PGIM
India Mutual Fund

MEGATRENDS

CRYPTOCURRENCY INVESTING

Powerful Diversifier or Portfolio Kryptonite?

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INTRODUCTION

Red dogs, stump tails and blue pups were just some of the creative names for the ultimately doomed currencies issued by poorly capitalized state-chartered banks during the wildcat banking era in U.S. monetary history from 1837 to 1863 – until Congress finally passed legislation that created a single centrally backed national U.S. currency.[1, 2]

History rarely repeats itself, but it often rhymes – and 150 years later we are in an era with thousands of unregulated cryptocurrencies and digital tokens with a collective market cap over $1 trillion.[3] These cryptocurrencies offer the promise of a frictionless, inclusive and decentralized network powered by blockchains and operated completely independently of central banks, which are increasingly seen as debasing fiat currencies by "printing money."*

For institutional investors, cryptocurrencies also offer the allure of extraordinary and diversified returns in a market that is now of sufficient size and liquidity for meaningful institutional positions. Indeed, some market participants estimate that about 5% of total Bitcoin supply are now held by institutional investors via custodial intermediaries.[4]

To understand the investment implications of the evolving cryptocurrency landscape, we have drawn on the insights of more than 30 investment professionals across PGIM's fixed income, equity and private alternatives managers – as well as leading economists, venture capitalists and crypto investors. Our resulting conclusions:

- While a few cryptocurrencies will endure on the fringes of the monetary system, **the broad replacement of fiat currencies globally by cryptocurrencies is unlikely to materialize. Functionally, cryptocurrencies are unable to meet the basic prerequisites of either a currency or a precious-metal substitute – shortcomings exacerbated by the powerful headwinds from increasing regulatory scrutiny and the growing likelihood of central bank digital currencies** (CBDCs) which provide almost all the functional benefits of fiat-linked cryptocurrencies, but with no liquidity or credit risk.
- Beyond hedge funds exploiting inefficiencies to generate alpha on the other side of "FOMO"-driven, largely retail and speculative flows, there is currently no compelling case for direct ownership of cryptocurrencies as a meaningful share of an institutional portfolio. Theoretically, cryptocurrencies have no ex-ante foundational underpinnings for delivering robust risk-adjusted returns in the future. Empirically, after examining the brief historical data available on crypto, **we find little real-world evidence that cryptocurrencies deliver diversification vs. mainstream assets, are effective inflation hedges, possess the intrinsic characteristics of a safe-haven asset, or advance ESG objectives.** Of course, it goes without saying that bitcoin and many other cryptocurrencies have delivered awe-inspiring returns over the last decade – albeit with frequent and substantial drawdowns – and this speculative momentum could continue for some time.
- In contrast to direct cryptocurrency ownership, **there are attractive institutional investment opportunities in the broader crypto ecosystem and the incidental innovation that has flourished in the creation of bitcoin and other cryptocurrencies.** These include private applications of distributed ledger technology and smart contracts used in financial services (like clearing and settlement of securities and international payment systems) as well as

* To sharpen our focus, we limit our analysis to crypto assets intended as substitutes for fiat currencies, such as bitcoin, ether and sol, which collectively represent close to 60% of the sector's market cap. Digital tokens specific to a particular application or sidechain are not our primary focus. We also explicitly exclude regulated central bank digital currencies (CBDCs) and non-fungible tokens (NFTs) from our analysis, except where they intersect with and influence our view on crypto opportunities and risks.

in logistics and supply-chain management. Tokenization could be a next-generation securitization mechanism for real assets. Additionally, the companies providing the essential infrastructure for crypto innovation will have a head start in underpinning CBDCs and other blockchain-powered applications. This collateral innovation has the potential to generate attractive returns for owners of the companies that provide these services but will not necessarily accrue to the owners of cryptocurrencies.

We share analysis to support our hypotheses and unpack the critical investment implications of these conclusions in the rest of this report. Chapter 1 summarizes the cryptocurrency landscape, cutting through the breathless media hype. Chapter 2 explains why cryptocurrencies are deeply inadequate as currencies. Chapter 3 lays out the empirical evidence for why cryptocurrencies fail to meet most institutional investor objectives around portfolio diversification, risk-adjusted returns, inflation protection and ESG. To "stress test" our conclusions, we also lay out the potential scenarios that would need to materialize for the extraordinary price trajectory of bitcoin and other cryptocurrencies to continue. Our base case is these scenarios are highly unlikely to materialize.

