DEUTSCHE DIGITAL ASSETS I RESEARCH

View From The Citadel
Deep Dive Series

CRYPTOASSET ADOPTION & VOLATILITY

Where do we stand, where do we go?

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Executive Summary

This report examines the global adoption rates of cryptoassets, highlighting key trends and factors that contribute to their growth. Developing countries lead the way in adoption rates, with male millennials around the age of 35 being the most likely cryptoasset owners. Factors such as inflation and money supply growth have an impact on adoption rates, with institutional investors like high-net-worth individuals and financial advisors being the most likely to invest.

Retail adoption rates vary between 5% and 24%, while institutional adoption rates range from 28% to 57%. Switzerland and the Netherlands exhibit the highest adoption rates in Europe, while France and the United Kingdom have the lowest. The pace of adoption has accelerated post-Covid, with the growth rate of retail cryptoasset users averaging around 87% per year since 2017.

In conclusion, the global adoption of cryptoassets is evolving rapidly, with a clear shift towards digital and decentralized currencies. While certain demographic groups and countries are more likely to adopt these assets, the growth rate of adoption tends to cycle and is typically highest around market cycle tops. As such, it is important for investors and policymakers to closely monitor these trends and adjust their strategies accordingly.

Current State of Adoption

Global cryptoasset adoption rates are currently around 19% for retail and 57% for institutional investors.

Outlook for Future Adoption

Social dynamics and the associated economic benefits of cryptoassets will continue to drive global adoption in the future.

Structural Decline in Volatility

As adoption progresses, more heterogeneous types of investors are bound to lead to a continuous decline in cryptoasset volatility.

Introduction

"Creative Destruction is the essential fact about capitalism." Joseph A. Schumpeter

Technological adoption is not always liked. Taxi drivers tend to dislike Uber. Hotel owners tend to dislike Air BnB. Cinema owners tend to dislike Netflix. In fact, technologies usually have far-reaching socio-economic consequences which can have both positive and negative effects for societies. Old incumbent business models get "disrupted" and put out of business in consequence of new ways of doing things. The process of "creative destruction" as Austrian economist Joseph Schumpeter has once phrased it, naturally creates winners and losers which is why technological adoption usually evolves rather slowly at the beginning before becoming mainstream, once the so-called "critical mass" is achieved.

Think of the automobile for example: At the beginning of the 20th century, the main mode of transportation was by horse such that there was a high adoption rate of horse carriages. With the advent of mass-produced automobiles via the assembly line that was brought forth by Henry Ford, horse carriage producers were at risk of going out of business and, in consequence, were vocally against the adoption of automobiles as transportation technology. Eventually, despite a history of horse transportation spanning thousands of years, automobiles became the dominant mode of transportation to this day.

The automobile adoption example also highlights another important aspect of technological adoption: Just because mankind has used horses for transportation in the preceding millennials, does not necessarily imply that horses as transportation technology can never be disrupted. In other words, a high time period of technological usage does not guarantee that it will not be disrupted and replaced at some point in the future.

Age is no guarantor for survival in the technological sphere.

The same goes for those business models that the current financial system is focused on: Bitcoin could potentially disrupt international cross-border payments, gold as a store-of-value and potentially even the US Dollar as global reserve currency. Ethereum could potentially disrupt centralized exchanges, banking institutions as well as the way we transfer assets in general. Other cryptoassets have similarly bold implications for the financial system. These technologies all have in common that they introduce a peer-to-peer based financial architecture that is apolitical and censorship-resistant, and where control over assets is decentralized. They are fairly new (Bitcoin was just introduced in 2009) and compete with technologies and financial architectures that have gradually been established over the last centuries. It is no wonder that the majority of the population is still suspicious of these newcomer technologies and that incumbent institutions tend to dislike them as well.

Nonetheless, we will demonstrate in this research piece that not only cryptoasset adoption has grown very rapidly in the last years but also that this trend is likely going to continue in the future which is why every professional investor should engage with this topic.

The next chapter takes a look behind the reasons of technological adoption, both from a socio-dynamic and economic point of view. The subsequent chapter performs a meta-study of different surveys and reports on global cryptoasset adoption. Chapter 4 tries to forecast future developments while chapter 5 tries to link cryptoasset adoption with volatility. Chapter 6 concludes.

Reasons for technological adoption

Social dynamics of adoption

Network Effect

A network effect in economics is the phenomena by which the value or utility a user obtains from a good or service depends on the number of users of comparable products. It is also known as network externality or demand-side economies of scale. Most of the time, positive network effects lead to a user getting more value out of a product when other users join the same network.

Direct or indirect network effects are possible. When a product or technology is adopted by numerous users, there are direct network effects that result, indicating that the use of the product by various users is complementary. This effect is distinct from price-related benefits, such as a benefit to current customers brought on by price reductions when more users sign up. Social networking sites like Twitter, Facebook, Airbnb, Uber, and LinkedIn as well as telecommunications tools like the phone and instant messaging services like MSN, AIM, or QQ all exhibit direct network effects.

When there are "at least two different customer groups that are interdependent, and the utility of at least one group grows as the other group(s) grow," indirect (or cross-group) network effects occur. The rise of compatible software, for instance, may increase the value of hardware to consumers.

Hence, technological adoption can be self-fulfilling driven by network effects.

Lindy Effect

According to the Lindy effect, commonly referred to as Lindy's Law, the lifespan of some non-perishable items, such as ideas or technologies, will increase in direct proportion to their age in the future. Accordingly, the Lindy effect postulates that something has a longer remaining life expectancy the longer it has endured to exist or be employed in the present. A greater likelihood of continuing to exist in the future and resistance to change, obsolescence, or competition are implied by longevity. The mortality rate falls over time in areas where the Lindy effect is present.

The idea was formally conceived by comedians in Lindy's Delicatessen in New York City, hence its name. Mathematicians and statisticians have since theorized about the Lindy effect.
Items that are "non-perishable," or don't have a "unavoidable expiration date," are affected by the Lindy effect.

Humans, for instance, are brittle; in industrialized nations, the life expectancy at birth is roughly 80 years. As a result, the Lindy effect does not apply to individual human lifespan. For example, while the Lindy effect would predict that both scenarios would have an equal likelihood of occurring, a 5-year-old person dying within the next five years is unlikely, while a 70-year-old person dying within the next 70 years is highly likely.

Hence, the probability of technological adoption increases with an increase in lifespan of the technology itself.

Dunning-Kruger Effect

The tendency of people with low skill in a particular field to give too positive judgments of this competence is known as the Dunning-Kruger effect. This is frequently seen as a cognitive bias, which is the systematic propensity to think and judge things incorrectly. Insofar as they consistently manifest in various circumstances, biases are systemic. They are called tendencies because they deal with particular propensities or inclinations that can be seen in groups of people but aren't always displayed in actions. The Dunning-Kruger effect primarily affects persons who have little expertise in a certain field and are attempting to gauge their level of proficiency in that field.

Technological adoption can be affected by the Dunning-Kruger Effect in the first stages of adoption where people tend to underestimate the capabilities of a new technology and dismiss them as irrelevant for them. This can hamper the speed of adoption at first but accelerate adoption at a later stage when people had time to investigate the new technology.

Bottom Line

Network effects, the Lindy Effect and the Dunning-Kruger Effect will increase the likelihood of continuing technological adoption of cryptoassets.

Box 1: Thiers' Law/Reverse Grashham's Law

Financial historian Adam Fergusson noted that during the great inflation in the Weimar Republic in 1923, as the official money became so worthless that essentially no one would take it, people just stopped accepting it in exchange for goods. As a result, any form of cash that was supported by value started to circulate.
Zimbabwe's hyperinflation started to exhibit comparable traits in 2009.

In a high inflation environment, people will choose to accept the money they believe has the highest long-term value if given the option, and they will refuse to accept money they believe has a poor long-term value. They will tend to keep the money with a higher perceived value in their hands and give the poor money to others if they are not given the option and are forced to accept all money, good and bad. This has the effect that poor money with low or no intrinsic value circulates more frequently while hard money gradually fades out of circulation due to hoarding.

In other words, in the absence of legal tender regulations, the buyer will only offer money with the lowest commodity value (bad money), because the creditor must accept such money at face value, whereas the seller will only accept money of a specified value (good money) in the presence of legal tender laws.

In honor of French politician and historian Adolphe Thiers, economist Peter Bernholz has dubbed this phenomenon—that good money drives away bad money anytime the latter is practically worthless— "Thiers' Law", sometimes also referred to as "Reverse Grashham's Law".

Theirs' Law is an empirical example for an accelerated monetary adoption of hard media of exchange due to high inflation which could also be applicable to the adoption of scarce cryptocurrencies.

Economic reasons for technological adoption

The reasons for technological adoption are manifold but are mostly of economic nature.

One of the primary economic reasons for technological adoption is the potential for increased efficiency and productivity. New technologies often enable businesses to produce goods and services more quickly and at a lower cost, which can lead to higher profits and improved competitiveness. For example, the introduction of automated assembly lines and robotic systems in manufacturing has dramatically increased the speed and efficiency of production, reducing labor costs and increasing output. This has allowed companies to offer goods at lower prices, thus increasing demand and expanding their customer base.

Another economic driver of technological adoption is the potential for innovation and new market opportunities. As technologies advance and new ideas emerge, businesses are able to create new products and services that were previously impossible or too costly to produce. This creates new markets and opportunities for growth, leading to increased revenue and profits. For example, the rise of smartphones and mobile applications has created a new market for app developers, leading to the growth of an entirely new industry that did not exist a few decades ago.

In addition, technological adoption can lead to improved quality of life for consumers, which in turn can drive economic growth. For example, the widespread adoption of personal computers and the internet has transformed the way people live and work, enabling remote work, e-commerce, and online education. These technological advancements have made it easier for people to access goods and services, which has increased demand and expanded the market for businesses.

