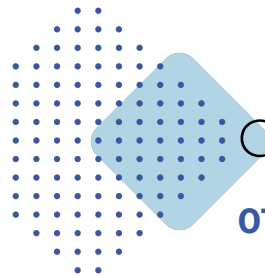




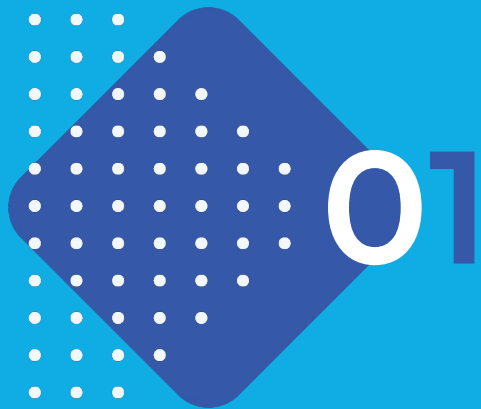
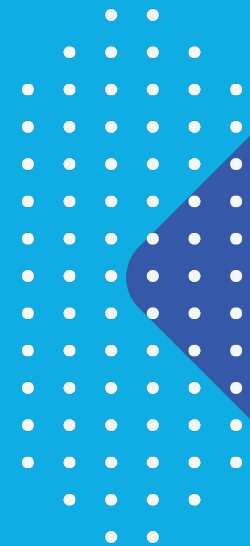
2019 Cryptoasset Investment Thesis





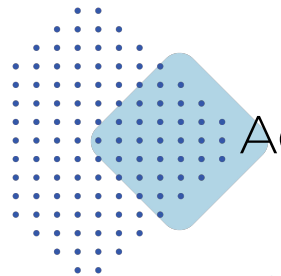
Contents

- 01** Summary
- 02** Crypto awareness and adoption in 2019
- 03** Examining why billions of people do not yet own crypto
 - Trust
 - Need
 - Want
- 04** Factors driving crypto adoption
 - Push
 - Pull
- 05** Valuation and fundamentals
- 06** Wrap-up



01

Summary



Adoption is growing towards **critical mass**

High growth rate: on average, more than one million new cryptoasset users are added per month

Expanding ownership: at least 30 million individuals own cryptoassets like bitcoin (BTC); some estimates place ownership at greater than 60 million individuals

Bitcoin leads: BTC continues to dominate the cryptoasset landscape across key metrics

- over \$1 billion in BTC is transferred on-chain each day, more than all other cryptocurrencies combined
- BTC's total computing power and miner fee income are an order of magnitude greater than all other cryptocurrencies combined



Endogenous and exogenous drivers are **both supporting expanding crypto ownership**

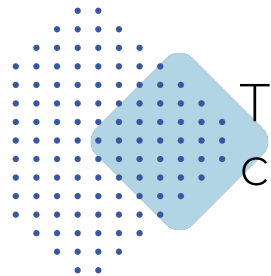
Innovation: continued technical maturity and innovation (e.g. transaction capacity)

Demographics: ongoing shifts in demographics and preferences are favorable towards expanding crypto ownership

Brand: growing crypto awareness and educational understanding

Regulation: improved regulatory clarity

Political economy: macroeconomic and institutional environment are favorable for adoption

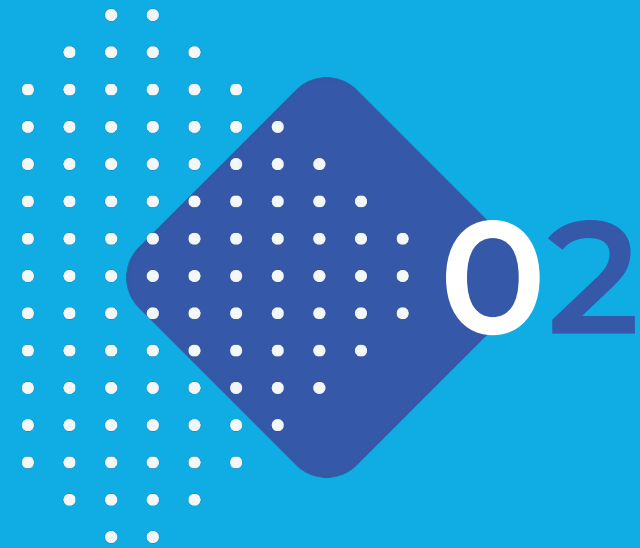


Transaction and price data suggest we are on the cusp of the **next crypto bull market**

Inherently 'bubbly': Last year BTC experienced its sixth 70%+ price drop; periodic exuberance followed by large sell-offs appear to be endemic to widening crypto adoption, and we anticipate further outsized volatility

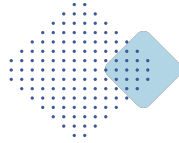
Return of the Hodl: significant selling by longer-term owners over last 18-months has abated; growing evidence of renewed accumulation

As goes the price of BTC, so goes the broader cryptocurrency market: cryptoassets continue to be highly positively correlated (~90%); in the near-term it is unlikely that the broader crypto market can rally higher without higher bitcoin



02

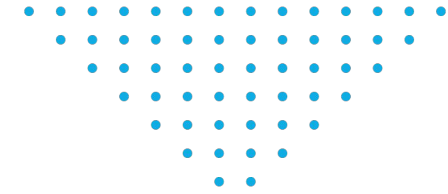
Crypto awareness and adoption in 2019



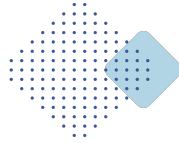
Bitcoin marked its 10-year anniversary in January 2019, and
**tens of millions of people now own and use
cryptoassets.**

But billions of people still do not own any crypto.

Source: [Blockchain.com](https://www.blockchain.com)



Why **not**?

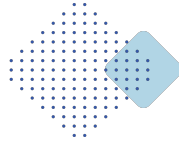


Lack of awareness does not appear to be the issue:

According to a recent survey conducted by the New York Federal Reserve Bank, **85% of US citizens have heard of cryptocurrencies like bitcoin**

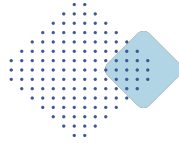
Similar awareness levels have been measured in other countries (e.g. Canadian awareness is **also 85%**)

Sources: <https://libertystreeteconomics.newyorkfed.org/2019/03/deciphering-americans-views-on-cryptocurrencies.html>
<https://www.bankofcanada.ca/wp-content/uploads/2018/07/san2018-23.pdf>



Instead, the New York Fed survey found that the top reason given by US citizens for not owning crypto is because it is viewed as a **“bad investment”**

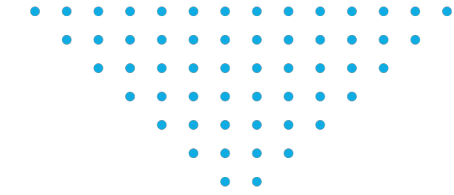
Source: <https://libertystreeteconomics.newyorkfed.org/2019/03/deciphering-americans-views-on-cryptocurrencies.html>



However, the same survey also found that the top reason given by the 5% of US citizens that have acquired crypto is because crypto is viewed as a **“good investment”**

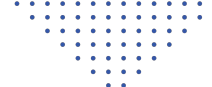
Note: The survey question on this data point asked about both current and past owners of cryptoassets, so current ownership levels in the US may be below this figure.

Source: <https://libertystreeteconomics.newyorkfed.org/2019/03/deciphering-americans-views-on-cryptocurrencies.html>



Question:

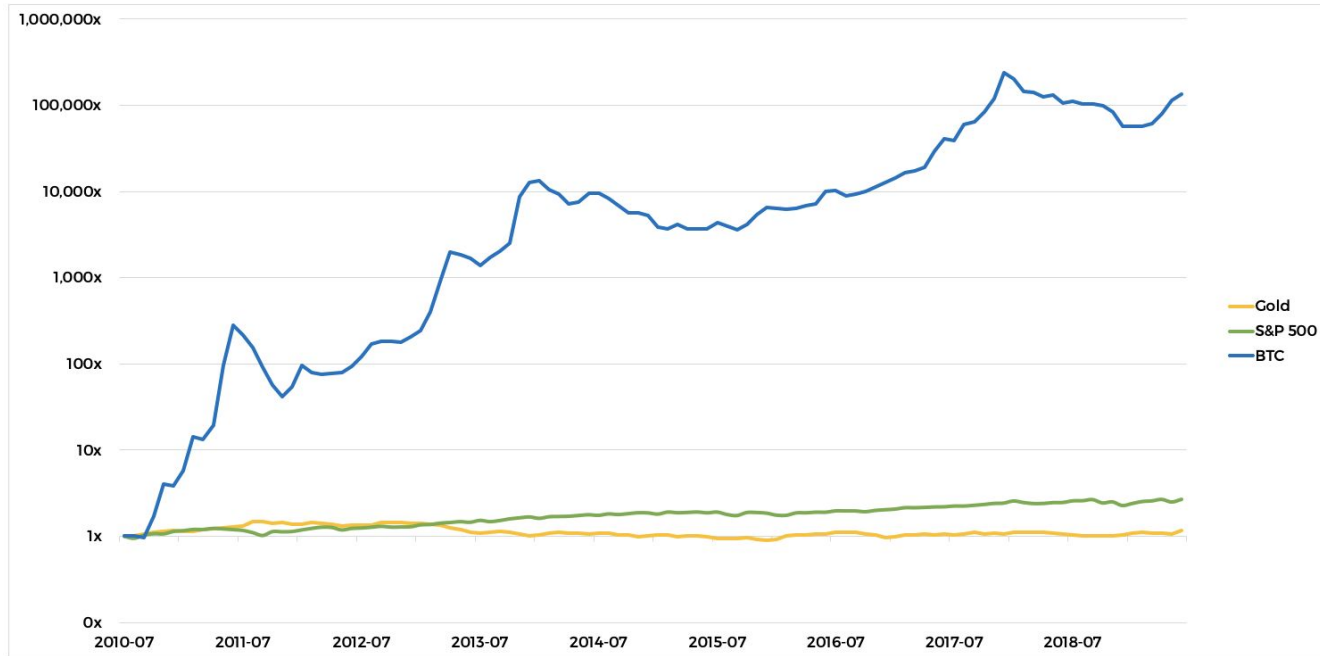
Which of these two views is in fact correct?



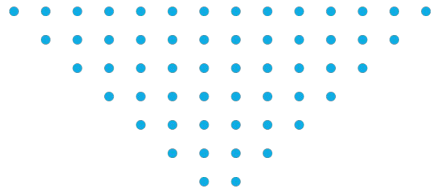
Over some shorter time periods cryptoassets have experienced **dramatic price corrections...**

Major Bitcoin Corrections	# Days	Bitcoin High	Bitcoin Low	% Decline	% Return to New High	New High Date	# Days to New High
12/17/2017 to 12/15/2018	363	\$19,783	\$3,204	-84%	?	?	?
11/8/2017 to 11/12/2017	4	\$7,879	\$5,507	-30%	43%	11/16/2017	8
9/2/2017 to 9/15/2017	13	\$5,014	\$2,951	-41%	70%	12/10/2017	40
6/11/2017 to 7/16/2017	35	\$3,025	\$1,837	-39%	65%	5/8/2017	55
3/10/2017 to 3/24/2017	14	\$ 1,326	\$892	-33%	49%	4/27/2017	48
11/30/2013 to 1/14/2015	410	\$1,166	\$170	-85%	585%	2/23/2017	1181
4/10/2013 to 7/7/2013	88	\$266	\$63	-76%	323%	7/11/2013	211
6/8/2011 to 11/17/2011	162	\$32	\$1.99	-94%	1504%	2/28/2013	631
5/13/2011 to 5/21/2011	8	\$8.45	\$5.58	-34%	51%	5/25/2011	12
2/10/2011 to 4/4/2011	53	\$1.10	\$0.56	-49%	96%	4/17/2011	66
11/6/2010 to 11/10/2010	4	\$0.50	\$0.14	-72%	257%	1/31/2011	86
9/14/2010 to 10/8/2010	24	\$0.17	\$0.01	-94%	1600%	10/24/2010	40
Average - Top 5 declines	138						430
Median - Top 5 declines	88						211

...but over longer stretches of time (e.g. multi-year periods) cryptoassets have **substantially outperformed every other asset class**

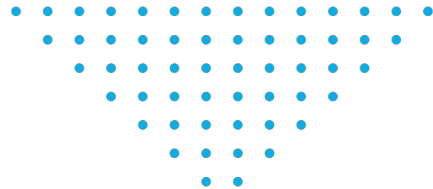


Source: Coinmetrics. NB. Log Chart



Answer:

both views can be correct (it depends on the timeframe)



But what about
the future?