Finally, Chapter 4 argues that enduring value for long-term investors will be found not in cryptocurrency holdings themselves, but in the use cases and applications from the remarkable breakthroughs that are the accidental by-products of the heroic but potentially doomed quest to build a viable decentralized, unregulated peer-to-peer payment system.

About PGIM

PGIM, the investment management business of Prudential Financial, Inc. (PFI), has a history that dates back over 145 years and through more than 30 market cycles.* Built on a foundation of strength, stability and disciplined risk management, PGIM's more than 1,300 investment professionals are located in key financial centers around the world. Our firm is comprised of six autonomous asset management businesses, each specializing in a particular asset class with a focused investment approach. This gives our clients diversified solutions from a leading global asset manager with global depth and scale across public and private asset classes, including fixed income, equities, real estate, private credit and other alternatives. For more information, visit www.pgim.com.

* 30 market cycles represents PFI's asset management expertise through PGIM, its affiliates and its predecessors.

CHAPTER 2

NOT QUITE A CURRENCY

> *No cryptocurrency adequately fulfills the three essential functions of money."*

CHAPTERS

1 2 3 4

CHAPTER 2

NOT QUITE A CURRENCY

Money has taken different forms through the ages, from cowry shells to peppercorns and from silver coins to the greenback, but they all share three common characteristics. They act as (1) a store of value, (2) a widely accepted medium of exchange and (3) a unit of account. Unfortunately, no cryptocurrency to date adequately fulfills these three essential functions. Bitcoin, the most prominent cryptocurrency, for example, has a notoriously unstable price, is a poor medium of exchange and is rarely used outside the crypto-native digital realm as a unit of account. These fundamental inadequacies are rarely acknowledged by crypto enthusiasts, who often conflate bitcoin's phenomenal price appreciation with its actual utility as a digital cryptocurrency.[19]

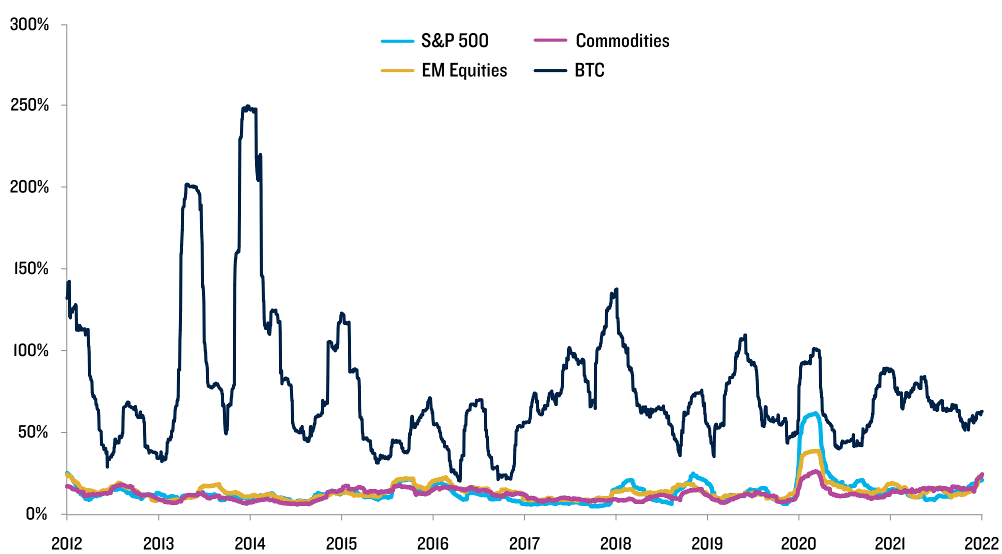
Do cryptocurrencies pass any of the three well-defined tests of a currency?

Bitcoin has an unstable price, is a poor medium of exchange and is rarely used outside the crypto-native realm as a unit of account.

Store of Value

Preserving value, at least over short periods of time, is an important function of currency. Fiat currencies can be eroded over time by price inflation. However, outside of extremely rare hyperinflationary environments they have been an efficient store of short- and medium-term value. In contrast, the wild price gyrations of many cryptocurrencies make them highly unattractive as a store of value – even in the

Exhibit 5: **Rolling 3-Month Volatility of Select Asset Classes**



Source: PGIM analysis; Refinitiv and Bloomberg.
Note: Volatility of daily returns, annualized. The Bloomberg Commodity and MSCI Emerging Markets Index were used for Commodities and EM Equities respectively.

very short term. Exhibit 5 demonstrates how the price of bitcoin has remained extremely volatile since its inception. Bitcoin clearly falls short on this first test of a workable currency.