Finally, technological adoption can have a positive impact on the environment and sustainability. New technologies can help reduce waste, improve energy efficiency, and reduce greenhouse gas emissions, all of which can have significant economic benefits. For example, the development of renewable energy technologies has enabled businesses to reduce their reliance on fossil fuels, leading to cost savings and reduced environmental impact.

In conclusion, the economic reasons behind technological adoption are varied and complex, but they all stem from the potential for increased efficiency, innovation, and improved quality of life. The adoption of new technologies has enabled businesses to produce goods and services more quickly and at a lower cost, create new markets and opportunities for growth, and improve environmental sustainability. As technology continues to evolve, it will undoubtedly continue to play a crucial role in shaping the economy and driving economic growth.

Bottom Line

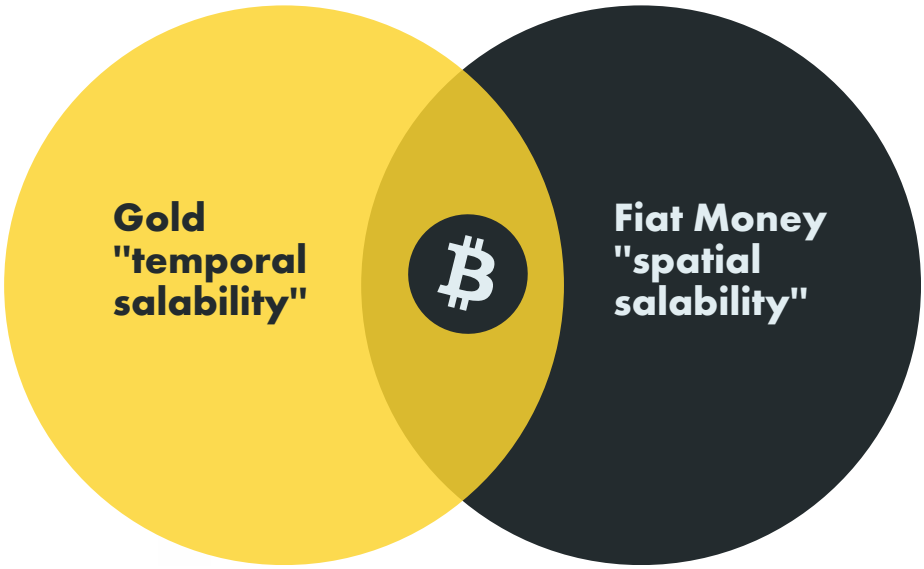
In general, the economic reasons behind technological adoption mostly center around a potential for increased efficiency, innovation, and improved quality of life – all of which are associated with the adoption of cryptoassets.

The economics of crypto adoption

In the context of cryptoassets and blockchain technologies, the economic reasons also center mostly around higher productivity and efficiency gains. For instance, Bitcoin combines the temporal salability of gold with the spatial salability of fiat monies like the US Dollar.

To put it more simply, gold as a scarce commodity allows holders to transfer value across time by maintaining their purchasing power over time (="temporal salability"). A drawback of gold is that it was not convenient to transfer gold over long distances without a significant loss of its face value due to transportation costs (="spatial salability") which is why fiat money like the US Dollar with only a claim on physical gold historically started to circulate as a substitute and eventually disrupted gold as a payment technology. The issue with fiat monies is that they do not possess temporal salability like gold since they have no intrinsic value and tend to lose purchasing power over time through inflation.

Bitcoin solves both the issue of temporal salability as a scarce asset and spatial salability of fiat money due to its electronic payment capabilities. So, there is an economic rationale behind the adoption of Bitcoin.



Another important economic reasons is that it is simply cheaper for users to send Bitcoin to one another than to rely on traditional financial system infrastructure, especially when it comes to cross-border payments.

Think of remittances for example: It takes a couple of seconds to send Bitcoins via the Lightning Network from a user in the US to a user in El Salvador for a fraction of a Cent. At the same time, traditional bank transfers can take up to several weeks in order to arrive at the recipient in another country, especially when that recipient is located in a developing country.
The reason is that traditional financial payment rails like SWIFT are antiquated networks with many intermediaries involved which increase the overall cost structure and the overall processing time.

Other cryptoassets such as Ethereum also offer potential for increased efficiency and cost-savings in the realm of security clearing and settlement. Imagine the following steps that are involved in a securities' order via the traditional financial system:

1. Investor places an order with a broker/dealer
2. Broker/dealer firm sends the order to an exchange or market for execution
3. The transaction is matched between buying and selling parties
4. The market's automated systems send trade information to the respective clearing corporation
5. The clearing corporation confirms the trade details between participating firms to create a guarantee on the completion of the transaction
6. The clearing corporation steps in as central counterparty, assuming responsibility to make the trade whole should either buyer or seller not be able to meet obligations
7. The clearing corporation issues a trade summary to the buyer and seller, indicating net money and net securities owed for settlement
8. The clearing corporation sends instructions to the Depository Trust company, detailing net positions to be settled
9. Depository Trust Company transfers securities electronically from the selling firm's account to the clearing corporation's account with the Trust Company, and then from the clearing corporation's account to the buying firm's account
10. Firms instruct their settling banks to settle funds to, or receive funds from, depository trust corporation to complete the transaction.

Not only is the abovementioned process rather complex but it also involves some element of risk due to counterparty and settlement risks as settlement usually occurs after t + 2 days later.

In contrast, consider the following exemplary process involved in buying a tokenized security:

1. Investor sends stablecoin to smart contract address in order to buy tokenized security.
2. Security token is automatically transferred to investor wallet via smart contract that is triggered via receipt of stablecoin (delivery-versus-payment)

This example highlights that sending any type of value, monetary and/or asset, can be as easy and instant as sending an Email which can have significant disruptive potential for the financial services industry.

Due to its complete automation and frequent settlement times (in the case of Ethereum, a block is validated every ~12 seconds), final settlement can be achieved significantly faster than in traditional financial markets and trading is enabled 24/7/365. There are even more cost-savings and efficiency gains involved in post-trade processes, e.g. in tax filings, regulatory filings, reportings and asset custody.
Moreover, the abovementioned trade and settlement process can not only be applied to the purchase of financial securities but also real tangible assets such as tokenized real estate, fine art or commodities.

Ethereum has also established itself as the prime cryptoasset for issuing Non-Fungible Tokens (NFTs) which represent unique, immutable, and transferable entries in the blockchain. NFTs build the basis for unique digital assets and enable the development of new digital ecosystems based on transferable values, e.g. in the metaverse. Examples are the Otherdeeds NFTs that represent unique digital land plots in the metaverse which are based on Ethereum.
Moreover, Ethereum has become the prime platform for the establishment of Decentralized Applications (dApps) of all sorts that can be programmed and automized on the Ethereum blockchain.

Other cryptoassets such as Uniswap or Avalanche enable the exchange of assets without central counterparty (Decentralized Exchange – DEX) or borrowing & lending without bank/financial intermediary (Decentralized Finance – DeFi) on a fully automated basis. This has the potential to disrupt and revolutionize the traditional financial industry.

Bottom Line

Bottom Line: There is a strong economic rationale behind the adoption of cryptoassets. In the case of Bitcoin, it is the combination of "temporal salability" of gold with the "spatial salability" of fiat currencies. Other cryptoassets such as Ethereum have the potential to significantly increase operational efficiency with respect to asset transferability and provide a platform for other digital ecosystems via NFTs or Decentralized Applications (dApps). Moreover, the establishment of Decentralized Exchanges (DEXs) and Decentralized Finance (DeFi) platforms have the potential to disrupt and revolutionize the traditional financial industry.

Box 2: Network Valuation

The approaches to network valuation usually center around the number of users in a given network. The logic behind it is that the utility and value of a network is somewhat proportional to the overall number of network participants.

For instance, according to Metcalfe's law, a telecommunications network's worth is proportional to the square of the number of users who are connected to the system (n^2). Metcalfe's law was first put forth in this form by George Gilder in 1993 and is credited to Robert Metcalfe in relation to Ethernet. It was first articulated in terms of "compatible communicating devices" around 1980 rather than users (e.g., fax machines, telephones). This law was originally intended to describe Ethernet connections, and it wasn't until later, with the globalization of the Internet, that it applied to people and networks.

In general, there have been different relationships proposed between network value and the number of users.

Sarnoff's Law: Network Value = Number of users
Zipf's Law: Network Value = Number of users * log(number of users)
Metcalfe's Law: Network Value = Number of users^2

One of the most-widely used valuation relationship today is still Metcalfe's Law which assumes a parabolic relationship between the number of users and the value of the network. This contrasts to Sarnoff's Law which only assumes a linear relationship between the number of users and the value of the network.

The following charts show the relationships between the market cap of both Bitcoin and Ethereum and their value transferred throughout the network (addresses * transfer value). As can be seen, there is a tight relationship between network activity and the valuation of the respective network.