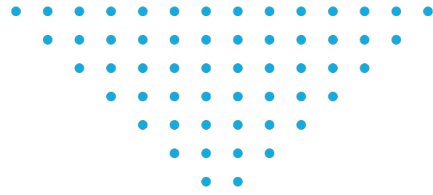


Growing use and ownership is necessary for cryptoassets to continue performing well

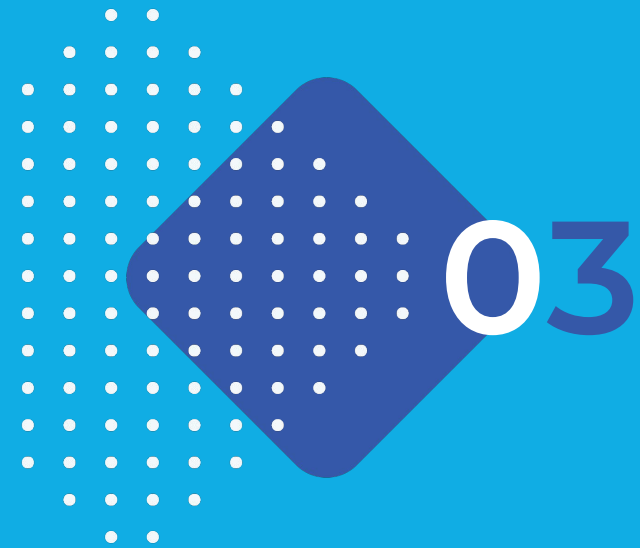
The purpose of this document is to critically examine:

Key drivers behind why we continue to observe increased crypto adoption

The **remaining challenges** and potential barriers to even wider adoption

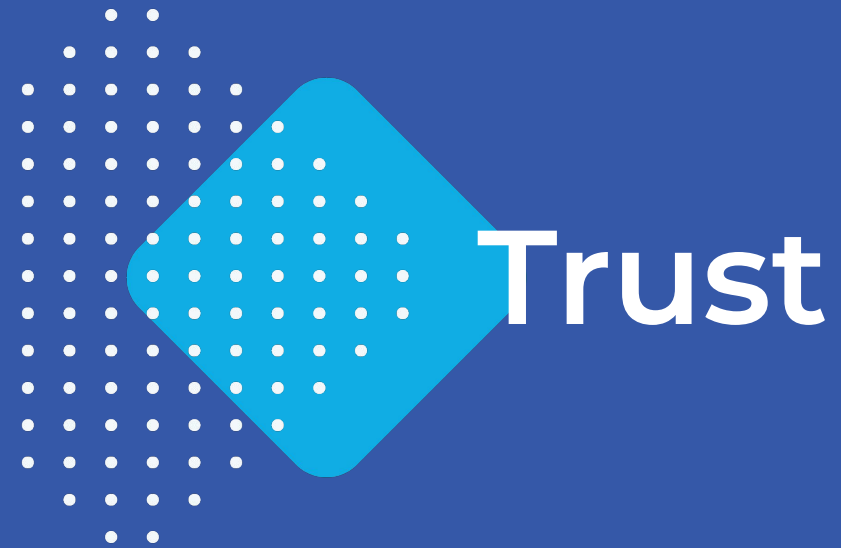


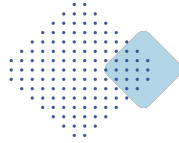
Let's first look at some **challenges**
facing wider crypto ownership



03

Examining why
billions of people have
not yet used crypto





While “bad investment” was the top reason given by US citizens for why they do not yet own crypto, survey respondents cited “**lack of trust**”¹ as the second biggest reason

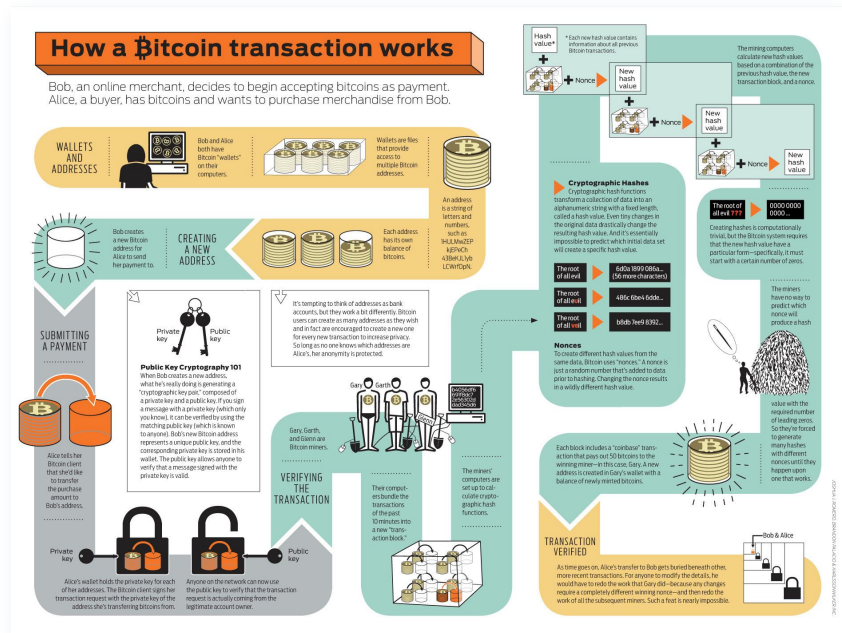
¹ **Lack of trust** in cryptoassets can be in reference to the widely publicized exchange hacks/heists or operational shortcomings (e.g. Mt. Gox, Coincheck, QuadrigaCX), but it may also relate to other aspects of cryptocurrencies (e.g. anonymous founders, lack of information and understanding about crypto ‘miners’, etc)

Source: <https://libertystreeteconomics.newyorkfed.org/2019/03/deciphering-americans-views-on-cryptocurrencies.html>

“Lack of trust” in cryptocurrencies may also be related to the feeling that crypto is complex and **difficult to understand...**

Source:
<https://www.finder.com/why-people-arent-buying-cryptocurrency>

For example, convoluted explanations and diagrams explaining “how bitcoin works” often leave those open to learning more feeling confused and left out, particularly those less tech savvy



The challenge with understanding bitcoin is compounded by broader challenges around financial literacy, such as the overall limited understanding of **where does money come from?**



Source: <https://www.pwc.com/us/en/about-us/corporate-responsibility/assets/pwc-millennials-and-financial-literacy.pdf>

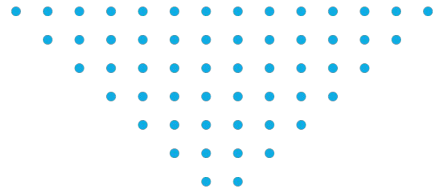
For example, most people do not know that the vast **majority of fiat money is created by privately owned commercial banks**, not central banks

Source:

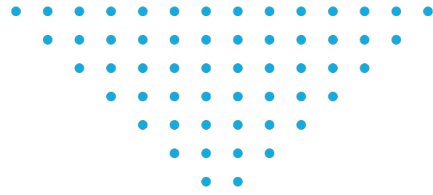
<https://www.finder.com/why-people-arent-buying-cryptocurrency>

Most fiat money (~90%) is 'lent into existence', meaning this money is created when commercial banks make a new loan; most central banks only create a small percentage (~5-10%) of fiat money

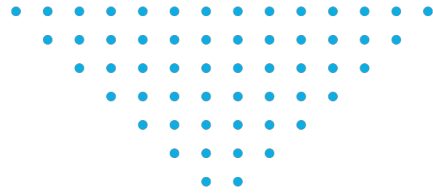




Are there good reasons to believe
crypto will remain **too complex** for
billions of people to use?



A **lack of understanding** of the fiat monetary system has not stopped billions of people from using fiat money...



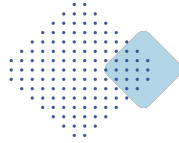
...and history shows **we are very capable** of adapting to complex, breakthrough technologies



"WHAT IS INTERNET ANYWAY?"

1994 TODAY SHOW CLIP BECOMES INTERNET SENSATION

  TODAYSHOW.COM



The email protocol, SMTP, that underpins the operation of all email is also complex, but **intuitive user interface design shields** email users from this complexity



Well designed apps enable **billions of people** all over the world (including the less tech savvy) to **use email and the internet**

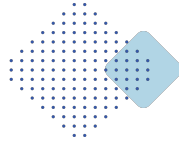
Source: https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol

“Even though right now most of us feel like we do not fully understand bitcoin, over time **we will all understand it** (bitcoin) as well and **as intuitively as we understand the internet today**”

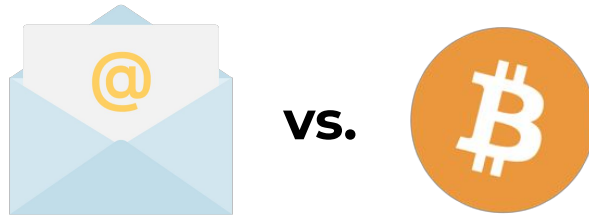
*Source: “The case for a small allocation to Bitcoin” by Wences Casares (2019)
<https://www.kanaandkatana.com/valuation-depot-contents/2019/4/11/the-case-for-a-small-allocation-to-bitcoin>*



Wences Casares
Xapo, Founder and CEO



But the **crypto user interface challenge** should not be underestimated



The lack of understanding of how email works ‘under the hood’ may be more tolerated because “it’s just email”

A greater degree of confidence and trust may be required in crypto and its underlying mechanics because value is at stake



Improving the crypto user experience is what companies like Blockchain are laser- focussed on

“At Blockchain, we’re committed to **putting our users first**. We’re empowering users to go beyond just storing their crypto to actually using them. ”



Peter Smith
CEO, Blockchain

Source: <https://techcrunch.com/2018/11/06/the-blockchain-wallet-plans-a-125m-air-drop-of-stellar-crypto-to-drive-mainstream-adoption/>

Lack of trust is likely also related to **widely publicized criminal** activity involving cryptocurrency. Ransomware attacks, including a widely reported 2017 attack that incapacitated some UK hospital computers, may be a part of the “lack of trust” sentiment

Source: <https://www.bbc.com/news/health-39899646>



...but new analytical tools are **helping police identify and catch criminals** by following their 'digital paper trail'

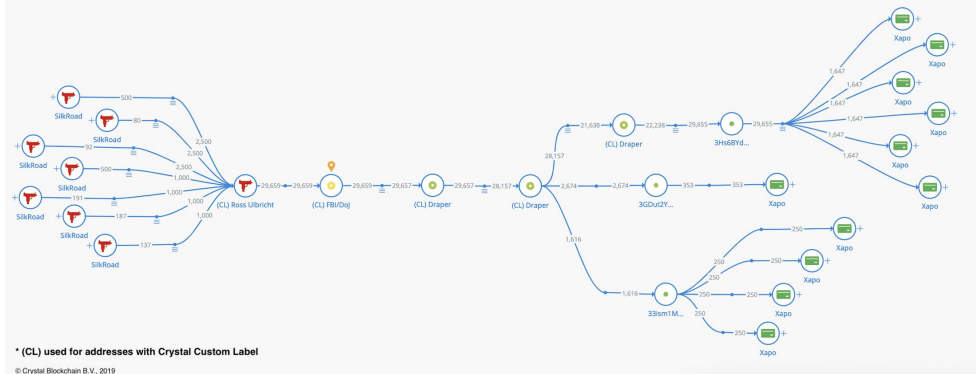
Quote source: 5:20 mark
<https://www.youtube.com/watch?v=JDD9TsqUNPY&list=PLM4u6XbiXf5r3yPwy29nO2XVG3rB6EzW5>



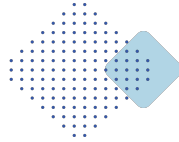
"If you want to cover your tracks and if you are a good 'criminal', bitcoin and cryptocurrency is one of the last things you should use."

