perpetual futures products—futures contracts that do not expire—are also popular. The FTX derivatives exchange lists over 200 perpetual futures on different coins.\textsuperscript{46} As expected, some institutions are choosing cryptocurrency futures trading on regulated exchanges to track cryptocurrencies without needing to trade or hold the underlying coin and set up digital wallets and custody arrangements.

The next section describes how S&P DJI addresses the unique market structure and combines it with robust pricing to build its benchmarks.

### WHY INDEXING?

Independent, reliable, user-friendly benchmarks are a key component of financial markets. As with traditional financial markets, independent benchmarks can help bring transparency and accessibility to the emerging cryptocurrency market. Like traditional markets, indices can be used as a basis for products such as ETFs, mutual funds, hedge funds, and structured products. However, in cryptocurrency markets, we believe that one of the biggest challenges is providing robust, transparent pricing. Our selection of Lukka as our price provider for these indices gives us the ability to provide institutional quality, standardized, and reliable cryptocurrency index data. Together with the Lukka data, we anticipate that our well-known, rules-based indexing capabilities will become a standard in this market. These easy-to-understand benchmarks are an important tool in helping investors understand the complexities of the digital assets market.

---


\textsuperscript{45} Open Interest Put/Call Ratios. The Block.

\textsuperscript{46} Futures Markets. FTX.
S&P Cryptocurrency Indices

The S&P Cryptocurrency Indices are designed to measure the performance of a selection of cryptocurrencies. As of July 13, 2021, the S&P Cryptocurrency Index Series includes eight indices.

Exhibit 2: S&P Cryptocurrency Index Series

The S&P Cryptocurrency BDM Index Series is meant to reflect a broad investable universe.

All S&P Cryptocurrency Indices are drawn from the S&P Cryptocurrency Broad Digital Market (BDM) Index Series, which is designed to track the performance of cryptocurrencies that meet minimum liquidity and market capitalization criteria and are listed on trading facilities included among the primary markets covered by Lukka Prime. The series is meant to reflect a broad investable universe.

Three of the indices—the S&P Bitcoin Index, S&P Ethereum Index, and S&P Cryptocurrency MegaCap Index—are designed to track the performance of the two most-liquid and well-known coins—bitcoin and ether—and a combination of the two weighted by market capitalization.

The S&P Cryptocurrency BDM Index is weighted by market capitalization. This corresponds to coin supply multiplied by coin price for cryptocurrencies. The S&P Cryptocurrency LargeCap Index is one of its subindices. Because the digital assets market is dynamic, the use of fixed ratios or fixed values to determine the large market cap cohort is quickly outdated. Instead, the large-cap index uses a clustering algorithm to select the appropriate cohort of constituents.47

Within the S&P Cryptocurrency BDM Index Series, we have built certain indices to exclude the components of the S&P Cryptocurrency MegaCap Index. These exclusions are used to highlight the performance of the

---

47 For additional details on the market capitalization classification algorithm, please refer to the S&P Digital Market Indices Methodology.
relatively smaller coins that would be otherwise overshadowed by the dominance of the two largest coins. Together, the market domination of Bitcoin and Ether is considerable—approximately 63% of the market capitalization of the total cryptocurrency market. Similarly, other indices exclude the large-cap constituents. The large-cap index accounts for approximately 78% of the total cryptocurrency market capitalization.

**Coin Eligibility**

S&P DJI’s goal is to build reliable and easy-to-understand benchmarks for the cryptocurrency industry and to represent the broad market activity. Lukka’s identification of the best-in-class exchanges is the starting point for determining index-eligible coins. Coins are eligible if they trade on a Lukka-approved exchange and have a supporting white paper. A “white paper” in this context refers to a detailed technical document created by a cryptocurrency’s project founders that discusses the concepts, goals, and future roadmap of the cryptocurrency. A cryptocurrency project with a white paper suggests that the project founders have done the research and supplied the data to demonstrate why cryptocurrency will likely become adopted. S&P DJI does not include stablecoins or any other pegged digital assets in their existing indices, because while they may be considered an essential part of the cryptocurrency ecosystem, they will not necessarily reflect growth (or decline) in the market.

In addition, any coins that are or become subject to a regulatory or legal concern may be considered ineligible. In recent years, we have seen the SEC file actions against ICOs and other coin projects, alleging that they conducted unregistered digital asset securities offerings. The allegations can lead to exchange delistings, volume decreases, and fewer custodians servicing the coins. These actions have the effect of making the coin less representative of the market overall.