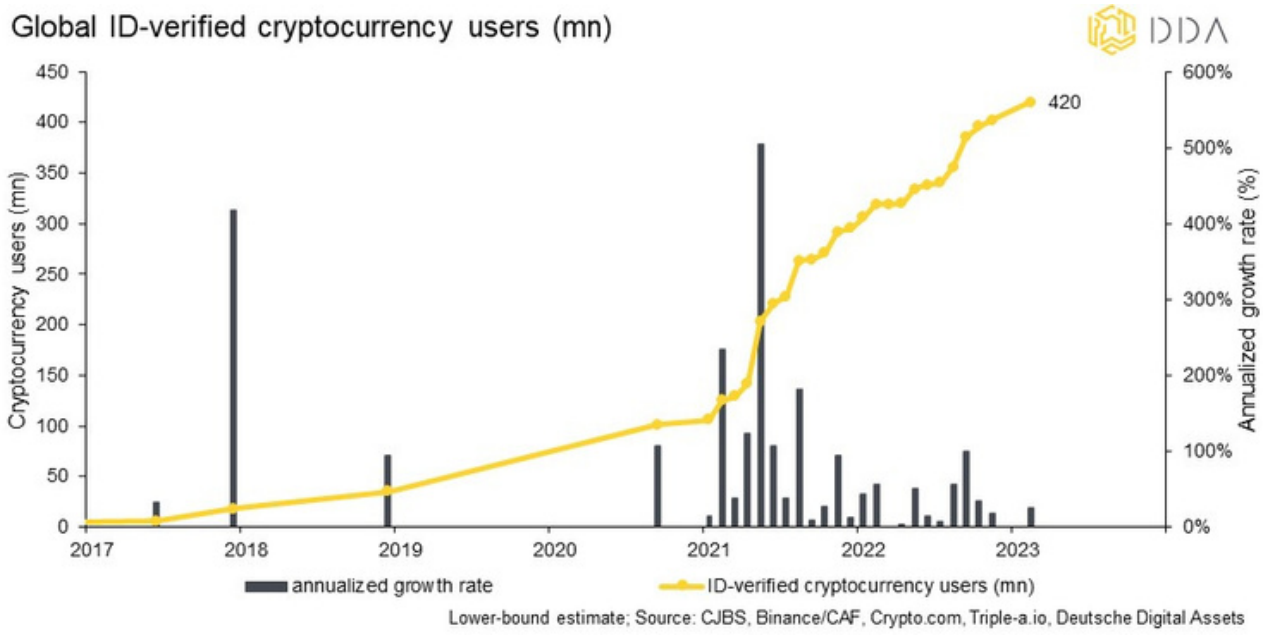
Crypto Adoption: Where do we stand?

Stylized facts on global cryptoasset adoption

- Adoption rates are generally higher in developing countries relative to developed countries; 8 out 10 countries within the top 10 of countries with the highest adoption rates are developing countries according to the IMF definition
- Demographically, most of the studies identify male millennials around the age of 35 most likely as cryptoasset owners; cryptoasset ownership is usually lower with female and/or, elderly parts of the population
- Different socio-economic factors can explain the variations in crypto adoption rates across countries, with inflation and money supply growth becoming increasingly significant
- Among institutional investors, HNWIs and financial advisors are more likely to invest into cryptoassets while Pension funds and E&Fs are usually the least likely types of investors
- Depending on the study, global cryptoasset adoption rates vary between 5% and 24% for retail individuals and 28% to 57% for institutional investors
- Within Europe, Switzerland and the Netherlands tend to exhibit the highest cryptoasset adoption rates while France and the United Kingdom tend to exhibit the lowest cryptoasset adoption rates
- The pace of global cryptoasset adoption has significantly picked up post-Covid, especially in 2021
- Growth rate of adoption evolves in cycles and tends to be highest around market cycle tops
- Growth rate of retail cryptoasset users has averaged around 87% p.a. since 2017

Current state of global crypto adoption

The current state of crypto asset adoption globally varies significantly from country to country. While some countries have embraced crypto assets and created a friendly regulatory environment, others remain skeptical or outright hostile to the technology.
In countries such as the United States, the United Kingdom, and Switzerland, the adoption of crypto assets has been on the rise. These countries have created regulatory frameworks that allow for the growth and development of the crypto asset industry. For example, in the United States, although the Securities and Exchange Commission (SEC) has recently created uncertainty surrounding unsolicited security offerings, it has been working to clarify regulations around crypto assets, allowing for more institutional investment in the space. Similarly, Switzerland has established itself as a hub for blockchain and crypto innovation, with its Crypto Valley becoming a global leader in the field.



In contrast, other countries, such as China and India, have taken a more cautious approach to crypto assets. In China, the government has banned initial coin offerings (ICOs) and has cracked down on cryptocurrency exchanges and mining, citing concerns over fraud and financial instability. In India, the Reserve Bank of India has prohibited banks from dealing with crypto-related businesses, citing concerns over money laundering and terrorism financing.

Despite the varying levels of adoption and regulation, the overall trend towards adoption of crypto assets globally has been positive. The growth rate of global retail cryptoasset adoption has averaged ~87% p.a. and these are just ID-verified users (see chart above).

In general, cryptoasset adoption is usually evolving in a pro-cyclical fashion, experiencing higher growth rates in bull markets than in bear markets. We have seen the highest growth rates during the peaks of the last two bull markets in December 2017 and May 2021, respectively.

The number of ID-verified cryptoasset users currently stands at approximately 420 mn people world-wide. This should be regarded as a lower-bound estimate. Earlier studies on global ID-verified users have also made estimations on the total user count such as the one by the Cambridge Centre for Alternative Finance. For instance, total user count was reported to be 2 to 9 times larger than the ID-verified user count between 2016 and 2020. Based on these earlier estimates, current total user count is probably around 650 mn users world-wide. The reason is that many investment options do not involve a form of KYC and ID-verification. Users might use anonymous third-party wallets and receive cryptoassets from other users. Another way is to earn cryptoassets via anonymous mining, through IT-development activity or simply exchange it on a Peer-to-Peer basis without any exchange involved.

Bottom Line

Cryptoasset adoption evolves in cycles and is usually highest around market cycle peaks. The growth rate of global retail cryptoasset adoption has averaged ~87% p.a. (ID-verified users). Cryptoasset adoption has significantly picked up post-2020.

Using blockchain data to estimate global adoption

Although the open ledger of a blockchain allows for public access to its entire transaction history, determining the network's user base is generally not an easy task.

Consider the following blockchain metrics for Bitcoin for example (source: Glassnode):

- Cumulative net new entitites: 34.5 mn
- Total non-zero addresses: 45 mn
- Total UTXOs: 138.5 mn
- Total addresses: 1105 mn

Even today, the number of addresses in the Bitcoin network are still most frequently used as a proxy for the total number of Bitcoin users and holders.

Yet it is commonly known that this strategy is flawed, mostly because there is no direct link between users and Bitcoin addresses:

1. Bitcoin addresses can store money from several people (e.g. exchange addresses).
2. Several Bitcoin addresses that are holding BTC can be owned and managed by a single entity.

Most of these issues have not been resolved so far and experts still have to resort to estimations despite the availability of detailed blockchain data. This could change in the future, due to the ongoing practice of "address tagging" that will allow for a better differentiation of wallet addresses.

Bottom Line

Despite its unparalleled public transparency, blockchain data do not provide an optimal view on the extent of global cryptoasset adoption, mostly because there is no direct link between users and addresses.

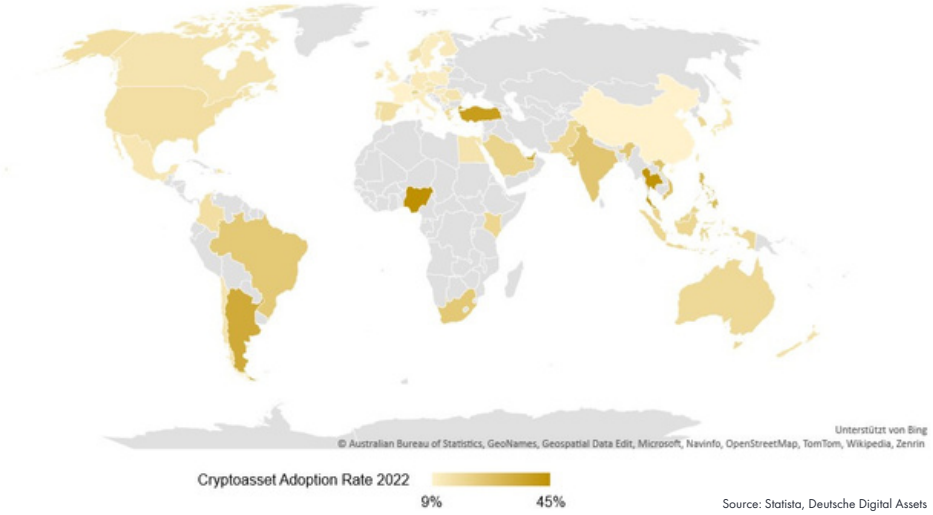
A meta survey of global cryptoasset adoption

Nonetheless, a more promising avenue to determine the current global adoption rate of cryptoassets has been to conduct surveys in several countries. We have conducted a meta study of the most recent investor surveys, both for retail and institutional investors. The results are displayed in the table below.

Source	Period	Regions	Asset	Users (mn)	Implied Adoption Rate	Note	Method
Retail							
Gemini	February 2022	20 coutries	Cryptocurrency	716	24%	nearly 30k adults in 20 countries	Survey
Morning Consult	June 2022	42 countries	Crypto	1260	22%	roughly 1000 adults per country	Survey
Finder	November 2022	26 countries	Cryptocurrency	711	21%	389,345 people surveyed in 26 selected countries	Survey
Statista	2022	56 countries	Cryptocurrency (e.g. Bitcoin)	1139	19%	2000 - 12000 respondents per country	Online Survey
BIS	November 2022	96 countries	Cryptoassets	380	8%	Only G20; App Downloads since 2015	Crypto Exchange App Data
triple-a.io	January 2023	Worldwide	Cryptocurrency	420	5%	16 reports and surveys were used	Survey
Crypto.com	November 2022	Worldwide	Cryptocurrency users	402	5%	ID-verified users	Proprietary Exchange Data
Institutional							
Fidelity	October 2022	NA, Europe, Asia	Digital Assets	-	57%	1052 institutional investors	Survey
Cointelegraph	July 2022	11 countries in US, Europe, Asia	Digital Assets	-	43%	84 professional investors	Survey
BNY Mellon	October 2022	Worldwide	Cryptocurrency	-	41%	271 institutional investors	Survey
Coinbase	November 2022	USA	Digital Assets	-	36%	140 institutional investors	Survey
JP Morgan	January 2023	60 global locations	Crypto/digital coins	-	28%	835 institutional traders	Survey

It turns out that global retail cryptoasset adoption rates vary between 5% and 24% while institutional cryptoasset adoption rates vary between 28% and 57%. For the retail space, we think that the study conducted by Statista appears to reflect the amount of global adoption most accurately since it covers a wide array of countries (56 countries) and covers a representative sample on a per-country basis (2000 – 12000 respondents per country). According to this survey, the highest adoption rates are currently found in Nigeria, Thailand and Turkey, while the lowest adoption rates are found in France, China and Israel:

Global Crypto Adoption Rates



Source: Statista, Deutsche Digital Assets

Adoption rates in percentage terms can hide the relative importance of individual countries in absolute terms. For instance, although China has only an adoption rate of 9% based on the Statista survey, the sheer size of the Chinese population implies that approximately 127 mn Chinese people hold cryptoassets. In absolute terms, India represents by far the biggest market with approximately 351 mn individuals holding cryptoassets.