Katie Haun
Former US Federal Prosecutor

Crystal





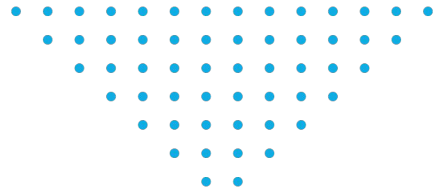


“**Lack of need**” was the third biggest reason cited for why the vast majority of US citizens do not yet own crypto

¹ **Lack of need** speaks to the fact that, today, in contrast with fiat currency, very few businesses, governments or individuals require payments exclusively in cryptocurrencies (i.e. it is not obligatory for most people to own crypto at present)

Sources: <https://libertystreeteconomics.newyorkfed.org/2019/03/deciphering-americans-views-on-cryptocurrencies.html>

**It should be noted that there are cases where ownership and use of crypto may effectively be essential eg <https://www.nytimes.com/2019/02/23/opinion/sunday/venezuela-bitcoin-inflation-cryptocurrencies.html>*



Are there good reasons to believe most people will continue to **not need crypto**?

A major barrier to wider use of crypto as **currency** (i.e. for every day payments, like coffee) is the lack of people who receive their work income/salaries in crypto...





Bitcoin offers numerous advantages over gold in terms of **ease of use**, **verifiability**, **speed** and **cost**:

...but compelling reasons for using crypto as an **asset** already exist today...

- **Storage**: billions of dollars in value can be managed on a smartphone or device the size of a USB stick
- **Transferability**: can be quickly moved around the world via electronic, satellite and radio networks
- **Verifiability**: gold must be expertly assayed to verify its authenticity and purity, making it difficult for a layperson to easily or quickly verify
- **Divisibility**: ease of dividing a digital vs physical unit; eight decimal places enable micro-transactions
- **Programmability**: smart contracts, trust-minimized escrow, multi-signature
- **Capped supply**: perhaps the most compelling feature of BTC is that its supply is hard-capped at 21m and, unlike gold and other commodities, the supply is largely unreflexive to price

...and less volatile **stablecoins**
could pave the way for
greater use of crypto as
currency for payments and
storing value

Source: <https://blog.blockchain.com/2019/02/20/introducing-2019-stablecoins/>



Billions of people today live in countries with **varying degrees of financial exclusion**

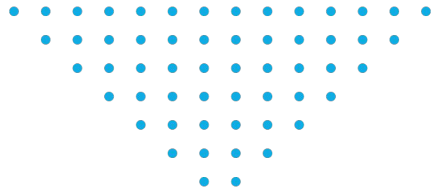
Sources:

<https://www.nytimes.com/2019/02/23/opinion/sunday/venezuela-bitcoin-inflation-cryptocurrencies.html>

https://siteresources.worldbank.org/EXTGLOBALFIN/Resources/8519638-1332259343991/world_bank3_Poster.pdf

Legitimate cases exist where many people effectively need to own and use cryptocurrency, such as the unbanked, dissidents, journalists, citizens of crises countries (e.g., Venezuelans)

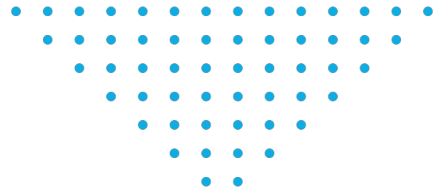




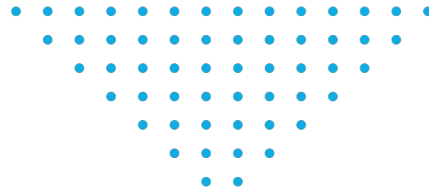
Overall, the number of ways to use crypto - and benefits from using crypto - **continue to grow**

We further explore the rationale for owning and using crypto in more detail in section 04



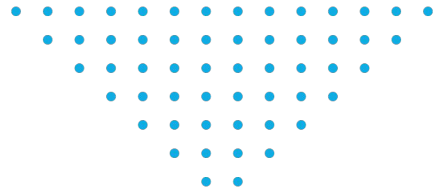


There are other reasons given for why some people **do not want to use crypto** beyond distrust and unessential

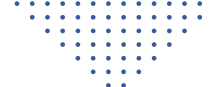


The first step to becoming an active participant in the crypto ecosystem is to get cryptoassets

This has become much easier than it used to be, but **significant barriers for those wanting to own crypto remain**



In other words, **friction and inertia** are significant factors behind why many people do not want to own crypto



Airdrops are one of the many ways it is becoming easier for people around the world to **access cryptoassets**

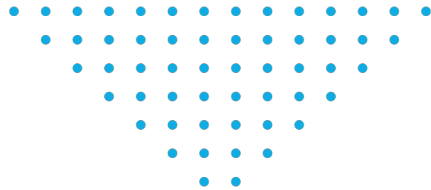


For those who want to use crypto, three acquisition methods remain the most common:

- Purchase
- Mine
- Airdrop

While there is evidence of growing interest in receiving salaries paid in cryptocurrency, this practice is still not very widespread for various reasons

Sources: <https://www.blockchain.com/static/pdf/BlockchainAirdrops.pdf>
<https://twitter.com/BitGo/status/1134583334040788992>

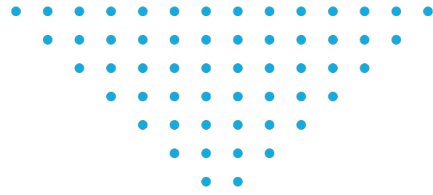


Since launching our Stellar Airdrop in October, Blockchain has completed more than **1M airdrops**, and proven the massive impact airdrops can have on scaling cryptocurrency networks.

For every three completed airdrops, we've seen **two additional transactions on-network**, and **doubled the number of XLM holders**.

Trust in crypto may also be held back due to **environmental concerns**, particularly amongst those most concerned about issues like global warming

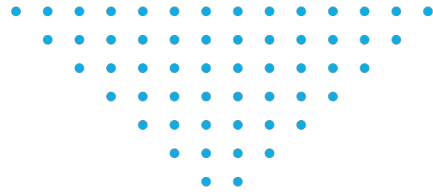




Estimates of crypto's carbon footprint - **both how much and the type of electricity** miners are utilizing - can vary significantly...

...but **perceived**
environmental impact and
“wasteful” use of energy may
be holding back crypto
adoption





What are **the facts** on
Bitcoin's energy consumption?

Today, all bitcoin miners consume about as much electricity as is generated by the **largest hydro dam in the United States (~5 to 6 GW)**



Sources: "The case for a small allocation to Bitcoin" by Wences Casares (2019)
<https://www.kanaandkatana.com/valuation-depot-contents/2019/4/11/the-case-for-a-small-allocation-to-bitcoin>
https://en.wikipedia.org/wiki/Grand_Coulee_Dam

Bitcoin's total energy consumption for the 10 years it has now been in operation is equal to the **amount of gasoline** consumed **every three days by US cars**

Source: <https://twitter.com/khannib/status/1116352595537403905>



Also often missing in this discussion are reliable estimates of the significant environmental impact and **carbon footprint of the traditional financial system**, (e.g. physical metals extraction)

Sources:

<https://www.bloomberg.com/opinion/articles/2017-12-07/bitcoin-is-greener-than-its-critics-think>



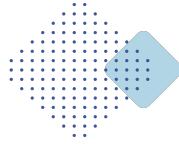


Breakdown of **renewable energy usage** in Bitcoin mining

Over 77% of electricity used for Bitcoin mining is derived from renewable energy
–stark contrast to the popular market belief

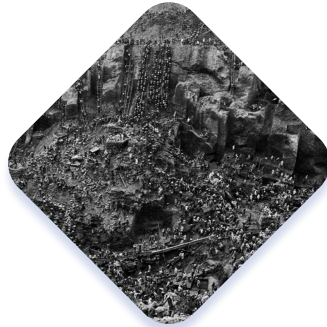
Region	Global Mining Share	Renewable Penetration	Share of Renewables for Mining	Share of Fossil/Nuclear for Mining
Sichuan	48%	90.1%	43.2%	4.8%
Relevant Remaining China	12%	47.1%	5.7%	6.3%
Relevant Western Regions	35%	79.4%	27.8%	7.2%
Rest of World	5%	18.2%	0.9%	4.2%
Global Total	100%		77.6%	22.4%

Source: Deutsche Bank Research, Chinese National Energy Agency, Morgan Stanley Research, EIA, CoinShares Research
<https://www.bloomberg.com/opinion/articles/2017-12-07/bitcoin-is-greener-than-its-critics-think>

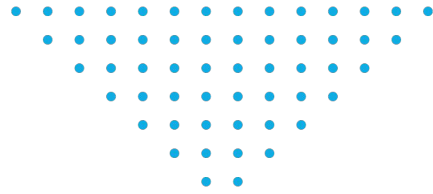


Overall, the environmental impact of the traditional financial and monetary system likely far exceeds crypto

Gold Proof of Work vs. Bitcoin Proof of Work



Sources: <https://www.bloomberq.com/opinion/articles/2017-12-07/bitcoin-is-greener-than-its-critics-think>
<https://twitter.com/obiwankenobit/status/1130885885468143616?s=12>



Another factor behind why many people do not want to own cryptoassets is that some **key benefits of owning cryptoassets** arise from financial destabilization and other unpleasant to contemplate events

While hedging against various risks may be unpleasant to contemplate, **economic history** underscores the value of prudence



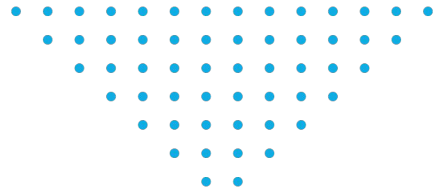


Kicking the can down the
road works.

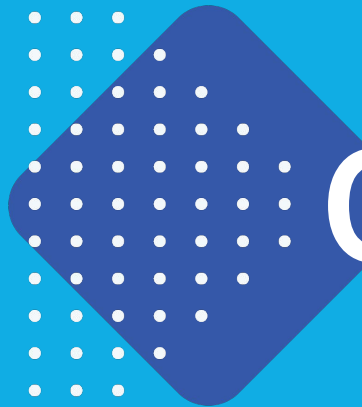
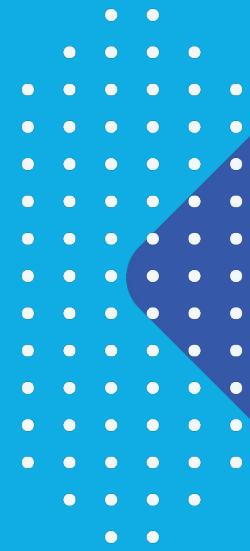
Until it doesn't.