Finally, S&P DJI’s index methodology is intended to screen out privacy-enhanced coins. Over the past few years, we have seen countries around the globe recommend the delisting of privacy-enhanced coins from exchanges. In the U.S., FinCEN requires exchanges to understand the identity and profile of its customers via the Bank Secrecy Act. Certain privacy-enhanced coins employ features to anonymize this information, making them a potential target of the regulators. Lukka’s pricing covers regulated exchanges who have “know your customer” rules. Privacy coins available on certain regulated exchanges will be tied to a specific exchange user as a result of these “know your customer” rules. Transactions in privacy coins outside of regulated exchanges are much more likely to be

---

48 Source: Lukka. Data as of June 30, 2021, based on USD 1.46 trillion and 950+ assets priced by Lukka Prime.

49 Please refer to the S&P Digital Market Indices Methodology for additional details.

truly anonymous. The S&P Digital Assets Index Committee reserves the right in its sole discretion to remove a digital asset that becomes subject to a legal, regulatory, or practical concern or due to potential market disruption. Coins may also be excluded from an index based on market capitalization and liquidity, as previously discussed.

**Index Pricing**

In order to properly provide transparency to the market via benchmarks, S&P DJI believes that working with an institutional-grade pricing provider that seeks to address certain market risks, such as fraud and market manipulation, is critical. We believe a robust cryptocurrency price provider should meet the following criteria.

- **Evaluate exchanges utilized for price sourcing on an ongoing basis:** Exchanges should be regularly evaluated, and only the highest-quality exchanges in sufficiently regulated jurisdictions should be selected.
- **Possess a robust, transparent pricing methodology:** The methodology should address the unique attributes of the market—such as volatility or potential for manipulation—to arrive at a reliable, transparent price.
- **Provide standardized, quality reference data:** Data should be normalized across exchanges and across currency pairs.

Our cryptocurrency price provider Lukka meets all these criteria.

Specifically, Lukka Prime’s Fair Market Value (FMV) pricing uses a proprietary methodology with quantitative and qualitative factors to determine the primary market (exchange) of each asset at any given time, as well as each asset’s FMV. The FMV pricing methodology reflects actual executed trades, is compatible with how fund assets are valued, and is aligned with the SEC’s guidance on fair value, the U.S.’s generally accepted accounting principles (GAAP), and the International Financial Reporting Standards (IFRS). In contrast, average prices (such as VWAP or TWAP) are not considered to be FMV and usually do not exist in the market as tradable prices.

In addition, Lukka looks to normalize reference data across exchanges to uniquely identify each asset and allow the mapping of validated cryptocurrency reference data. S&P DJI uses the Lukka Prime FMV price at 4:00 p.m. ET for its end-of-day branded cryptocurrency index.

---

52 S&P Global, Inc., the parent of S&P Dow Jones Indices LLC, is an investor in Lukka. For information on S&P Global’s investment in Lukka, please see here.
53 For additional details on Lukka and FMV, see https://data.lukka.tech/prime/
calculations. This is the first, and we believe only, methodology designed specifically for determining the pricing of liquid cryptocurrency assets via actual executed prices.

In the following sections, we discuss index performance and analytics.

**PERFORMANCE AND ANALYTICS**

The following exhibits show back-tested results of the indices and their correlation with other asset classes.

**S&P Bitcoin Index**

Designed to measure the oldest and most well-known cryptocurrency, the S&P Bitcoin Index is the S&P Cryptocurrency Index with the longest back-tested history, with a first value date of Jan. 1, 2014. Since inception, its historical annual return based on back-tested data has been over 71%, amounting to a total return above 5,700% through Sept. 30, 2021. The annualized back-tested returns are characterized by high volatility, which lowers the risk-adjusted return. It is worth noting that the risk-adjusted return of this index over the one-year period ending Aug. 31, 2021, was higher than that of the S&P 500®, which had a banner year, with returns over 29%.54

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>RETURN (ANNUALIZED, %)</th>
<th>VOLATILITY (ANNUALIZED, %)</th>
<th>RISK-ADJUSTED RETURN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Year</td>
<td>303.29</td>
<td>72.56</td>
<td>4.18</td>
</tr>
<tr>
<td>2-Year</td>
<td>121.97</td>
<td>68.65</td>
<td>1.78</td>
</tr>
<tr>
<td>3-Year</td>
<td>88.69</td>
<td>72.29</td>
<td>1.23</td>
</tr>
<tr>
<td>Since Inception (Jan. 1, 2014)</td>
<td>71.73</td>
<td>70.27</td>
<td>1.02</td>
</tr>
</tbody>
</table>

The risk-adjusted return of the S&P Bitcoin Index for the year ending Aug. 31, 2021, was higher than that of the S&P 500.