Applying the different surveyed adoption rates as reported by Statista to the respective country populations, we estimate that approximately 1.1 bn people world-wide are already holding or using cryptoassets such as Bitcoin (~19% of global population).

Bottom Line

Based on a variety of surveys, global retail cryptoasset adoption rates vary between 5% and 24% while institutional cryptoasset adoption rates vary between 28% and 57%.

Cryptoasset adoption in Europe

Cryptoasset adoption in Europe has been on the rise in recent years, with countries taking different approaches to regulation and adoption. The European Union has been working to establish a comprehensive framework for crypto assets, while individual countries have been developing their own regulatory environments and fostering growth in the industry.

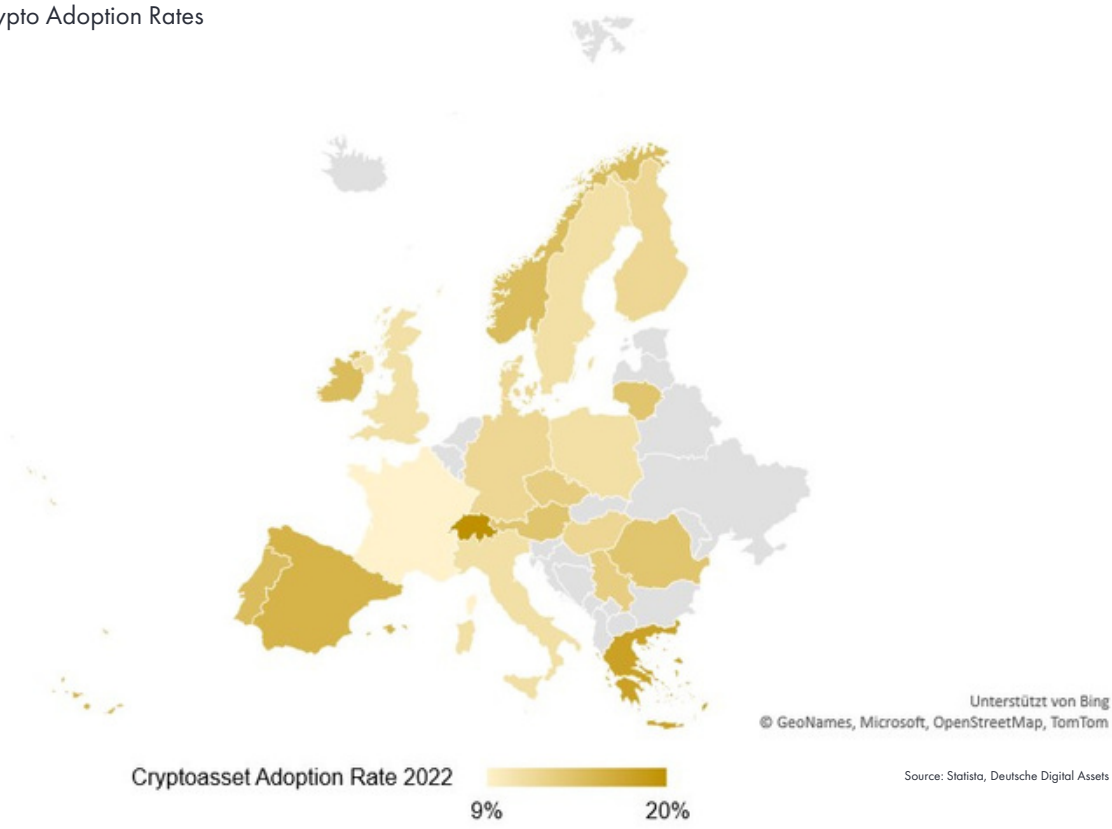
In January 2021, the European Union introduced a new regulatory framework for crypto assets, known as the Markets in Crypto-Assets (MiCA) regulation. The aim of MiCA is to provide a clear regulatory framework for the issuance, trading, and custody of crypto assets, and to promote investor protection and market integrity. MiCA has been well received by industry participants, who have praised the clarity and certainty it provides. The vote on the MiCA regulation has recently been postponed due to minor technical issues until April 2023 when it is expected to pass the European Parliament. This is bound create a transparent and safe regulatory environment for cryptoassets within the EU.

Individual countries in Europe have also been working to establish their own regulatory environments for crypto assets. Switzerland, for example, has established itself as a hub for blockchain and crypto innovation, with its Crypto Valley becoming a global leader in the field. The country has a progressive regulatory framework for crypto assets, which has attracted numerous crypto startups and investors. This might explain the significantly higher rates of adoption in Switzerland compared to other jurisdictions.

Other European countries, such as Germany and France, have also taken steps to establish clear regulatory frameworks for crypto assets. In Germany, a new law passed in December 2020 allowing institutional funds to invest up to 20% of their assets in crypto assets, while in France, a new regulatory framework for initial coin offerings (ICOs) has been established.

Within Europe, we can observe the highest retail adoption rates in the Netherlands (20%), Switzerland (20%), and Greece (18%) while France (9%), the United Kingdom (11%), and Sweden (11%) exhibit the lowest rates of adoption, according to the survey conducted by Statista.

European Crypto Adoption Rates



Bottom Line

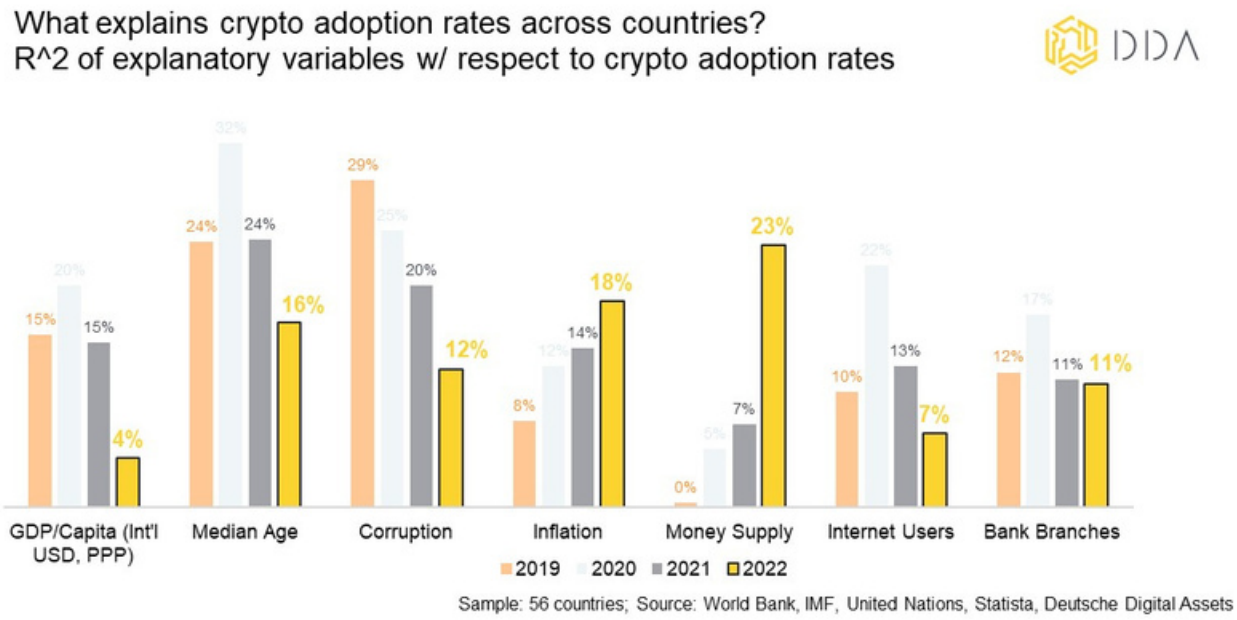
In Europe, retail cryptoasset adoption is currently highest in the Netherlands (20%), Switzerland (20%), and Greece (18%) while France (9%), the United Kingdom (11%), and Sweden (11%) exhibit the lowest rates of adoption.

What explains different adoption rates?

The differences in adoption rates across countries are believed to be attributable to a number of factors but the entry of new cryptoasset users appears to be mostly driven by increases in prices (BIS, 2022). This hypothesis is also supported by the data on global ID-verified users which shows the highest rates of user growth during bull market cycle peaks (see chart above).

Variations across countries can also be explained by demographic differences since cryptoasset adoption is significantly more pronounced in younger (and male) parts of the population which is usually less risk averse (BIS, 2022). Since the average age of the population is significantly lower in developing countries relative to developed countries, lower average age could explain significantly higher adoption rates in these countries. Thus, there appears to be an inverse correlation of age and cryptoasset adoption across countries.