Source: <https://twitter.com/khannib/status/1116352595537403905>



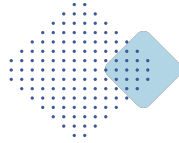


Let's now look at some of the **powerful factors** driving the growing use of crypto



04

Factors driving
crypto adoption



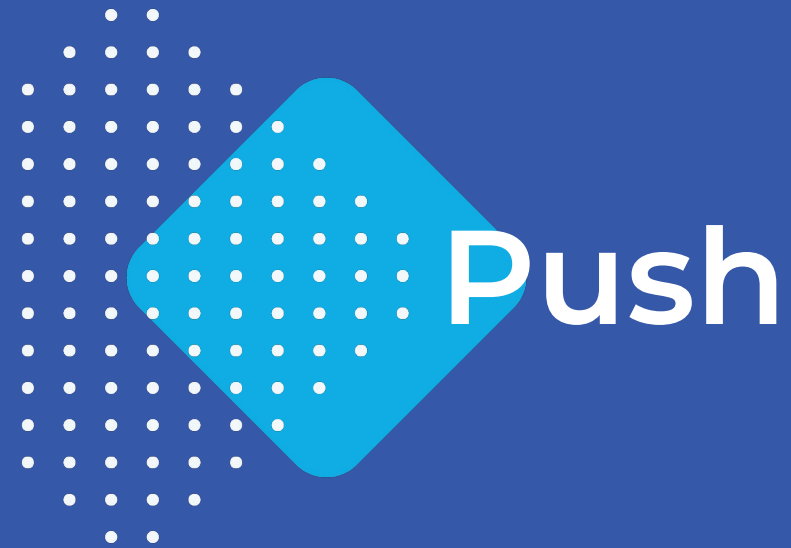
There are **three main reasons to own crypto**, but
'push' factors dominate at present

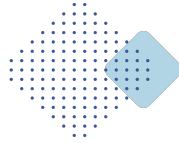
'Pull' factors

- Next-generation financial 'plumbing' (open/decentralized finance)
- Web 3.0 (decentralized internet)

'Push' factors

- Scarce store of value against macroeconomic and political risk ('digital gold')





It is always just a **matter of time** until the **next financial crisis**

“Further financial crises are inevitable” -March 2019



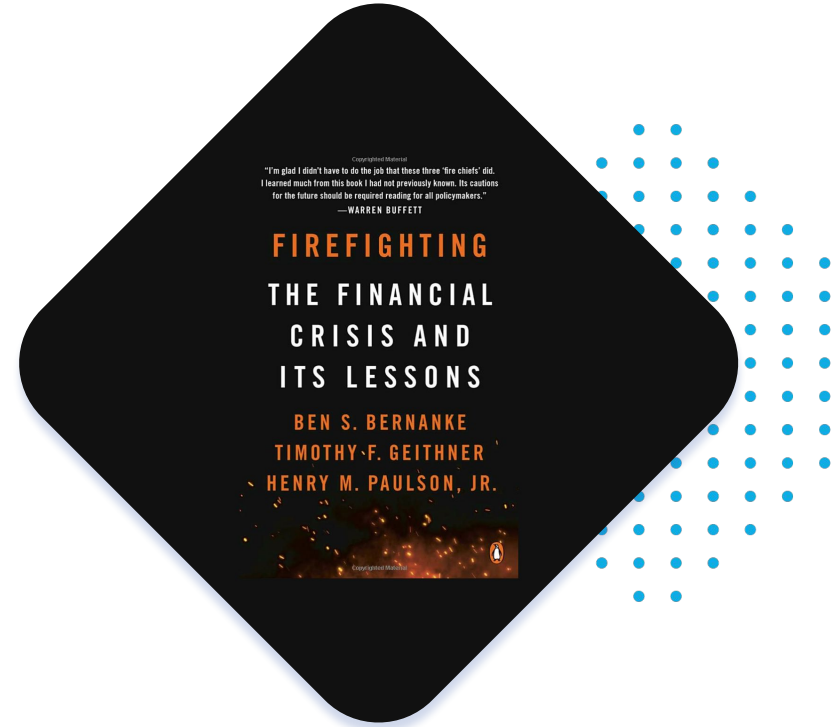
Martin Wolf

Chief Economics
Commentator

Source: <https://www.ft.com/content/d9d94f4a-4884-11e9-bbc9-6917dce3dc62>

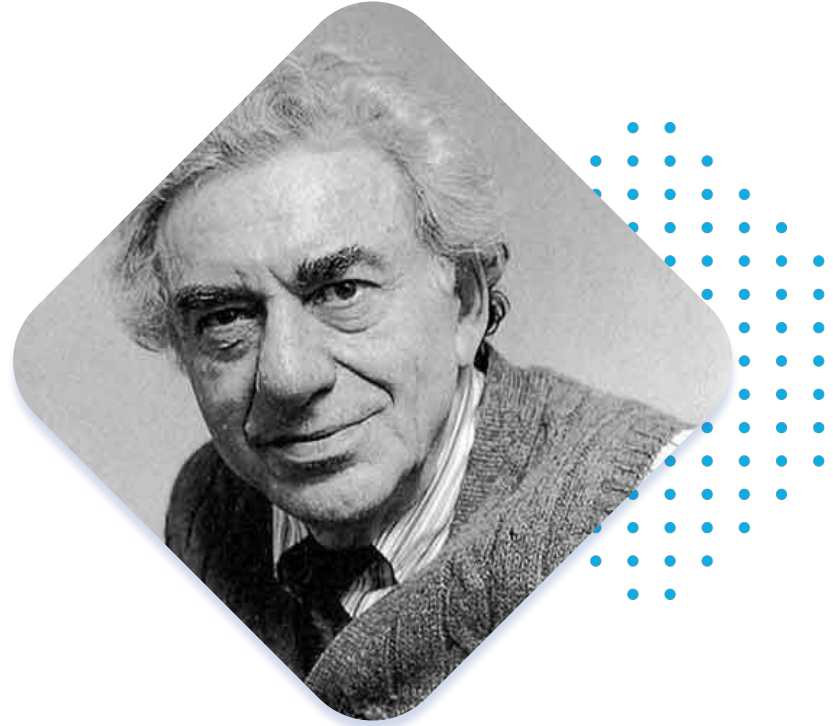
As the 2008 financial crisis reminded us, the traditional financial system relies on **confidence**, which can vanish in an instant

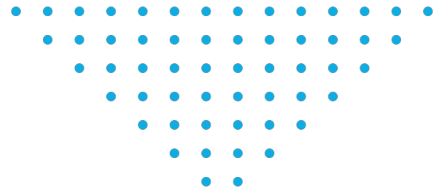
Source: <https://twitter.com/khannib/status/1116352595537403905>



Cryptoassets, which remain largely **independent from traditional finance** and governments, may prove attractive during the next 'Minsky moment' (sudden collapse in confidence)

For more on Minsky see <https://www.bloomberg.com/news/articles/2017-10-25/minsky-moment-hangs-over-world-swimming-in-debt-quicktake-q-a> and <https://www.newyorker.com/magazine/2008/02/04/the-minsky-moment>





Where do we stand **today**?

EX-POLICYMAKERS ARE CONCERNED

“While the United States has much stronger safeguards against the occurrence of panic than it had before the crisis, it (US) **has weaker emergency authorities for responding when a panic occurs.**”

Sources:

<https://marginalrevolution.com/marginalrevolution/2019/04/firefighting-a-plea-for-discretion.html>



DECLINING CENTRAL BANK INDEPENDENCE

Political efforts to ‘stack’ central banks could lead to looser monetary policy and **drive investors to hard assets**

Sources:

<https://www.ft.com/content/acd24b0c-5728-11e9-91f9-b6515a54c5b1>

<https://www.project-syndicate.org/onpoint/how-central-bank-independence-dies-by-kenneth-rogoff-2019-05>

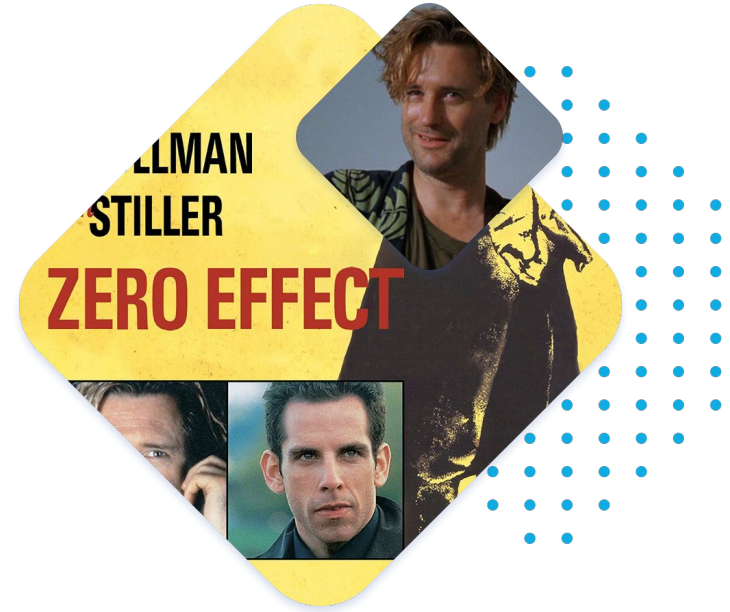


CONSTRAINED CENTRAL BANKS...

Recessions typically require 500 basis points of interest rate cuts, and some countries are arguably too close to the “**zero lower bound**” to meaningfully counteract a downturn with interest rates alone

Source:

https://www.washingtonpost.com/opinions/its-tempting-for-the-fed-to-move-slowly-that-would-be-a-grave-error/2019/06/04/6ee34f6c-8612-11e9-a491-25df61c78dc4_story.html?utm_term=.ecac5afb1581



...MAY FORCE FURTHER PIERCING OF THE ZERO LOWER BOUND

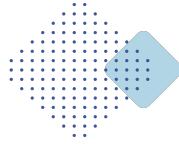
Central banks have already enacted **negative interest rates**, and some prominent economists believe the US will be forced to follow suit

Sources:

<https://www.project-syndicate.org/onpoint/how-central-bank-independence-dies-by-kenneth-rogoff-2019-05>

https://en.wikipedia.org/wiki/List_of_countries_by_central_bank_interest_rates



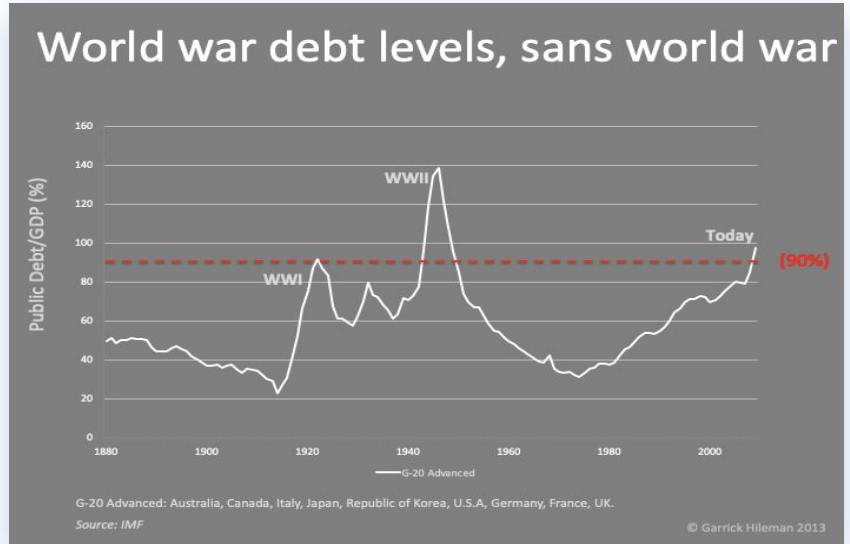


Negative interest rates **penalize savings** and can serve as powerful demand driver for hard assets

Negative rates can also **motivate fiscal expansion** given the unusually low costs of government borrowing

WORLD WAR-LEVEL FISCAL EXPANSION DRIVES...