Source: S&P Dow Jones Indices LLC. Data as of Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Table and chart are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

54 Source: S&P Dow Jones Indices LLC. For the S&P 500, the one-year annualized return was 29.21%, and the one-year annualized risk-adjusted return was 1.95 as of Aug. 31, 2021.
S&P Cryptocurrency MegaCap Index and S&P Ethereum Index

The S&P Cryptocurrency MegaCap Index seeks to track the performance of a market-capitalization-weighted index portfolio consisting of Bitcoin and Ethereum. The S&P Cryptocurrency MegaCap Index and S&P Ethereum Index have back-tested historical data going back to Feb. 28, 2017, and April 4, 2016, respectively. The back-tested history for the S&P Ethereum Index reflects a total return of over 26,000% through Sept. 30, 2021.

In the chart in Exhibit 4, the levels of the S&P Bitcoin Index and S&P Ethereum Index have been rebased at the first value date of the S&P Cryptocurrency MegaCap Index to allow a visual comparison of the performance.

Exhibit 4: Performance of the S&P Cryptocurrency MegaCap Index and S&P Ethereum Index

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>RETURN (ANNUALIZED, %)</th>
<th>VOLATILITY (ANNUALIZED, %)</th>
<th>RISK-ADJUSTED RETURN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S&amp;P CRYPTOCURRENCY MEGACAP INDEX</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Year</td>
<td>374.39</td>
<td>74.31</td>
<td>5.04</td>
</tr>
<tr>
<td>2-Year</td>
<td>153.23</td>
<td>70.11</td>
<td>2.19</td>
</tr>
<tr>
<td>Since Inception (Feb. 28, 2017)</td>
<td>140.14</td>
<td>78.39</td>
<td>1.79</td>
</tr>
<tr>
<td><strong>S&amp;P ETHEREUM INDEX</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Year</td>
<td>681.05</td>
<td>100.31</td>
<td>6.79</td>
</tr>
<tr>
<td>2-Year</td>
<td>349.75</td>
<td>92.05</td>
<td>3.80</td>
</tr>
<tr>
<td>Since Feb. 28, 2017</td>
<td>228.91</td>
<td>106.27</td>
<td>2.15</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data as of Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Table and chart are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.
The S&P Cryptocurrency BDM Index is designed to track the performance of digital assets that satisfy minimal market cap and liquidity requirements.

The S&P Cryptocurrency LargeCap Index is designed to measure the largest constituents of the S&P Cryptocurrency BDM Index. Constituents are selected by using a modified K-means algorithm to group the constituents of the S&P Cryptocurrency BDM Index by the logarithm of their market capitalization. Although it only has 34 constituents, the index represents more than 95% of the S&P Cryptocurrency BDM Index in terms of market capitalization and has performed similarly over the past three years (see Exhibit 5).

Exhibit 5: Performance of the S&P Cryptocurrency BDM Index and S&P Cryptocurrency LargeCap Index

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>RETURN (ANNUALIZED, %)</th>
<th>VOLATILITY (ANNUALIZED, %)</th>
<th>RISK-AJUSTED RETURN</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P CRYPTOCURRENCY BDM INDEX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Year</td>
<td>384.85</td>
<td>75.86</td>
<td>5.07</td>
</tr>
<tr>
<td>2-Year</td>
<td>159.65</td>
<td>71.34</td>
<td>2.24</td>
</tr>
<tr>
<td>3-Year</td>
<td>90.94</td>
<td>74.22</td>
<td>1.23</td>
</tr>
<tr>
<td>Since Inception (Feb. 28, 2017)</td>
<td>133.94</td>
<td>79.44</td>
<td>1.69</td>
</tr>
<tr>
<td>S&amp;P CRYPTOCURRENCY LARGECAP INDEX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Year</td>
<td>383.78</td>
<td>75.48</td>
<td>5.08</td>
</tr>
<tr>
<td>2-Year</td>
<td>155.17</td>
<td>71.11</td>
<td>2.18</td>
</tr>
<tr>
<td>3-Year</td>
<td>90.94</td>
<td>74.18</td>
<td>1.23</td>
</tr>
<tr>
<td>Since Inception (Feb. 28, 2017)</td>
<td>105.36</td>
<td>79.16</td>
<td>1.33</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data as of Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Table and chart are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