Other typical explanations found in the academic literature are bank penetration (number of bank branches per 100k people) and the number of internet users (as % of the population) but more recent studies do not find a significant influence of these variables on the entry of new cryptoasset users.
The following chart shows the % of variation in cryptoasset adoption rates across countries explained by the respective metric over time:

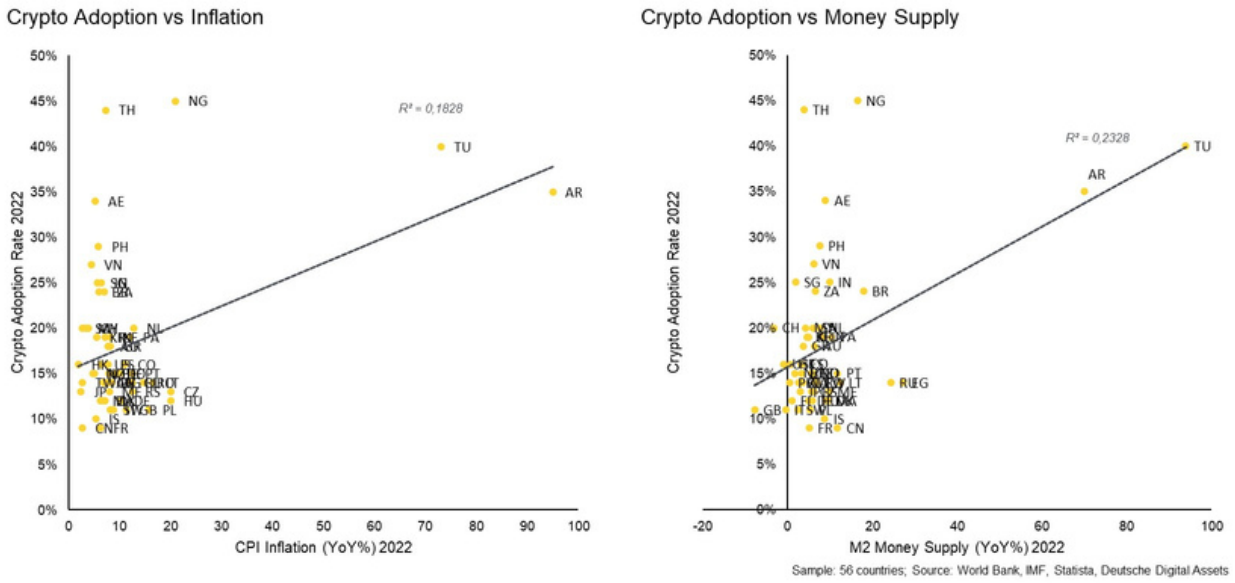


As can be seen in the chart above, in the earlier years, median age and the perceived degree of corruption within countries were able to explain a large part of variations in cryptoasset adoption rates across countries. On average, a younger population was associated with higher rates of adoption, especially in 2020. This supports the notion by other studies that crypto adoption is usually higher with the more risk-seeking younger parts of the population. The perceived degree of corruption used to explain a significant part of variation across countries but has gradually declined in importance over time. A high degree of perceived corruption might be associated with other circumstances such as low trust in government or the ability to expropriate wealth. Cryptoassets as a trustless, unconfiscatable, censorship-resistant asset might provide a more secure way to transfer and store wealth in such an environment.

More recently, different inflation and money supply growth rates across countries were able to explain an increasing part of crypto adoption variation across countries.

The coefficients are also positive implying that higher levels of inflation/money supply growth are associated with higher rates of cryptoasset adoption rates across countries and vice versa. This supports the notion that scarce cryptoassets such as Bitcoin increasingly appear to be seen as hedge against inflation/monetary debasement, especially in developing countries like Argentina where inflation rates are significantly higher than in developed countries. Please note that cryptoassets also include stablecoins backed by major currencies such as the US Dollar which are traditionally used as a store-of-value in developing countries.

That being said, the higher degree of explanatory power of either inflation and money supply growth seems to be skewed by high inflation countries (Argentina = AG and Turkey = TU) that happen to show high rates of crypto adoption. In contrast, countries like Nigeria (NG) or Thailand (TH) that exhibit one of the highest adoption rates currently do not show significantly higher rates of inflation/money supply growth.

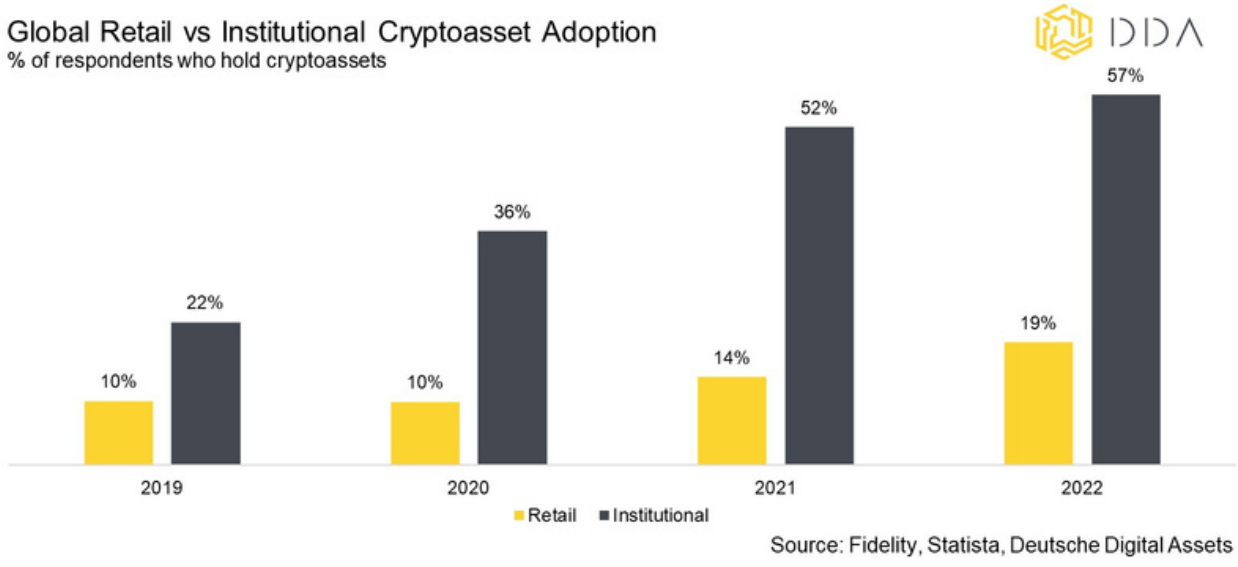


Bottom Line

All in all, there are different factors that can explain why there are differences in cryptoasset adoption rates across countries. However, these factors are dynamic and seem to change in relevance over time. This is also consistent with the changing characteristics of cryptoassets and the different investment narratives over time.

Retail vs institutional adoption

Based on the Statista survey, the retail cryptoasset adoption rate has increased from 10% in 2019 to 19% in 2022. Similarly, institutional adoption rates have increased from 22% in 2019 to 57% in 2022, based on a global survey of institutional investors conducted by Fidelity.



In terms of demographics, most retail surveys identify male millennials, around the age of 35, to be most likely to hold cryptoassets. The preferred cryptoassets identified in those surveys are usually Bitcoin (BTC) and Ethereum (ETH), followed by Dogecoin (DOGE). For instance, based on the latest Cryptocurrency Adoption survey conducted in November 2022 by Finder, approximately 36% of global respondents who already hold cryptoassets have indicated that they hold Bitcoin (BTC), followed by 24% who indicated that they hold Ethereum (ETH).

Among institutional investors, most surveys identify High Net Worth Individuals (HNWIs) and Financial Advisors as being most likely to invest into cryptoassets, while Pension funds as well Endowments & Foundations are potentially less likely to invest into cryptoassets.

Bottom Line

Both retail and institutional cryptoasset adoption rates have significantly increased since 2019. Most retail surveys identify male millennials, around the age of 35, to be most likely to hold cryptoassets. Most surveys identify High Net Worth Individuals (HNWIs) and Financial Advisors among institutional investors as being most likely to invest into cryptoassets, while Pension funds as well Endowments & Foundations are potentially less likely to invest into cryptoassets.

Crypto Adoption: Where are we going?

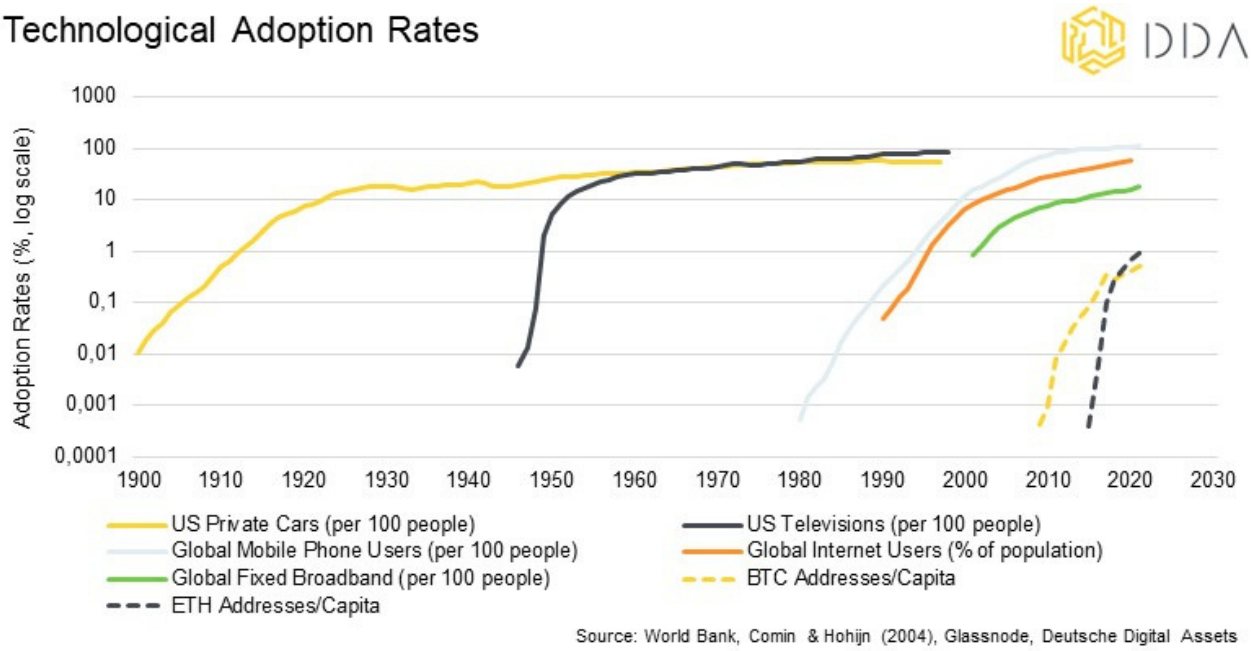
In order to forecast where cryptoasset adoption is going to develop in the future, it makes sense to analyse historical developments in the past. In this regard, several remarks with respect to the historical developments of technological adoption are in order:

According to the model first introduced by Rogers (1962), technological adoption usually follows a pattern with 5 distinctive groups of adopters:

1. Innovators (2.5%)
2. Early Adopters (13.5%)
3. Early Majority (34%)
4. Late Majority (34%)
5. Laggards (16%)

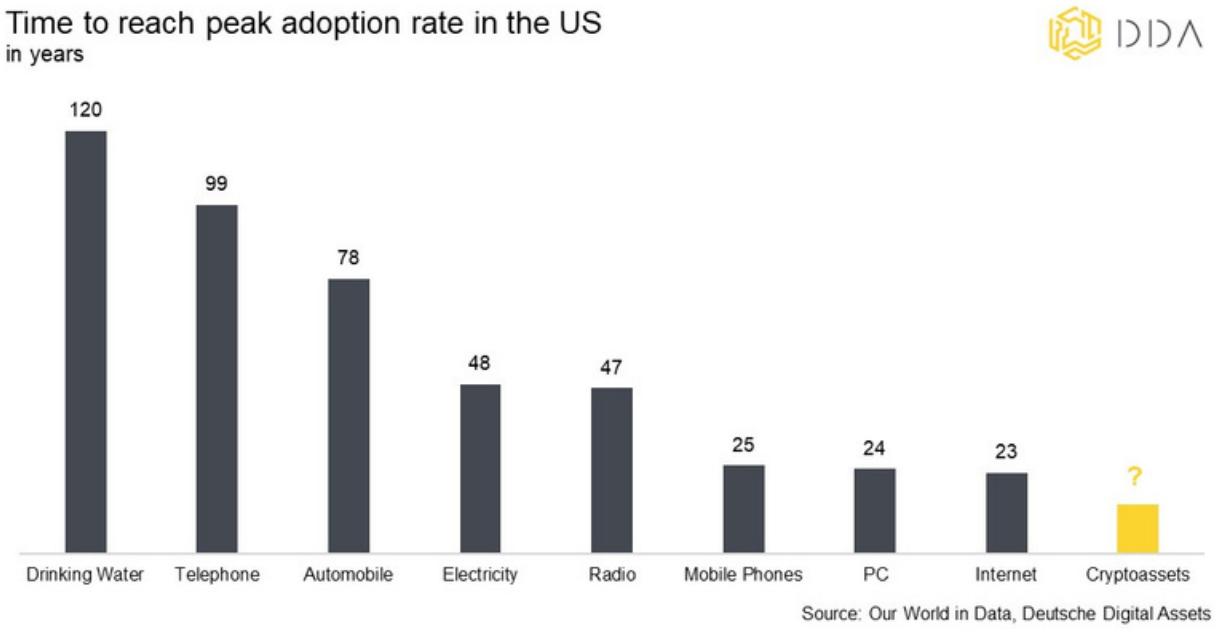
Based on this model, in most countries today, we are still in the early stages of cryptoasset adoption with only Innovators and Early Adopters (~16% of the population) using cryptoassets according to most retail surveys. This is particularly true for developed countries.
Technological adoption usually follows an "S-curve" which represents a logistic growth function: The exponential growth of a small population creates the lower curve of the S. As the population gets close to its carrying capacity and its growth rate decreases, the upper curve of the S is produced.

It is important to note that the "take-off phase" happens between phase 2 and 4 when the majority of the population is "captured" by the new technology. This implies that high growth rates of global cryptoasset adoption are still ahead.
However, another important remark to make is that cryptoasset adoption has so far grown faster than many preceding technological innovations before that. In other words, it took less time to reach a similar adoption rate for both Bitcoin and Ethereum compared to the internet or mobile phones on a global basis.



There is a general tendency for new technologies to reach saturation faster than preceding technologies.

Consider the following examples for the US:

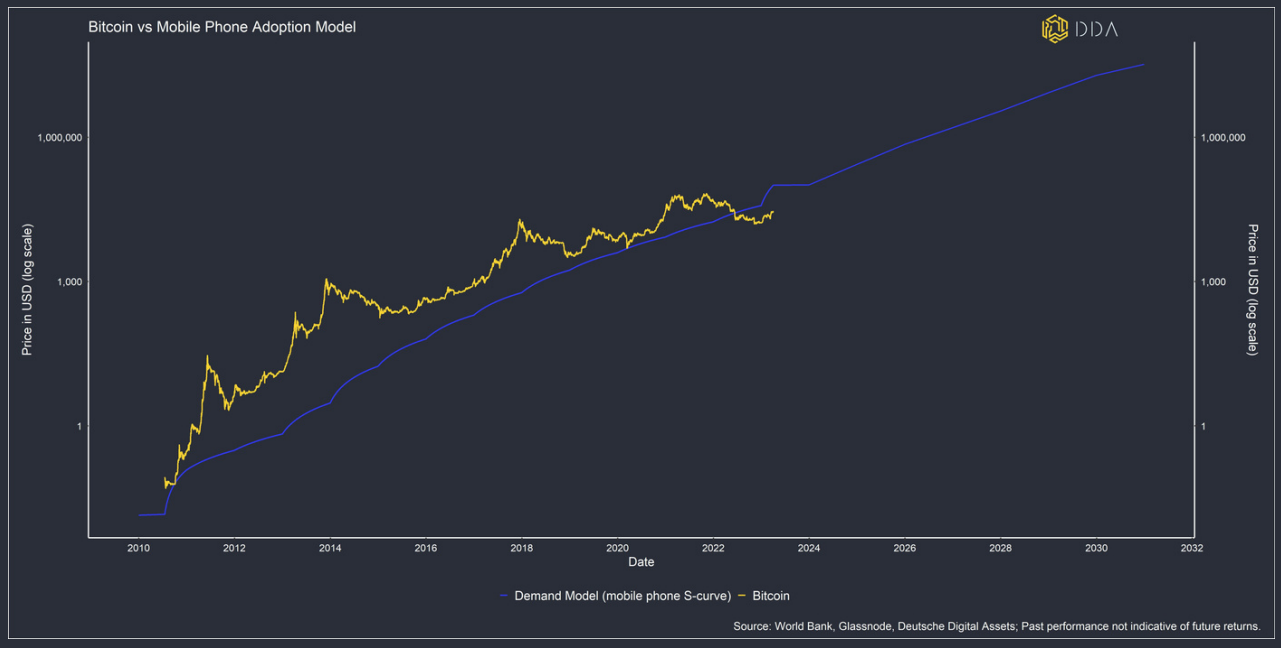


The aforementioned examples demonstrate that the amount of time needed for widespread technological adoption has decreased throughout time. At least as far as the US is concerned, but certainly the rest of the world should exhibit a similar pattern, albeit possibly not at the same rate of acceleration.

This implies that closing the existing digital divide in terms of access to cutting-edge information technologies should take a lot shorter time than, say, radio or electricity did. Of course, a lot of this depends on the unique social, political, economic, and cultural conditions of each nation and region but it generally implies that cryptoasset adoption could also be faster than the internet itself.

To answer this question more specifically, we have estimated a simple model for Bitcoin adoption based on the global mobile phone adoption rate.
In a first step, we have estimated the relationship between the price of Bitcoin and its adoption rate based on non-zero Bitcoin addresses per capita on a global basis as a proxy for its adoption rate.

In a second step, we have aligned the starting point of the historical mobile phone adoption curve with that of Bitcoin and estimated the model price for Bitcoin:

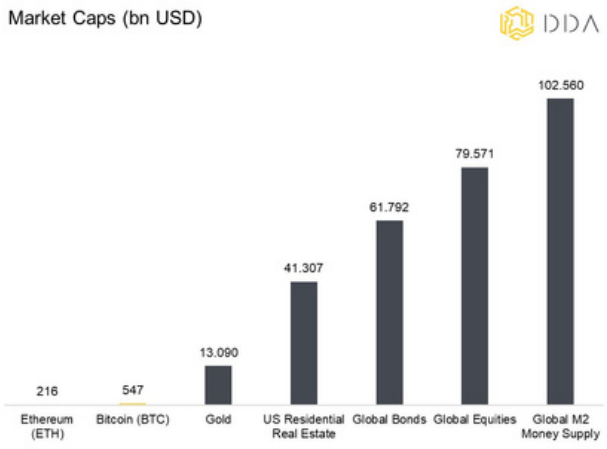


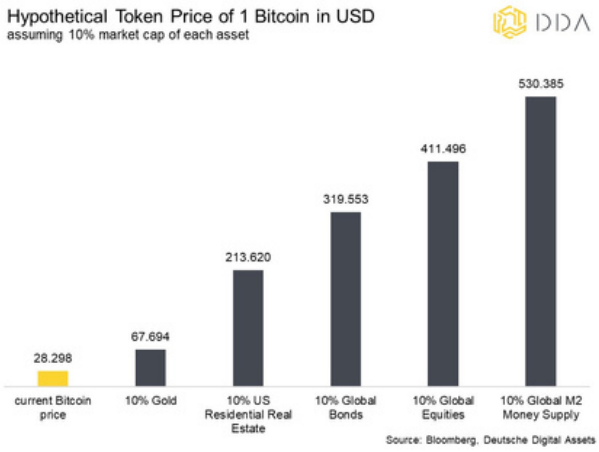
As can be seen in the chart shown above, the price of Bitcoin and non-zero addresses per capita have initially grown faster than the historical mobile adoption curve would suggest.