Impact of changes in government policy and programs that could increase fiscal spending drive demand for hard assets not denominated in fiat currency



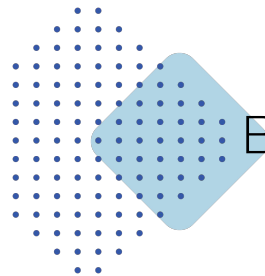
... HARD ASSETS DEMAND

Hard assets are back in vogue: recent gold price breakout combined with **record buying of gold** by some major central banks (e.g. China, Russia, India, Turkey, etc. in recent years)

Source:

<https://www.bloomberg.com/news/articles/2019-04-23/central-bank-gold-buying-gets-boost-as-india-s-reserves-to-swell>



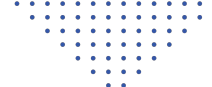


Bitcoin: ironically the **'hardest' asset** in history is virtual

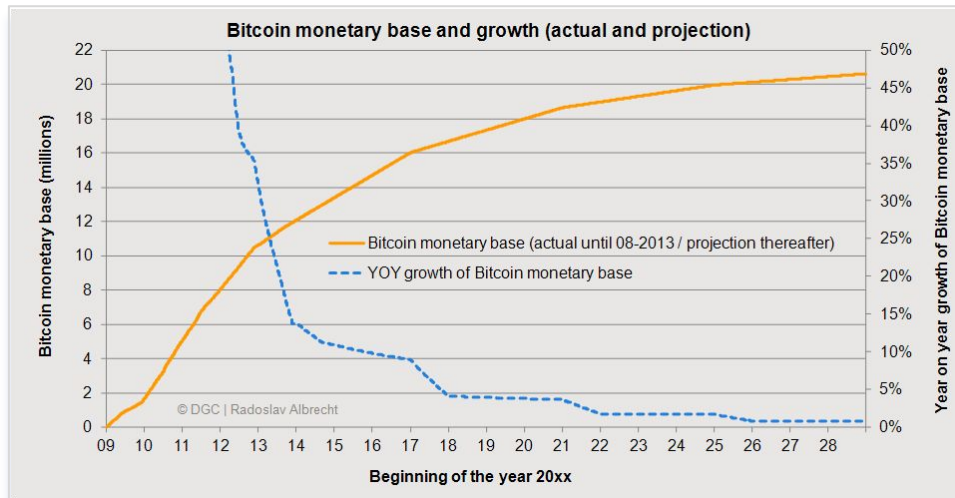
A **'hard asset'** has traditionally been defined as a tangible or physical item, such as gold or silver, which have been used to hedge against fiscal and monetary expansion and resulting inflation

Rising gold prices = increased total gold supply, which acts as a check on further gold price increases

In contrast, **rising BTC prices** \neq increased **total BTC supply**



Bitcoin has compelling supply and liquidity dynamics to rate as a **superior hard asset** and **long-term store of value**



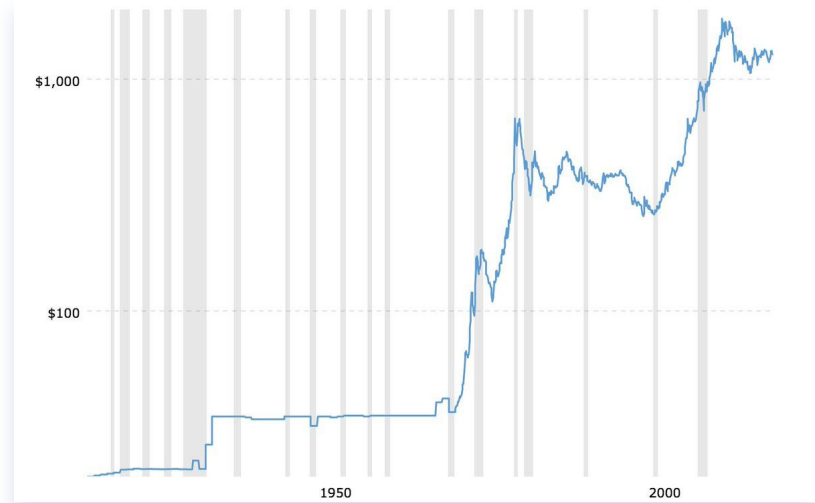
- total supply hard capped at 21 million
- 4-6 million bitcoins estimated to be lost
- in May 2020 supply of new bitcoins slows sharply again when mining reward is cut by 50% (the 'halvening')
- the halvening repeats every 4 years until the hard cap is reached in approximately 2140
- liquidity: 20% of BTC estimated to be in long-term cold storage; only 25-35% is semi-liquid

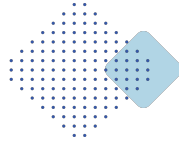
Sources: <http://fortune.com/2017/11/25/lost-bitcoins/RadoslavAlbrecht>

While centuries of data exist on gold's performance in various economic circumstances we have **yet to witness how bitcoin performs during a global downturn**

Source:
<https://twitter.com/obiwankenobit/status/1130885885468143616?s=12>

Hard assets have often performed well during economic downturns and periods of financial instability





There are **many other political and macroeconomic push factors** playing out over different time frames that are driving growing interest in cryptoassets

OTHER PUSH FACTORS

Political uncertainty can lead to **currency uncertainty** (e.g. Greece and Italy euro membership and redenomination risk)

Currency uncertainty has been correlated with upswings in cryptoasset prices



OTHER PUSH FACTORS

Cryptoassets are resilient against unlawful or corrupt **asset seizures**, or surprise expropriation, such as the 2013 Cyprus deposit tax



OTHER PUSH FACTORS

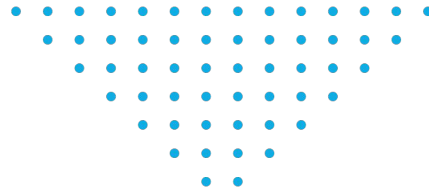
Cryptoassets may benefit from the opening created by the once-a-century **reserve currency realignment** currently underway, where the US dollar's dominance is expected to decline

EXORBITANT PRIVILEGE

The Decline of the Dollar
and the Future of the
International Monetary System

BARRY
EICHENGREEN





Which currencies should be classed as reserve currencies?

The world could arguably benefit from an independent and global **standard of value** and **means of settlement** (i.e. a cryptocurrency)

“Can you imagine a world in which we changed the length of the meter or the weight of the kilo regularly according to **political (economic) considerations?**”

Source: “The case for a small allocation to Bitcoin” by Wences Casares (2019)
<https://www.kanaandkatana.com/valuation-depot-contents/2019/4/11/the-case-for-a-small-allocation-to-bitcoin>



Why China should consider bitcoin as a **new reserve asset**:

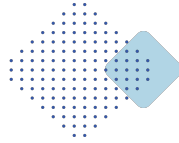
- The emergence of a new reserve asset could weaken US dollar/US's grip on global monetary system
- Central banks are openly weighing pros/cons of acquiring bitcoin
- In an effort to boost China's global economic standing, for years the PBOC has acquired gold
- However, China's gold holdings still trail the US, Germany, IMF, etc
- Gold is expensive (global market cap ~\$7tn) compared to bitcoin (\$6 bn)
- With over half of all cryptocurrency mining inside 'The Great Firewall of China', China can exert influence

Source:

<https://twitter.com/obiwankenobit/status/1130885885468143616?s=12>

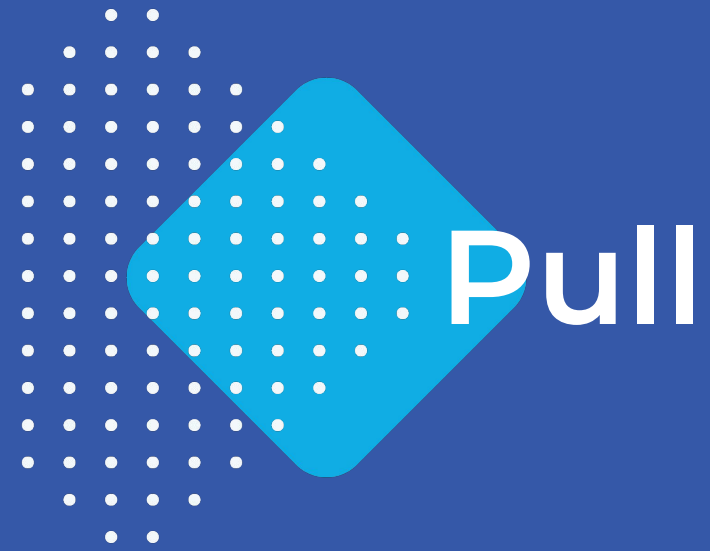
There are strategic reasons why some governments may embrace cryptoassets

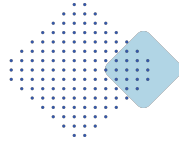




In the near-term, 'push' factors are likely to remain the key driver of growing crypto adoption

Longer-term, **'pull'** factors will fuel widened and sustained use



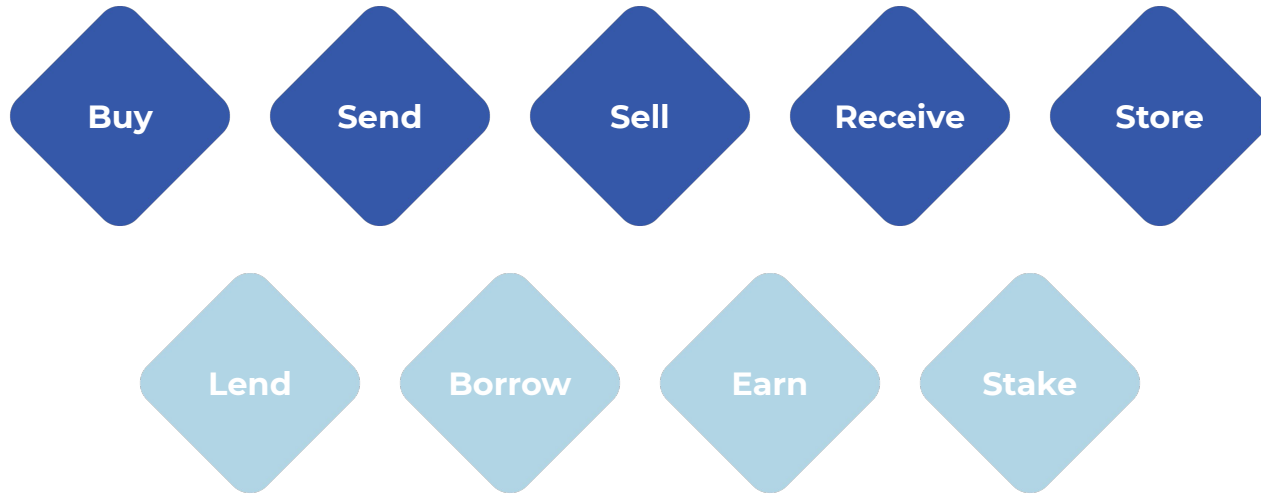


Sustainable growth in cryptoasset adoption

will be aided by new types of activity, more efficient processes, lower costs, and more compelling user experiences



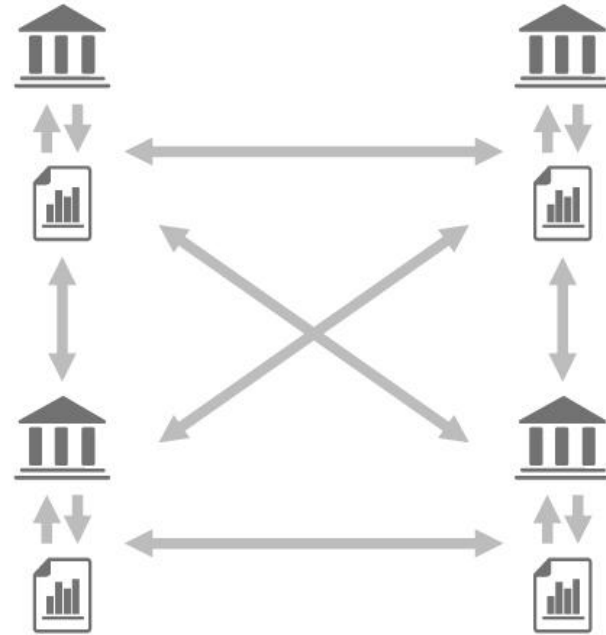
Use cases for cryptoassets

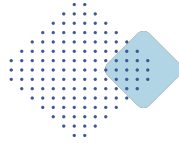


Source: Balaji Srinivasan

To better understand these pull factors it is helpful to first understand **why blockchain technology is compared to the internet** in terms of its potential impact

Distributed Ledger





Just as the internet disintermediated telcos with a **neutral communication platform** based on **open standards...**

BEFORE



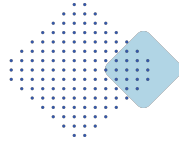
- Phone company was the gatekeeper
- To transmit information, or deploy code on network backbone, you needed a Telco's permission

AFTER



- Anyone can send packets to anyone (or any machine) via open internet

Source: Balaji Srinivasan



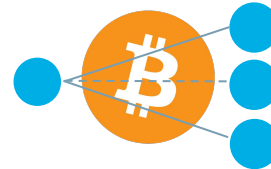
...blockchain technology disintermediates banks with **programmable currency** and **new payment 'rails'**

BEFORE



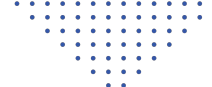
- Bank was the gatekeeper
- Must deal with bank to move value, launch FinTech applications