55 Market capitalization requirements greater than or equal to USD 10 million, liquidity requirement of a three-month MDVT of USD 100,000.
As previously discussed, the digital markets asset class has grown rapidly. One indicator of the rapid growth of this asset class is the number of eligible constituents for the S&P Cryptocurrency Index Series. Exhibit 6 illustrates the number of constituents and market cap of the S&P Cryptocurrency BDM Index.

Exhibit 6: Number of Constituents and Market Cap of the S&P Cryptocurrency BDM Index

![Chart showing number of constituents and market cap of the S&P Cryptocurrency BDM Index.](chart.png)

Source: S&P Dow Jones Indices LLC. Data as of Sept. 21, 2021. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

This growth in constituents is largely driven by increased market cap (defined by coin supply x price) of many coins beyond Bitcoin and Ethereum. As measured by back-tested data, the number of coins meeting these criteria has grown over the years, especially over the period from March-June 2021.

**Liquidity**

Exhibit 7 shows the liquidity of constituents of the S&P Cryptocurrency BDM Index as of its launch date on July 13, 2021, and illustrates a few aspects of the cryptocurrency market that may not immediately be apparent.
First, as of July 2021, there were over 200 coins with a three-month MDVT of USD 1 million or greater; there were 130 coins with an MDVT greater than USD 10 million; and there were 41 coins with an MDVT greater than USD 100 million.\(^\text{56}\)

Second, liquidity also indicates that the cryptocurrency market has grown rapidly. In the March 2021 rebalance, 30% of S&P Cryptocurrency BDM Index constituent coins had an MDVT between the minimum of USD 100,000 and USD 1 million. In the June 2021 rebalance, 15% of coins had an MDVT between that same range, with many more coins having significantly more liquidity.

Exhibit 7: S&P Cryptocurrency BDM Index Constituent Liquidity by Three-Month MDVT

![Liquidity Chart]

Source: S&P Dow Jones Indices LLC. Data as of July 13, 2021. Chart is provided for illustrative purposes.

**Comparative Analysis**


\(^{56}\) For the S&P Cryptocurrency BDM Index, the constituent coins must meet a minimum liquidity requirement (i.e., a three-MDVT of USD 100,000) and market capitalization requirements (i.e., greater than or equal to USD 10 million).
### Exhibit 8: Performance of the S&P Cryptocurrency Indices

<table>
<thead>
<tr>
<th>INDEX</th>
<th>1-YEAR (%)</th>
<th>2-YEAR (%)</th>
<th>3-YEAR (%)</th>
<th>SINCE MARCH 2018 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P Cryptocurrency BDM Index</td>
<td>384.85</td>
<td>159.65</td>
<td>90.94</td>
<td>57.88</td>
</tr>
<tr>
<td>S&amp;P Cryptocurrency LargeCap Index</td>
<td>383.78</td>
<td>155.17</td>
<td>90.94</td>
<td>57.53</td>
</tr>
<tr>
<td>S&amp;P Cryptocurrency BDM Ex-LargeCap Index</td>
<td>416.94</td>
<td>237.21</td>
<td>82.54</td>
<td>50.65</td>
</tr>
<tr>
<td>S&amp;P Cryptocurrency MegaCap Index</td>
<td>374.39</td>
<td>153.23</td>
<td>98.32</td>
<td>67.15</td>
</tr>
<tr>
<td>S&amp;P Cryptocurrency BDM Ex-MegaCap Index</td>
<td>389.65</td>
<td>177.76</td>
<td>62.69</td>
<td>29.12</td>
</tr>
<tr>
<td>S&amp;P Cryptocurrency LargeCap Ex-MegaCap Index</td>
<td>377.80</td>
<td>148.61</td>
<td>51.11</td>
<td>16.69</td>
</tr>
<tr>
<td>S&amp;P Ethereum Index</td>
<td>681.05</td>
<td>349.75</td>
<td>129.24</td>
<td>71.03</td>
</tr>
<tr>
<td>S&amp;P Bitcoin Index</td>
<td>303.29</td>
<td>121.97</td>
<td>88.69</td>
<td>65.02</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>29.21</td>
<td>24.32</td>
<td>15.95</td>
<td>15.96</td>
</tr>
<tr>
<td>S&amp;P GSCI Gold</td>
<td>-8.11</td>
<td>9.03</td>
<td>14.64</td>
<td>9.64</td>
</tr>
<tr>
<td>S&amp;P U.S. TIPS Index</td>
<td>5.60</td>
<td>7.10</td>
<td>7.09</td>
<td>6.68</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data from March 19, 2018, to Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In addition to the difference in performance between cryptocurrencies and other asset classes, Exhibit 9 shows the low correlation between cryptocurrencies and other asset classes.