That being said, assuming that Bitcoin adoption would take a similar path as global mobile phone adoption, this implied a model price of around ~100k USD by the end of 2023 and ~733k USD by the end of 2025.

As a matter of course, neither adoption nor price will evolve in a straight linear fashion but will exhibit cycles of lower and higher growth rates over time as mentioned in the previous chapter.
Nonetheless, it is generally valid to say that global cryptoasset adoption is still in the early stages since the current rate of adoption, based on non-zero addresses per capita for Bitcoin, is around 0.5% which is comparable to the global rate of adoption of mobile phones in the year 1993 or the % of global internet users in the year 1995.

This is also true for the relative market capitalizations for both Bitcoin and Ethereum relative to established traditional financial assets:





For instance, the current market capitalization of Gold is approximately 25 times larger and global m2 money supply is even more than 200 times larger than the current market capitalization of Bitcoin. These examples highlight that the potential upside for further adoption of cryptoassets is potentially still quite significant.

Bottom Line

There is still significant upside for global cryptoasset adoption as we are still at the early stages of the adoption curve. The historical path of global mobile phone adoption also implies significant upside price potential for Bitcoin. Cryptoasset market caps are also still relatively small compared to traditional assets such as equities or bonds.

Cryptoasset adoption and volatility

In order to understand the link between cryptoasset adoption and price volatility from a theoretical point of view, it is useful to look at how investor behavior and price discovery in financial markets work in general.

The Efficient Market Hypothesis (EMH) has long been the dominant theory in finance, suggesting that market prices reflect all available information and that it is impossible to consistently beat the market. However, the emergence of the Fractal Market Hypothesis (FMH) challenges this notion by arguing that markets exhibit patterns of self-similarity and non-randomness, i.e. trends.
The FMH builds upon the concept of fractals, which are complex patterns that repeat at different scales. In financial markets, this means that the same patterns can be observed across different time frames, from seconds to years. Proponents of the FMH argue that these fractal patterns provide evidence of market inefficiencies that can be exploited by skilled investors.

In contrast, the EMH assumes that markets are efficient, meaning that asset prices reflect all available information and that it is impossible to consistently outperform the market without taking on additional risk. Proponents of the EMH argue that any patterns or anomalies observed in the market are simply the result of random noise and not evidence of market inefficiencies.

The main difference between both types of hypotheses is the fact the FMH has more realistic assumptions than the EMH:

	EMH	FMH
Information set	Perfect and symmetric	Imperfect and asymmetric
Types of investors	Homogenous	Heterogenous
Investment horizon	Homogenous	Heterogenous

With respect to the adoption of cryptoassets, the FMH might give us a better understanding how higher adoption and a more heterogenous investor base might affect cryptoasset volatility in the future.

Consider a retail day trader and a pension fund for example:

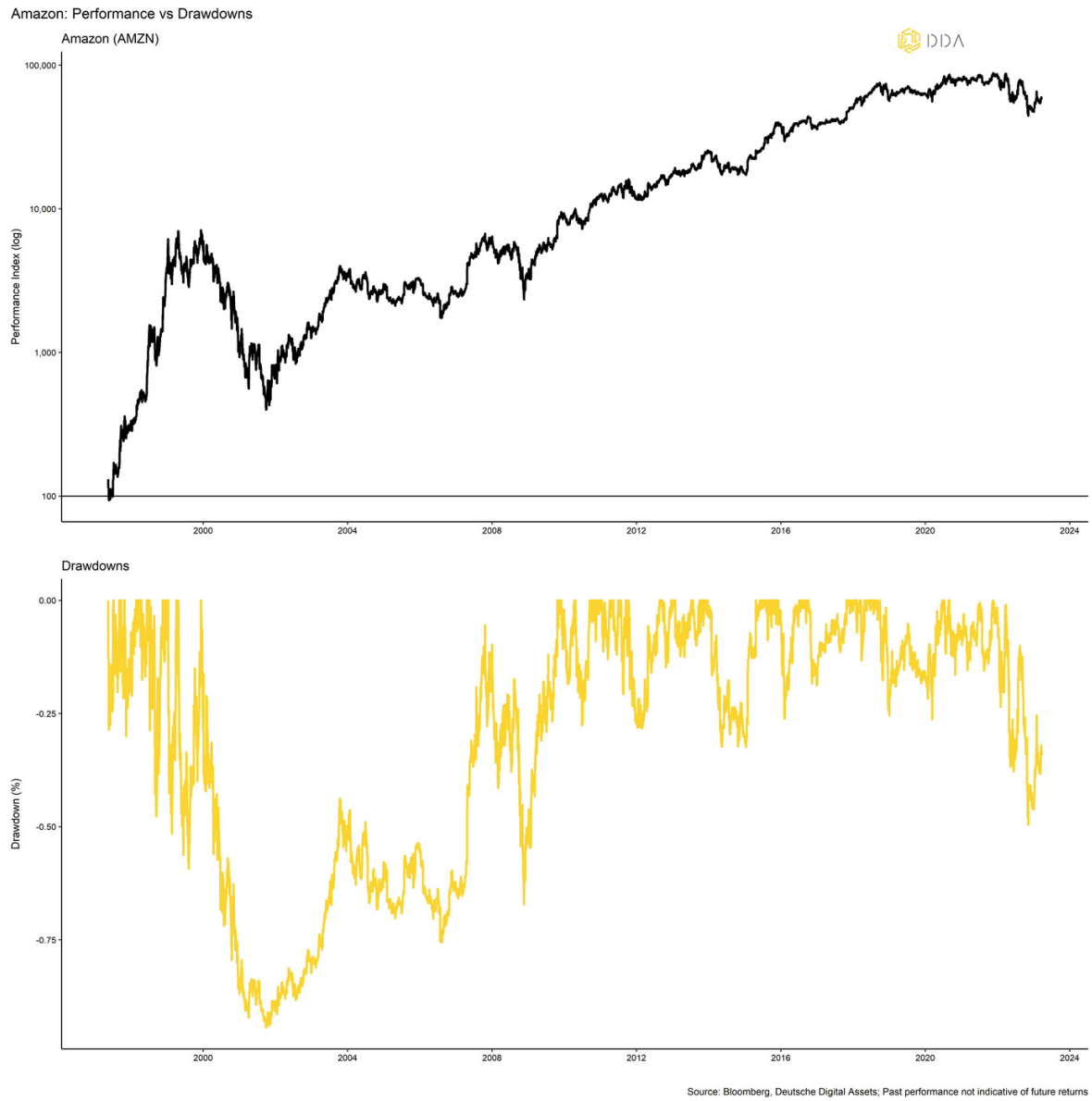
A day trader might consider a large intra-day price decrease as a reason to close the positions for the day. In contrast, a pension fund investment manager might use the price decrease as a buying opportunity to increase exposure. Disagreement between these two types of investors (day trader versus pension fund) with respect to the underlying asset actually creates a market of buyer and seller and therefore stability.

Now consider the extreme case of only day traders (homogenous investors) in the market with symmetric and perfect information, i.e. all have the same amount and all available information. This would imply that all these investors would buy and sell at the same moment in time as they would all agree on the underlying asset simultaneously. The price would theoretically fluctuate between 0 and infinity! This homogeneity and group-think among investors would create instability and therefore higher volatility in the market.

These simplified examples go a long way in explaining that a more heterogenous investor base through wider adoption is bound to create more disagreement between buyers and sellers, which creates stability and should have a dampening effect on volatility in the long term.

From a historical point of view, most investors dismiss the fact that companies that are very widely adopted among investors & consumers today used to be as risky as cryptoassets today in terms of volatility and drawdowns.

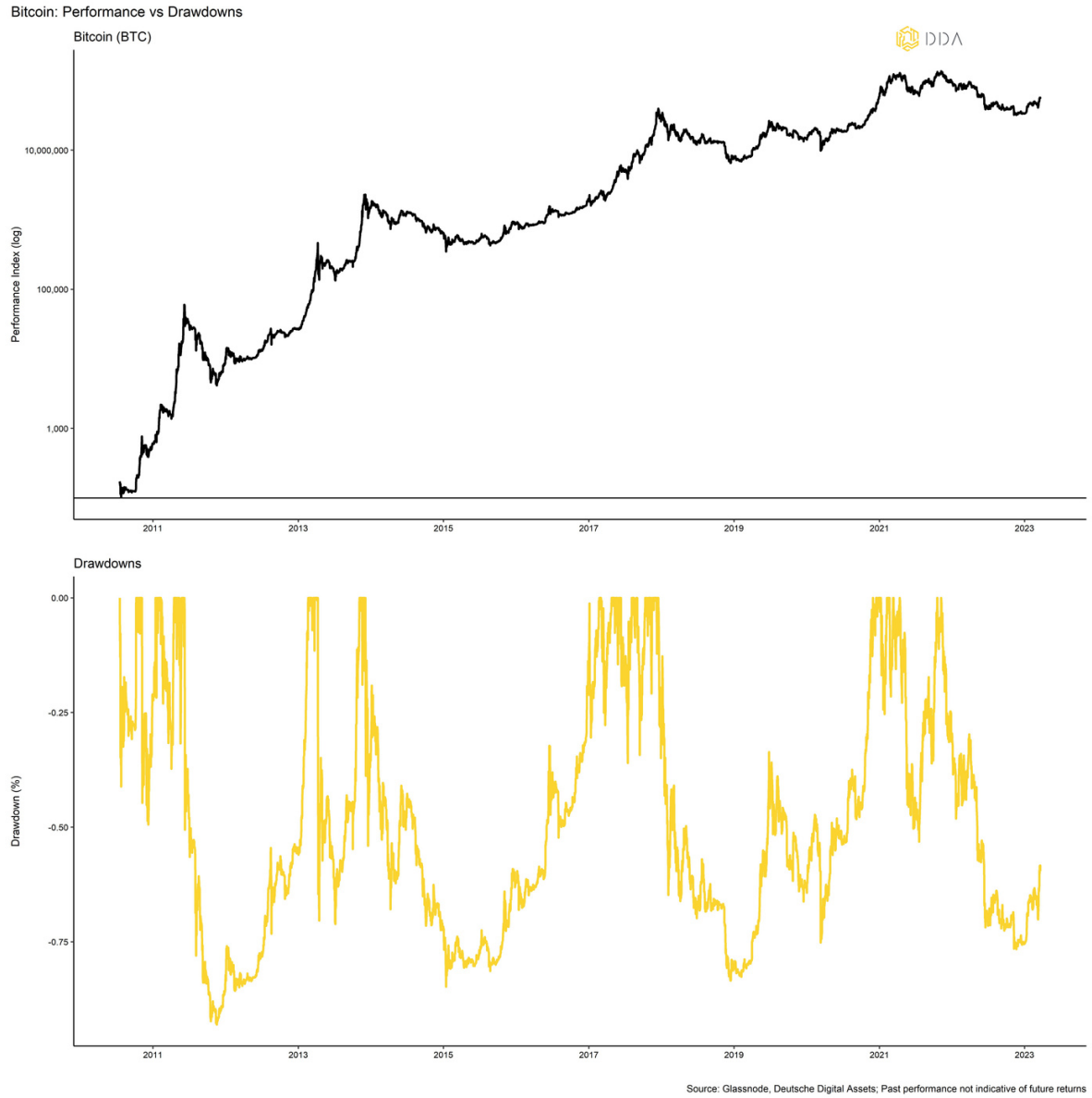
For instance, Amazon Inc. (AMZN) stocks lost approximately 90% of their value during the "Dot-Com" crisis in the early 2000s.