AFTER

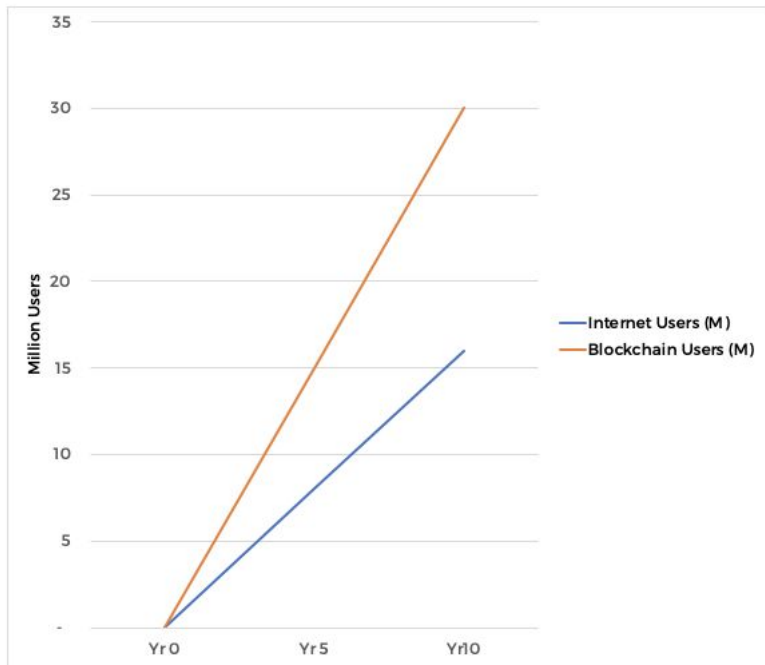


- Anyone can send any value (i.e., BTC, stocks, digital keys) to anyone (or machine) via a public blockchain
- Interoperability rather than different protocols (i.e., cash/cards/wires)

Source: Balaji Srinivasan



Bitcoin is showing **faster adoption than the PC and internet**



Note: Yr0 represents 1983 for TCP/IP & 2009 for blockchain

- Over 20 years after the invention of TCP/IP protocol in the early 1970s and its adoption by ARPANET in 1983, by 1995 IDC estimated approximately 16 million total internet users
- The world's first personal computers were released in 1970-71, and no personal computer achieved sales of over one million units until the 1980s
- Bitcoin was launched just over 10 years ago and we conservatively estimate over 30 million current global users of cryptocurrency; other estimates place total ownership at 60 or more million global users

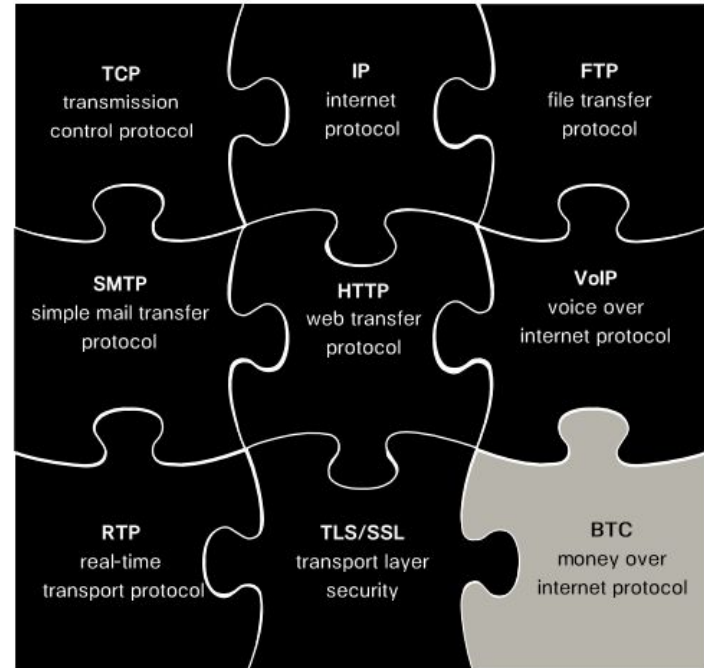
Sources: https://en.wikipedia.org/wiki/History_of_the_Internet
https://en.wikipedia.org/wiki/History_of_personal_computers
https://en.wikipedia.org/wiki/Commodore_VIC-20#cite_note-4

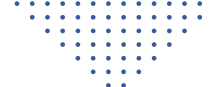
Money Over Internet Protocol

Blockchain technology is to commercial monopolies across industries what VoIP was to telephone monopolies, only more extreme. It disperses barriers and bypasses monopolies.

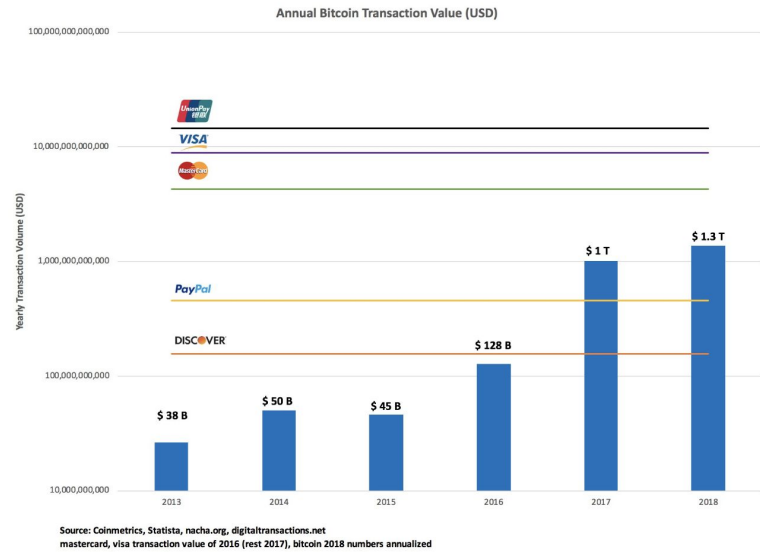
Blockchain technology enables a borderless, socially-connected world.

Source: Pantera

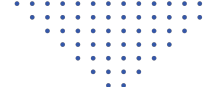




Cryptoasset use is no longer theoretical, with bitcoin daily transaction value in **excess of \$3 billion USD**



BTC transaction values already exceed Paypal and are nearing Mastercard & Visa



Bitcoin: already the world's most efficient system for **'macro' payments**

Transaction

View information about a bitcoin transaction

[ba3e354d53088d92740485ade3211309d80b427355b931a790575b6646970202](#)

3PvethXtsqaD9CkMirj28Htk31aXKM6FfuY → 1GMCDs6aSZbMt7Jksed1R7Si6tXq5vxiRA 0.8316 BTC
37AnGU6zY9esydc4qgTpAfB7BvU8z21TDf 29,999.16838536 BTC

29,999.99998536 BTC

Summary		Inputs and Outputs	
Size	250 (bytes)	Total Input	30,000 BTC
Weight	670	Total Output	29,999.99998536 BTC
Received Time	2018-10-15 19:40:00	Fees	0.00001464 BTC
Included In Blocks	545911 (2018-10-15 19:41:50 + 2 minutes)	Fee per byte	5.856 sat/B
Confirmations	24840	Fee per weight unit	2.185 sat/WU
Visualize	View Tree Chart	Estimated BTC Transacted	0.8316 BTC
		Scripts	Show scripts & coinbase

Source: [Blockchain.com](#)

- As bitcoin does not require many intermediaries, bitcoin transactions can be sent across the globe in less than an hour with low fees
- Recently, \$194m Bitcoin transfer incurred merely \$0.1 fee. (Would cost more than \$7,000 using Transferwise and banks)

Potential benefits of decentralized finance (DeFi) financial plumbing include:

- **Permissionless:** Anyone with an internet connection can access; this can boost financial inclusion
- **Censorship resistant:** No third-party can stop a transaction
- **Tamper resistant:** No third-party can easily tamper with or reverse a transaction
- **Reduced counterparty risk:** No need to trust a centralized third-party to custody funds or validate transactions
- **Transparent:** Public blockchains (e.g. Ethereum) are completely transparent and auditable
- **Open Source:** Anyone can develop on or modify the code. Smart contracts can be programmed for specific tasks and self-execute
- **Efficiency:** Powered by code, not humans
- **Composable:** Combine different protocols to create new financial products and services

Source: Delph Digital <https://www.delphidigital.io/defi/>

Decentralized Exchanges ("DEXs") & Protocols:



IDEX



0x



Kyber Network



Uniswap



Ren



Bancor Network

Lending & Borrowing:



MakerDAO



Compound



Dharma

Derivatives, Margin Trading, & Prediction Markets:



Augur



CDx

$\delta Y / \delta X$

dYdX



bZx

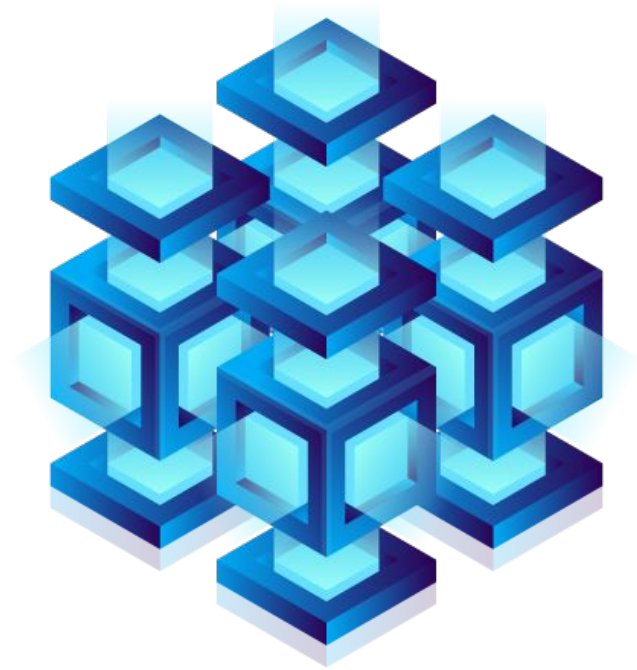


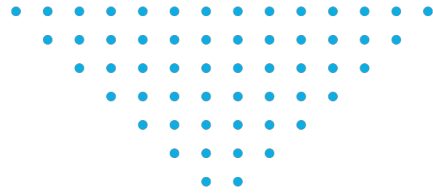
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Web 3.0

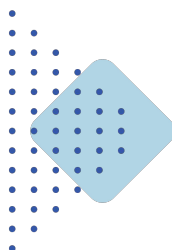
Many of the same types of benefits from DeFi can be realized with the broader internet with the use of blockchain technology in areas such as:

- Marketplaces
- Identity
- Social media
- Cloud storage
- Computation
- Entertainment





Substitution of many traditional business processes and services with **blockchain technology** and smart contracts is inevitable



‘Smart travel insurance’ is one compelling example of the broader application of blockchain tech

Source: Pantera



DESTINATION	FLIGHT	GATE	REMARKS
BERLIN	LH543	09	: DELAYED
NEW YORK	AA978	28	: CANCELLED
TORONTO	AC902	11	: CANCELLED
MADRID	18342	17	: CANCELLED

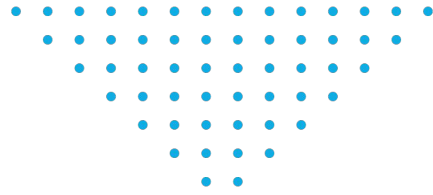
- Approximately 600,000 annual passengers do not file eligible insurance claims for delayed/cancelled flights in just the UK alone
- A delayed/canceled flight is a public record that can be queried/checked by a ‘smart flight insurance’ software application
- If the flight is delayed or canceled then the smart contract automatically pays the claimant, eliminating the painfully bureaucratic and slow claims process
- Insurance premium can also be escrowed ‘on-chain’ to eliminate counterparty risk



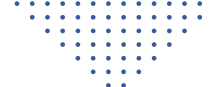
Over **130+ distinct use cases** for blockchain technology are being explored across a wide variety of economic sectors

Industry	Use Cases
Technology Services	Supply chain management
Banking & Finance	Netting and clearing
Government	Central Bank digital currency
Insurance	Claims management
Healthcare	Electronic medical records
Media	Copyright database