### Exhibit 9: Correlation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BDM</td>
<td>1.000</td>
<td>0.999</td>
<td>0.888</td>
<td>0.981</td>
</tr>
<tr>
<td>LARGECAP</td>
<td>1.000</td>
<td>0.872</td>
<td>0.994</td>
<td>0.898</td>
</tr>
<tr>
<td>BDM EX-LARGECAP</td>
<td>1.000</td>
<td>0.837</td>
<td>0.951</td>
<td>0.908</td>
</tr>
<tr>
<td>MEGACAP</td>
<td>1.000</td>
<td>0.850</td>
<td>0.836</td>
<td>0.989</td>
</tr>
<tr>
<td>BDM EX-MEGACAP</td>
<td>1.000</td>
<td>0.992</td>
<td>0.854</td>
<td>0.808</td>
</tr>
<tr>
<td>LARGECAP EX-MEGACAP</td>
<td>1.000</td>
<td>0.844</td>
<td>0.794</td>
<td>0.162</td>
</tr>
<tr>
<td>ETHEREUM</td>
<td>1.000</td>
<td>0.783</td>
<td>0.161</td>
<td>0.126</td>
</tr>
<tr>
<td>BITCOIN</td>
<td>1.000</td>
<td>0.148</td>
<td>0.154</td>
<td>0.056</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>1.000</td>
<td>0.087</td>
<td>-0.132</td>
<td></td>
</tr>
<tr>
<td>S&amp;P GSCI GOLD</td>
<td></td>
<td></td>
<td>1.000</td>
<td>0.335</td>
</tr>
<tr>
<td>S&amp;P U.S. TIPS INDEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data from March 19, 2018, to Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.
Exhibit 10 illustrates the rolling correlations between the S&P Cryptocurrency LargeCap Index and the S&P 500, S&P GSCI Gold, and S&P U.S. TIPS Index, respectively. The variability over time, as well as between asset classes, indicates cryptocurrencies may help with diversification. It also illustrates that the relationships between cryptocurrencies and other asset classes are still in flux and will continue to evolve as this asset class matures.

**Exhibit 10: S&P Cryptocurrency LargeCap Index 100-Day Rolling Correlation**

Source: S&P Dow Jones Indices LLC. Data from March 19, 2018, to Aug. 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

**Coin Intracorrelation**

Exhibit 11 represents an analysis of the correlations as of July 13, 2021, among coins within the S&P Cryptocurrency LargeCap Index showed a varied range, affirming our discussion that coins have different profiles. Of the 34 coins in the S&P Cryptocurrency LargeCap Index, the correlation to Bitcoin ranged from 0.468 to 0.796. Similarly, the range of correlation of those same coins to Ether extended from 0.481 to 0.853. The coins with the highest correlation to both Bitcoin and Ether are “Ethereum competitor” blockchains (i.e., Solana and Avalanche). When we look at the second- and third-highest correlated coins to both Bitcoin and Ether, the coins are identical—those from the DeFi exchanges Uniswap and PancakeSwap.

Finally, the range of correlations among all 34 coins was even greater—from 0.291 to 0.935. This is what we would expect to see, as cryptocurrencies have different functions and utility and perform differently.
Exhibit 11: Coin Intracorrelation Ranges

<table>
<thead>
<tr>
<th>COIN</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitcoin</td>
<td>0.468</td>
<td>0.796</td>
</tr>
<tr>
<td>Ether</td>
<td>0.481</td>
<td>0.853</td>
</tr>
<tr>
<td>All Large-Cap Coins</td>
<td>0.291</td>
<td>0.935</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data as of July 13, 2021. Table is provided for illustrative purposes.