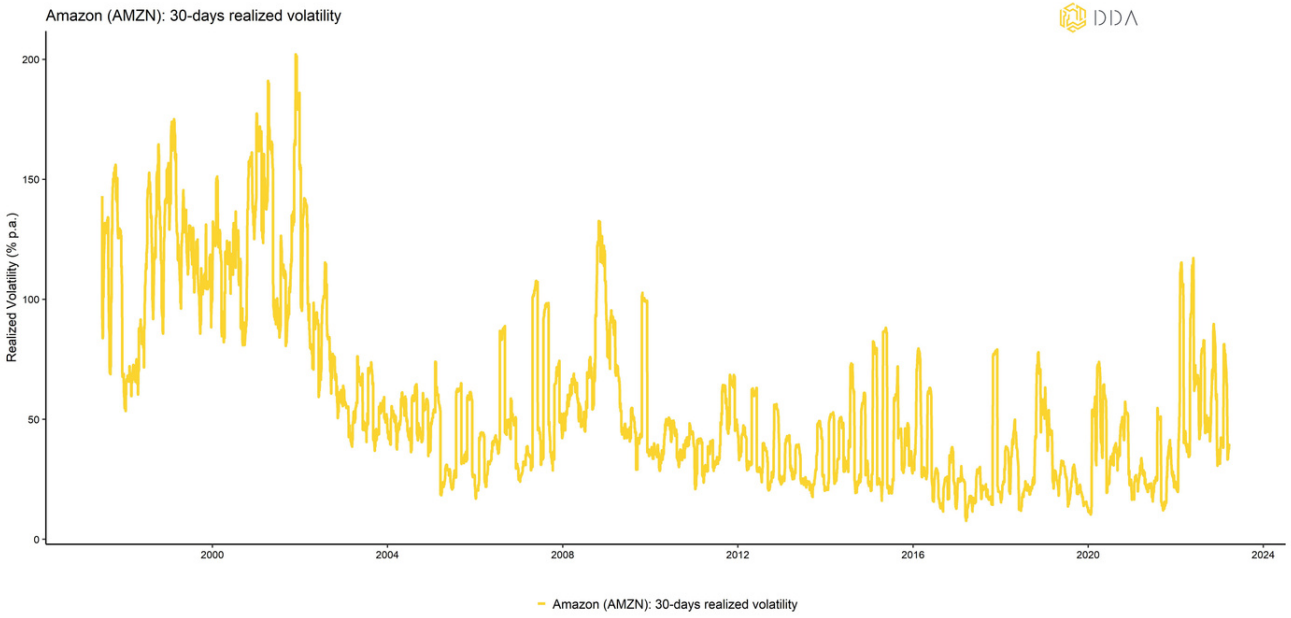
Source: Bloomberg, Deutsche Digital Assets; Past performance not indicative of future returns

Back then, the internet and online retailing were still in its infancy and stocks such as Amazon were considered high risk among investors. As the technological adoption of the internet and the volume of online retailing grew over time the drawdowns of Amazon stocks also structurally declined over time.

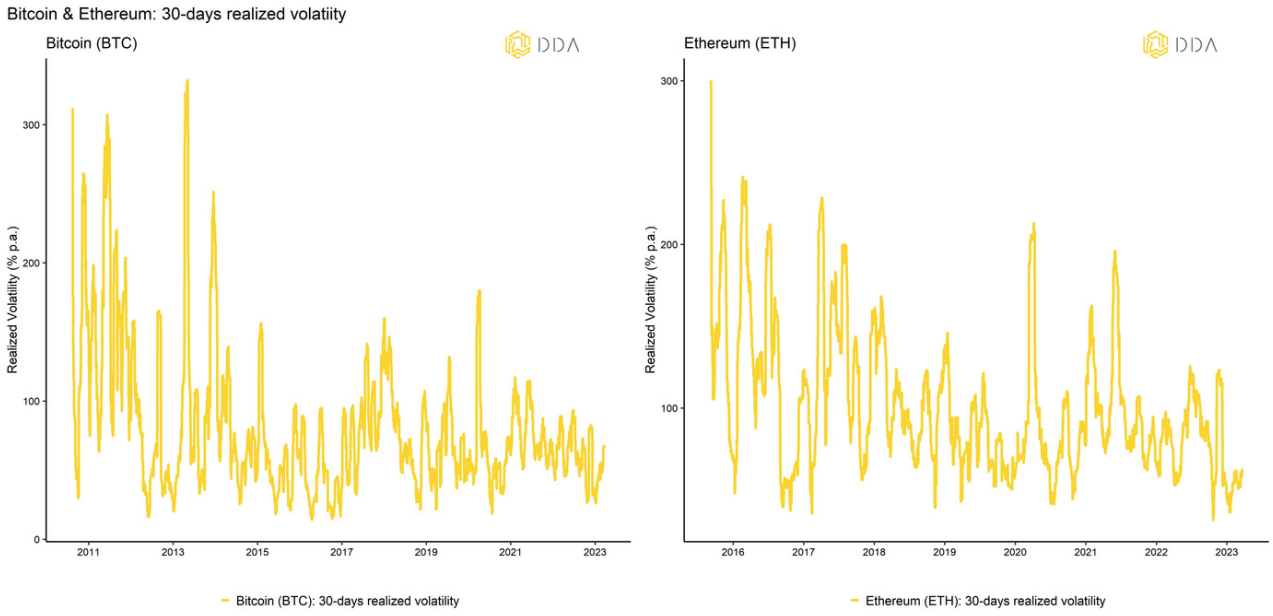
Similarly today, cryptoassets such as Bitcoin (BTC) and Ethereum (ETH) are considered to be high risk among traditional investors.



However, we expect bear market cycles and drawdowns for cryptoassets to be structurally less pronounced than in the past and this pattern appears to be playing out already. Bitcoin drawdowns have gradually been less severe over time.
The same is true for volatility. We also expect with increasing rates of adoption and a more "fractal" market structure of investors that volatility is going to continue to decrease over the coming years. Historically speaking, this was the pattern that we observed with Mega Cap growth stocks today as well. For instance, Amazon stocks (AMZN) had a realized 30-days volatility of above 200% p.a. during the turn of millennium, whereas currently the stock price usually fluctuates less than 50% p.a.



Source: Bloomberg, Deutsche Digital Assets



Source: Glassnode, Deutsche Digital Assets

Bottom Line

Continuing adoption is bound to lead to more heterogenous investor base. According to the Fractal Market Hypothesis (FMH), increasing "disagreement" among investors should lead to more market stability and should have a dampening effect on volatility over time. The historical example of Amazon Inc. highlights that very risky assets can exhibit a structural decline in volatility and drawdowns over time with more adoption by consumers and investors.

Conclusion

Cryptocurrency, or cryptoasset, adoption rates vary across the globe, with developing countries leading the way. In fact, according to the IMF definition, eight out of ten countries with the highest adoption rates are developing countries.

When it comes to demographics, male millennials around the age of 35 are most likely to be cryptoasset owners. However, ownership tends to be lower among females and/or the elderly population.

Different socio-economic factors can explain why crypto adoption rates vary across countries. For example, inflation and money supply growth have become increasingly significant.
Institutional investors also have varying levels of interest in cryptoassets. High-net-worth individuals and financial advisors are more likely to invest, while pension funds and endowments are usually the least likely.

Global cryptoasset adoption rates for retail individuals vary between 5% and 24%, while rates for institutional investors range from 28% to 57%, depending on the study.
Within Europe, Switzerland and the Netherlands exhibit the highest cryptoasset adoption rates, while France and the United Kingdom have the lowest.

The pace of global cryptoasset adoption has significantly picked up post-Covid, especially in 2021. The growth rate of adoption evolves in cycles, with the highest growth rates typically occurring around market cycle tops.

The growth rate of retail cryptoasset users has averaged around 87% per year since 2017. As the world becomes more digital and decentralized, it will be interesting to see how these trends evolve over time.

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