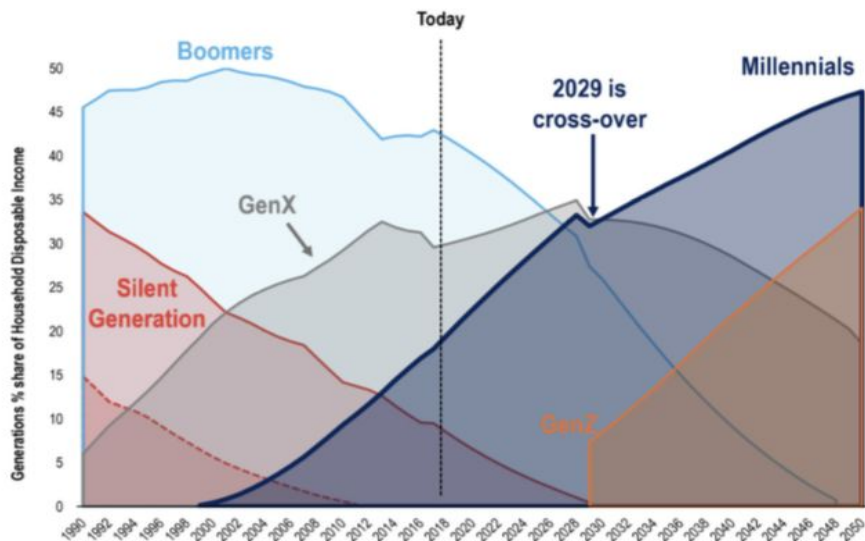
Source: Garrick Hileman



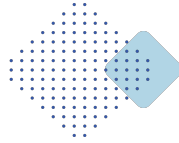
In addition to the new capabilities offered by cryptocurrencies and blockchain technology, **social and demographic trends** are providing a tailwind for growth in cryptoasset adoption



Generational Wealth Transfer: Millennials have shown more interest in cryptoassets than other demographic groups, and over next 10 years will grow to hold largest share of disposable income



Sources: Fundstrat



Millennials are just entering their prime income years and showing **significant interest in cryptocurrency**

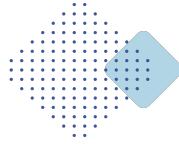
A quarter of affluent Millennials say they're holding or using cryptocurrency

Another **31 percent** say they're interested in using it



**“CryptoDad” Chris
Giancarlo**
CFTC Chairman

Source: <https://www.edelman.com/post/2018-millennials-with-money-key-insights>



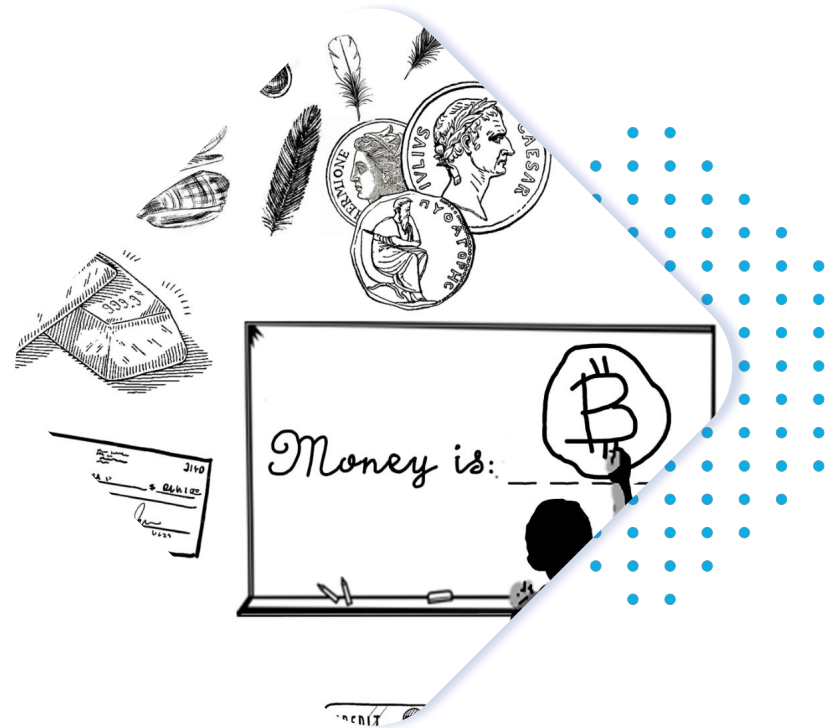
Current investment case primarily emphasizes
crypto's use as an asset ('digital gold')...



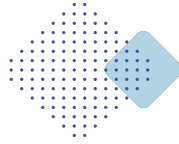
vs.



...but the path to becoming a widely used **currency + payments system** may be realized by first becoming a widely held asset



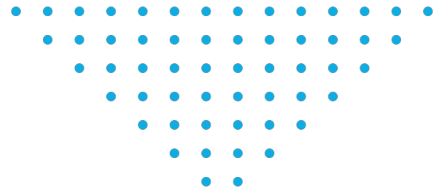
Sources:
<https://www.bbc.com/news/technology-30998361>



In other words, if hundreds of millions of people own something first as an asset it becomes easier for that asset to **be used as a currency**



But there is considerable uncertainty and debate over which cryptoasset can become a widely used currency longer-term



There are a number of other drivers of **growing use of crypto as a currency** that, while still in their infancy, could deliver massive growth in crypto usage in the decades ahead

As attitudes towards privacy continue to shift and the **death of cash** continues, cryptocurrency may draw even more privacy-driven adoption and may be the only option for those interested in protecting their financial privacy



Cryptocurrencies and blockchain technology will form the substrate for the economic interactions between **artificial intelligence** (e.g. self-driving cars that “own themselves”)

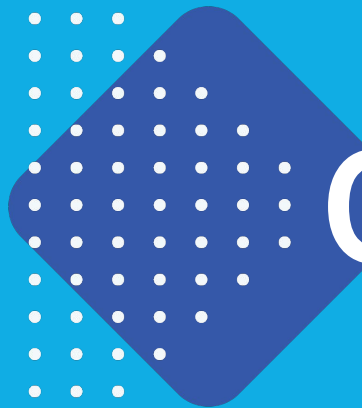
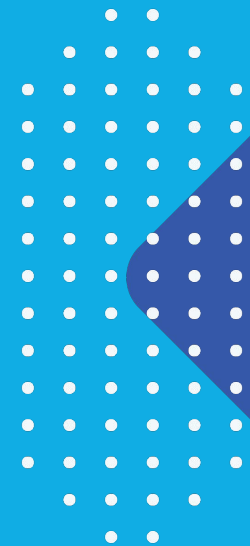
Sources: <https://www.bbc.com/news/technology-30998361>



Cryptocurrency can become the coin of the realm for the **machine economy**

- Machine-2-Machine (M2M):
 - Today, we see machines already paid in crypto for their 'labor' (proof of work)
- Human-2-Machine (H2M):
 - More and more people are paying with crypto for various machine services (e.g. distributed storage)





05

Valuation and fundamentals

Lack of **reliable valuation methodologies** has been cited as a reason why some investors have remained on the cryptoassets sidelines

“How much a bitcoin is worth, nobody knows.”

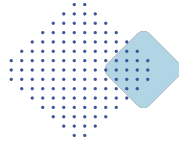


Thomas Peterffy
Chairman, Interactive Brokers



Robert Shiller
Nobel Prize winner

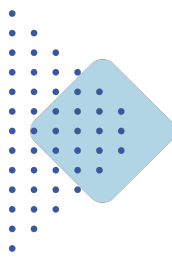
Source: <https://www.ft.com/content/829babb2-df74-11e7-a8a4-0a1e63a52f9c>



Uncertainty over classification complicates cryptoasset valuation efforts...

Is  a **currency, commodity, asset**, or some **combination**?

Sources: <http://aswathdamodaran.blogspot.com/2017/10/the-bitcoin-boom-asset-currency.html>

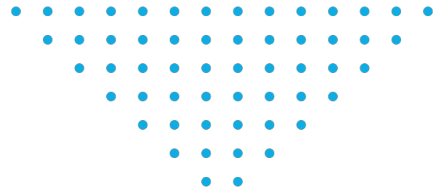


If it **walks like** a duck, and **talks like** a duck, then....

Sources:

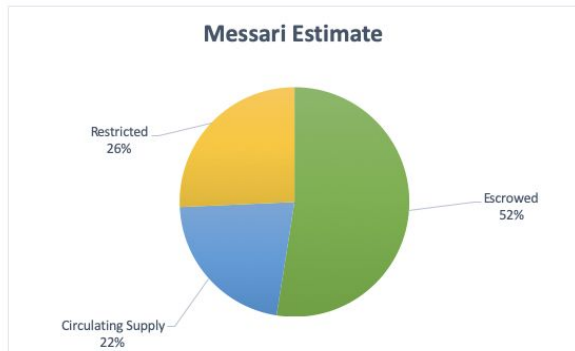
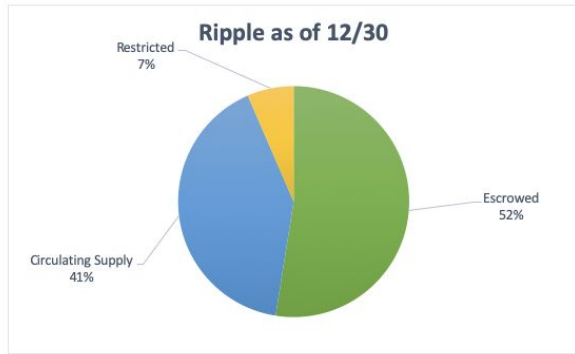
<http://aswathdamodaran.blogspot.com/2017/10/the-bitcoin-boom-asset-currency.html>

- Initially bitcoin was deemed by some as a **currency**, meaning it could be 'priced' by the market based on supply/demand but not 'valued'
- Argument that cryptoassets like bitcoin are not a **commodity** because they can not be used to generate something useful is problematic given the role bitcoin plays in generating diverse forms of utility (e.g., digital storage, escrow service, timestamping, record keeping, digital identity, etc.)
 - bitcoin's historically high volatility price also more closely resembles a commodity than a typical currency
- Argument that cryptoassets should not be classed as an **asset** because they do not generate cash flows is increasingly untenable due to the emergence of fee revenue built into some cryptoassets and networks (e.g. Lightning), returns generated by Proof of Stake (PoS) cryptoassets, and other forms of upside participation



Overall, the uncertainty over how best to classify cryptoassets like bitcoin lends support to the view they **represent something new** and are more hybrid in nature

Standardized measurement has also generated debate, such as over **how best to calculate total market value**



**Ripple’s Encumbered XRP Supply
Reported “Distributed Supply”**

Less: Jed McCaleb Restricted Supply

Less: Foundation Assets

Less: Chris Larsen Foundation Commitments

Less: XRP II Purchaser Restricted Supply

Total Estimated Illiquid Distributed Supply

Total Estimated Circulating Supply

Market Cap Overstatement

Market cap Overstatement %

41,040,405,095

6,668,132,964

2,522,000,000

5,967,000,021

4,062,097,900

19,219,230,885

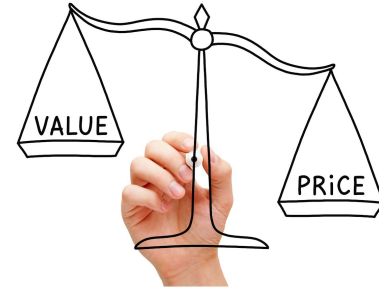
21,821,174,210

\$6,073,276,960

43.83%

- According to [Messari’s XRP report](#) dated Jan 2019, “XRP’s liquid “circulating supply” and “market cap” could be overstated by 46%, which would put total XRP “market cap” at \$6.9 billion vs. \$13.0 billion widely reported at current USD-XRP exchange rate.”
- This is mostly due to classification inaccuracies i.e. some of the assets held by founders and Ripple should have been classified as restricted supply as it has been pledged

While a variety of cryptoasset valuation methods have been proposed, cryptoasset valuation remains a **nascent** and challenging area



Efforts to **adapt existing valuation methods** to

cryptoassets, such as Fisher's Quantity Theory of Money (QTM) equation, have proven problematic

Sources:

<https://www.smithandcrown.com/cryptofinancial-valuation-series-part-2-the-quantity-theory-of-money/>

<https://www.gsb.stanford.edu/faculty-research/working-papers/bitcoin-pricing-adoption-usage-theory-evidence>



"Our model leaves out a number of important factors...empirical evidence from Bitcoin prices and utilization provides mixed evidence about the ability of the model to explain prices."