CONCLUSION

As digital assets continue to gather broad appeal as an asset class, and flourish by creating an entirely new financial ecosystem, the importance of having transparent indices will only continue to grow. The S&P Cryptocurrency Index Series seeks to provide market participants with new tools by which to measure and assess this emerging asset class. Our analysis demonstrates that cryptocurrencies are not monolithic and may yield outperformance relative to conventional asset classes, though not without potential risk. S&P DJI aims to continue to enhance this index series to keep pace with the innovations and provide additional accessibility to market participants.
GLOSSARY

Airdrop: The distribution of a crypto asset to all current holders of a specific crypto asset, which is proportional to the holders’ current ownership position. Airdrops present unique tax compliance.

Crypto asset: Any digital asset that utilizes cryptography to secure transaction records on a ledger, such as on a blockchain, to control the creation of additional assets, and to verify the transfer of asset ownership.

Crypto exchange: A venue that facilitates buying, selling, trading, or storage of crypto assets. Crypto exchanges often fulfill the role of a traditional securities exchange as well as a broker/dealer or a custodian by holding customer accounts and providing account-related services. Crypto exchanges can choose to list any crypto assets, and currently no centralized processes exist to standardize the names or ticker symbols of crypto assets that are listed on the various crypto exchanges around the world.

Cryptocurrency: A type of crypto asset that may be used as an electronic form of money. Cryptocurrencies are built and transferred on blockchains.

Cryptocurrency wallet: Software that interacts with the blockchain and enables the secure storage of cryptocurrencies. One can store, send, and receive cryptocurrencies via a wallet.

Digital asset: The binary representation of anything that has economic value and can be owned.

Hard fork: A change in a blockchain’s code (protocol) that is significant enough to change the nature of a crypto asset, which the network participants do not agree to in majority. The result is two (or more) crypto assets that are treated as unlike assets and differ in value after the hard fork has occurred.

Initial coin offering (ICO): Equivalent to an initial public offering (IPO) for the creation of new crypto assets. Cryptocurrencies and other crypto asset protocols raise money from investors in exchange for early ownership of the crypto asset.

Mining: The act of verifying transactions on a “proof-of-work” blockchain through computational power and, therefore, the use of hardware and electricity. Typically, participating in mining results in the award of a small amount of the crypto asset to the miner, such as in Bitcoin mining.

Smart Contract: A program that runs on the Ethereum blockchains. It is a collection of code (its functions) and data (its state) that resides at a specific address on the Ethereum blockchain. The contracts have a balance, and they can send transactions over the network. However they’re not controlled by a user, instead they are deployed to the network and run as programmed. Smart contracts work similarly on Cardano and Solana blockchains.

Soft fork: A change in a blockchain’s code (protocol) that is not significant enough to change the nature of a crypto asset, which the network participants do not agree to in majority. The result is a possible change to the cryptocurrency and its protocols without a new asset being created.


**Stablecoin**: A cryptocurrency that is designed to create greater asset value stability and prevent volatility. A stablecoin can be pegged to fiat money, exchange-traded commodities (such as precious metals), or even baskets of assets that are held in equal quantity to that of stablecoins.

**Staking**: The act of verifying transactions on a “proof-of-stake” blockchain. Staking also results in a reward, but in contrast to mining, it is in return for “staking” a quantity of the crypto asset instead of for computational power.

**Virtual currency**: The term created by the European Central Bank in 2012 to describe all cryptocurrencies. Since then, the definition has expanded to include use by the IRS to describe all crypto assets.
PERFORMANCE DISCLOSURE/BACK-TESTED DATA

The S&P Cryptocurrency Broad Digital Market Index, S&P Cryptocurrency Large Cap Index, S&P Cryptocurrency BDM Ex-LargeCap Index, S&P Cryptocurrency BDM Ex-MegaCap Index, and S&P Cryptocurrency Large Cap Ex-MegaCap Index were launched July 13, 2021. The S&P Cryptocurrency MegaCap Index, S&P Bitcoin Index, and S&P Ethereum Index were launched May 3, 2021. All information presented prior to an index’s Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at http://www.spglobal.com/spdji/. Past performance of the Index is not an indication of future results. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results. Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations. Back-tested performance is for use with institutions only; not for use with retail investors.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate S&P DJI’s ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using “Backward Data Assumption” (or pulling back) of ESG data for the calculation of back-tested historical performance. “Backward Data Assumption” is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as “product involvement”) were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on “Backward Data Assumption” please refer to the FAQ. The methodology and factsheets of any index that employs backward assumption in the back-tested history will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used.

Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices maintains the index and calculates the index levels and performance shown or discussed but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).
GENERAL DISCLAIMER

© 2021 S&P DowJones Indices. All rights reserved. S&P, S&P 500, S&P 500 LOW VOLATILITY INDEX, S&P 100, S&P COMPOSITE 1500, S&P 400, S&P MIDCAP 400, S&P 600, S&P SMALLCAP 600, S&P GIVI, GLOBAL TITANS, DIVIDEND ARISTOCRATS, S&P TARGET DATE INDICES, S&P PRISM, S&P STRIDE, GICS, SPIVA, SPDR and INDEXOLOGY are registered trademarks of S&P Global, Inc. (“S&P Global”) or its affiliates. DOW JONES, DJ, DJIA, THE DOW and DOW JONES INDUSTRIAL AVERAGE are registered trademarks of Dow Jones Trademark Holdings LLC (“Dow Jones”). These trademarks together with others have been licensed to S&P Dow Jones Indices LLC. Redistribution or reproduction in whole or in part are prohibited without written permission of S&P Dow Jones Indices LLC. This document does not constitute an offer of service in jurisdictions where S&P Dow Jones Indices LLC, S&P Global, Dow Jones or their respective affiliates (collectively “S&P Dow Jones Indices”) do not have the necessary licenses. Except for certain custom index calculation services, all information provided by S&P Dow Jones Indices is impersonal and not tailored to the needs of any person, entity or group of persons. S&P Dow Jones Indices receives compensation in connection with licensing its indices to third parties and providing custom calculation services. Past performance of an index is not an indication or guarantee of future results.

It is not possible to invest directly in an index. Exposure to an asset class represented by an index may be available through investable instruments based on that index. S&P Dow Jones Indices does not sponsor, endorse, sell, promote or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any index. S&P Dow Jones Indices makes no assurance that investment products based on the index will accurately track index performance or provide positive investment returns. S&P Dow Jones Indices LLC is not an investment advisor, and S&P Dow Jones Indices makes no representation regarding the advisability of investing in any such investment fund or other investment vehicle. A decision to invest in any such investment fund or other investment vehicle should not be made in reliance on any of the statements set forth in this document. Prospective investors are advised to make an investment in any such fund or other vehicle only after carefully considering the risks associated with investing in such funds, as detailed in an offering memorandum or similar document that is prepared by or on behalf of the issuer of the investment fund or other investment product or vehicle. S&P Dow Jones Indices LLC is not a tax advisor. A tax advisor should be consulted to evaluate the impact of any tax-exempt securities on portfolios and the tax consequences of making any particular investment decision. Inclusion of a security within an index is not a recommendation by S&P Dow Jones Indices to buy, sell, or hold such security, nor is it considered to be investment advice. Closing prices for S&P Dow Jones Indices’ US benchmark indices are calculated by S&P Dow Jones Indices based on the closing price of the individual constituents of the index as set by their primary exchange. Closing prices are received by S&P Dow Jones Indices from one of its third party vendors and verified by comparing them with prices from an alternative vendor. The vendors receive the closing price from the primary exchanges. Real-time intraday prices are calculated similarly without a second verification.

These materials have been prepared solely for informational purposes based upon information generally available to the public and from sources believed to be reliable. No content contained in these materials (including index data, ratings, credit-related analyses and data, research, valuations, model, software or other application or output therefrom) or any part thereof (“Content”) may be modified, reverse-engineered, reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of S&P Dow Jones Indices. The Content shall not be used for any unlawful or unauthorized purposes. S&P Dow Jones Indices and its third-party data providers and licensors (collectively “S&P Dow Jones Indices Parties”) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Dow Jones Indices Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON AN “AS IS” BASIS. S&P DOW JONES INDICES PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT’S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Dow Jones Indices Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Global keeps certain activities of its various divisions and business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions and business units of S&P Global may have information that is not available to other business units. S&P Global has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

In addition, S&P Dow Jones Indices provides a wide range of services to, or relating to, many organizations, including issuers of securities, investment advisers, broker-dealers, investment banks, other financial institutions and financial intermediaries, and accordingly may receive fees or other economic benefits from those organizations, including organizations whose securities or services they may recommend, rate, include in model portfolios, evaluate or otherwise address.

INDEX EDUCATION | Digital Assets

For use with institutions only, not for use with retail investors.