> *Central bank digital currencies are not a distant prospect: China has already launched the e-CNY.*

Of course, stablecoins pegged to fiat currencies could function as a more reliable store of value, but they face a potentially existential risk: they would be made redundant once central bank-issued digital currencies (CBDCs) become more commonplace.*

For example, a digital dollar issued by the Federal Reserve and backed by the U.S. Treasury would provide all the functionality of USD Coin – but without any liquidity or credit risk.[20] And CBDCs are not a distant prospect: China has already launched the e-CNY. The Fed released a long-awaited study on a digital dollar in January 2022 and the ECB will share its findings on the viability of a digital euro in 2023.

Even beyond the threat from CBDCs, there are material risks around the reserve mechanisms of stablecoins – including a lack of transparency and third-party audits. Stablecoins are essentially unregulated money market funds. Even when regulated, the stable value of these instruments remains vulnerable to large outflows under stressed conditions, as was evident during the financial crisis in 2008.[21] This lack of transparency and reliable auditing in prominent stablecoins was apparent in the case of Tether – the largest issuer of stablecoin – which was fined for falsifying reserve reporting.[22]

Medium of Exchange

Cryptocurrencies are still not close to being widely used as a medium of exchange. It is indeed telling that even after a dozen years, few commercial enterprises accept them. Using bitcoin as an example, this situation is unlikely to change soon for several reasons.

First, the bitcoin blockchain, optimized for security and decentralization, does not prioritize operational efficiency. Bitcoin's maximum transaction speed of 7 transactions per second (TPS) pales in comparison to the speed of conventional payment networks, which average 1,700 TPS.**

Second, bitcoin transactions are expensive rather than cheap and frictionless. In fact, bitcoin's transaction fees are an intrinsic outcome of the highly secure and decentralized structure of its blockchain and the need to incentivize miners to decipher cryptographic problems. Fees have been as high as $50 for a single transaction – making bitcoin highly impractical for everyday, small-scale transactions.[23]

> *Bitcoin's high transaction fees are an intrinsic outcome of the highly secure and decentralized structure of its blockchain.*

Unit of Account

Currencies are used to denominate the value of products and services. That is, a haircut, a cup of tea, or a diamond ring are typically priced in euros, pesos or yuan. Fiat currencies serve as a common yardstick to measure value across the wide range of daily economic transactions.

Outside of the deep digital realm, however, cryptocurrencies are only rarely used to price products or services. While a growing number of companies accept bitcoin as a payment option (e.g., Burger King, Microsoft, Norwegian Air, and Pizza Hut, to name a few), *none of them* price their products or services in

* A CBDC is the digital form of a country's fiat currency. Instead of issuing paper money, the central bank issues electronic coins or accounts backed by the full faith and credit of the government. However, as they are issued by central banks, they are not truly decentralized and not technically considered cryptocurrencies.
** Blockchains optimized for scalability do offer more attractive transaction speeds. For example, the Solana blockchain theoretically offers up to 65,000 TPS. However, even its cryptocurrency falls short in terms of being a store of value or a unit of account.

> *Merchants simply accepting bitcoin does not mean it is preferable – or even viable – for wages, prices and assets to all be denominated in bitcoin.*

bitcoin. In other words, virtually no business fixes the price of their product in bitcoin and then converts it into fiat currencies.

Importantly, merchants simply accepting bitcoin does not mean it is preferable – or even viable – for wages, prices and assets to all be denominated in bitcoin.[24] The lone real-world example of a nation adopting bitcoin as its currency, El Salvador, has not gone well so far. Early experience strongly suggests both consumers and businesses have resisted government-mandated adoption and prefer to price merchandise and transact in U.S. dollars anyway.[25, 26]

No matter how robust the evidence on the inadequacies of cryptocurrencies as a currency, it is undoubtedly true that some market actors have invested heavily in cryptocurrencies. The soaring speculative rise of many cryptocurrencies has been dramatic, and it is hard to predict how much further momentum can carry cryptocurrency valuations. Some investors now see cryptocurrencies as a new "digital gold."

Regardless of their multiple shortcomings as currencies, Chapter 3 discusses if cryptocurrencies have a useful or significant role to play in institutional portfolios – and also lays out some alternative scenarios institutional investors would need to believe under which cryptocurrencies would potentially continue to flourish.

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