Professor Susan Athey et al

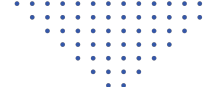
August 2016

$$MV = PQ$$

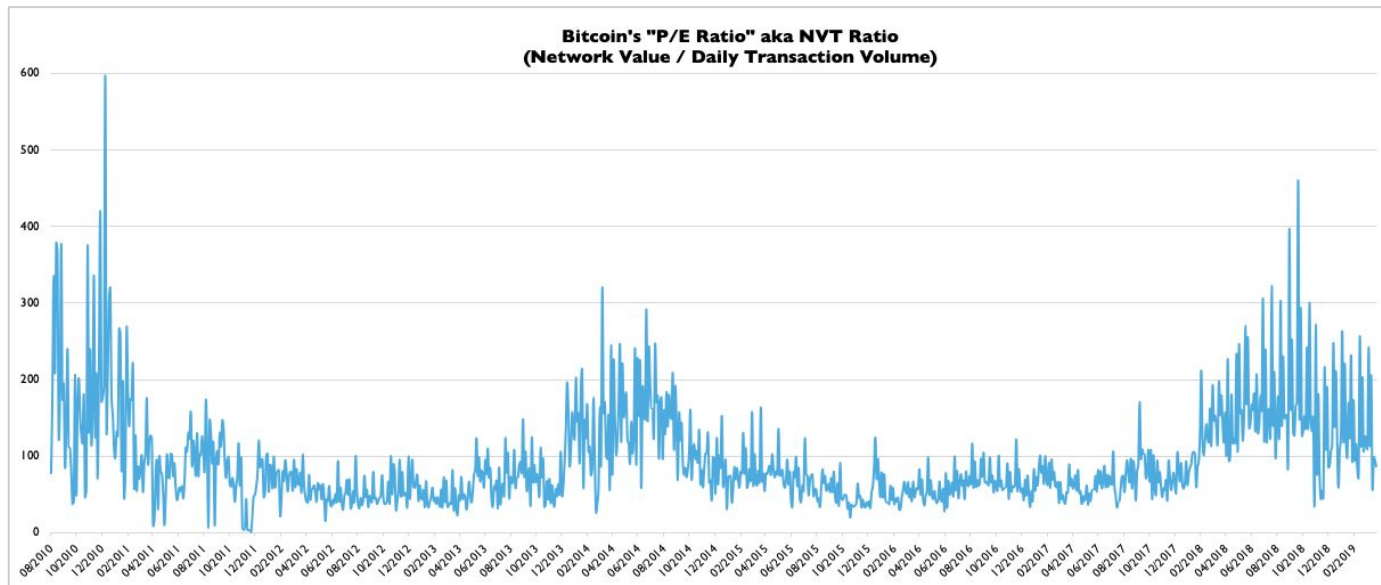
"Given the host of challenges associated with properly implementing a QTM-based payment token valuation, the approach may raise as many questions as it resolves."

Smith & Crown

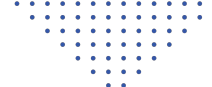
March 2019



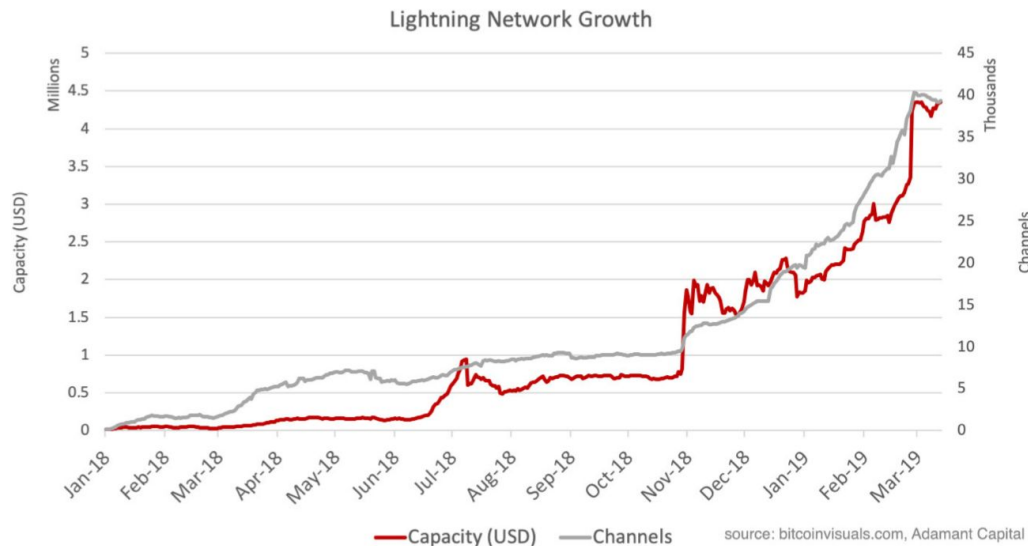
Porting **traditional valuation methods** to cryptoasset can at least provide a frame a reference for comparing different periods



Data source: <http://www.blockchain.com>
NVT methodology discussion: [Kalichkin](#), [Willy Woo](#) & [David Puell](#)



Cryptoassets have generated a number of “**hockey stick**” growth charts, but the potential for value capture is unclear

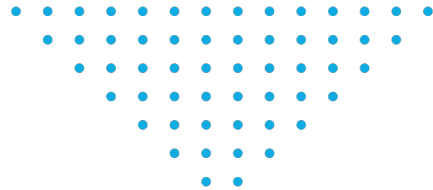


Source: Harver analytics

Challenge of valuing cryptoassets has been compared to the difficulty of valuing 'eye balls' of loss-making internet companies

Clarity around valuing internet companies arrived after business and revenue models matured and the value capture associated with new metrics was observed over time





Over time we expect data-rich cryptoasset networks to yield new metrics and valuation methodologies;

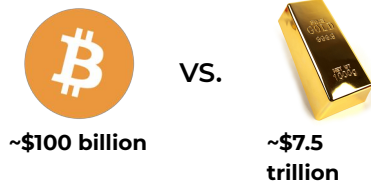
Today, ***relative valuation*** can offer some perspective

While bitcoin is often compared to gold (“**digital gold**”), the comparison has limitations

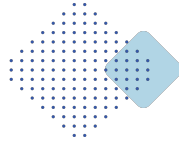
Sources: https://en.wikipedia.org/wiki/Gold_reserve

<https://www.gold.org/about-gold/gold-supply/gold-mining/how-much-gold>

<https://www.bbc.com/news/magazine-21969100>



- Today, the vastly greater total market value of all gold in existence compared to bitcoin (~75x total greater value) fuels arguments that bitcoin is currently undervalued
- However, gold has properties not possessed by bitcoin (e.g., physical nature, certain industrial uses and resultant demand, thousands of years of history as a store of value and medium of exchange)...
- ...and bitcoin possesses properties not held by gold (e.g., natively digital, programmability, ease and speed of transfer across space and time, easily divisible, inflexible supply response to price increases, capped total supply)
- Bottom line: it is possible that these differences could mean the use of relative valuation is causing us to either over or (more likely in our view) under estimate bitcoin's total potential value



Gold vs Bitcoin supply growth

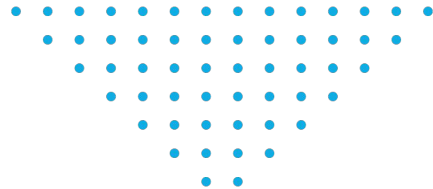
Gold annual supply growth is ~1.6%, which will be higher than Bitcoin's supply growth in a few years

Sources: <https://www.gold.org/about-gold/gold-supply/gold-mining/how-much-gold>

Comparing metrics for one cryptoasset against something comparable, such as a similar cryptoasset or traditional asset / network / app, can **inform a relative valuation analysis**

Source: Blockchain Research
<https://www.blockchain.com/research>

OVERVIEW	NAME	BITCOIN CASH	BITCOIN SV	BCH VS. BSV
	Ticker	BCH	BSV	
	Launch date	1 August 2017	15 November 2018	
	Key differentiator(s)	Ecosystem support, community	Capacity/throughput (128mb block size)	
Valuation & Use	Price	\$131	\$78	68%
	Total Issued Coin Supply	17,567,663	17,566,861	0.0%
	Market (Network) Value	\$2,301,363,853	\$1,370,215,158	68%
	Network Value to Transactions (NVT) Ratio (30d)	4	16	-72.7%
	Daily Exchange Volume (30d average)	\$281,277,110	\$86,591,208	224.8%
	Volatility of daily returns (30d)	12.4%	8.1%	4.3%
	Avg. Transaction count / day (30d)	10,072	37,457	-73.1%
	Avg. transaction fee	\$0.0050	\$0.0039	28.2%
	Cumulative transactions since fork (Tx Count)	3,126,005	13,106,229	-76.1%

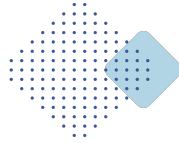


However, reliable **metrics are required to compare different cryptoassets**, and obtaining such metrics can prove challenging

For example, recent research has shed light on **inflated self-reported cryptoasset exchange trading volume data...**

Sources: <https://www.blockchaintransparency.org>
<https://www.sec.gov/comments/sr-nysearca-2019-01/srnysearca201901-5164833-183434.pdf>





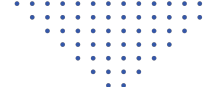
...but **'on-chain'** data like increases in the number of bitcoin transactions per day in a bear market can be quite useful for measuring activity and adoption

Source: [Blockchain.com](https://www.blockchain.com)

Right now, simple empirical measures of use arguably provide the **most reliable tools for gauging**

Indicator Name	Unique Addresses	Network Hash Rate	Total Transactions
<i>Strengths</i>	Good gauge of actual network activity on a monthly basis.	This metric is less subject to speculation because of the real world implications of mining at scale (moving dirt, laying power lines etc).	Gives a ratcheting up point of view in which Bitcoin's price is either forced up over time or has to fail completely.
<i>Weaknesses</i>	Can be thrown off by batching and volatility in transaction fees due to dust consolidation	Indicator can be thrown off by advances in computing and can lag the market because of the gap in time between investment and operations of large mining facilities.	If people completely stop using Bitcoin, this figure would break down because it would simply flatten out instead of showing the market cap drop to zero.
<i>Reasoning</i>	Metcalf's Law (the network effect)	Miner CAPEX may reflect future expected earnings of industry insiders	Longer blockchains are more secure and closer to immutability
<i>Correlation (monthly sample)</i>	0.9708	0.9567	0.9676
<i>P-Value</i>	3.1501E-58	1.4915E-50	3.2910E-56

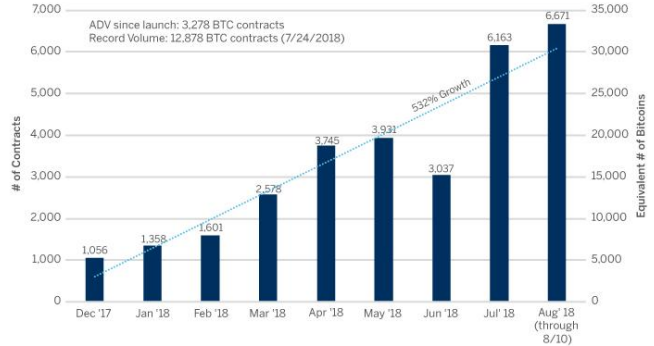
Source: https://seekingalpha.com/author/hans-hauge#regular_articles & <https://the-ecoin.com/2018/06/11/3-models-to-explain-bitcoins-market-cap/>



Monitoring **institutional activity** and funds flow can also be useful for understanding adoption trends

CME bitcoin futures saw record activity in May 2019

CME Bitcoin Futures Average Daily Volume by Month

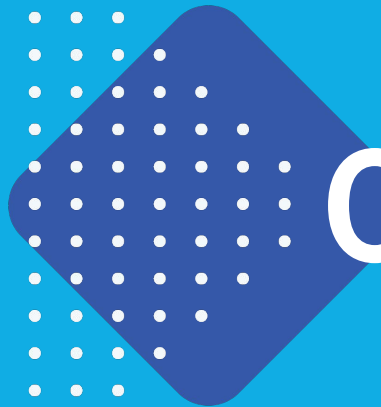
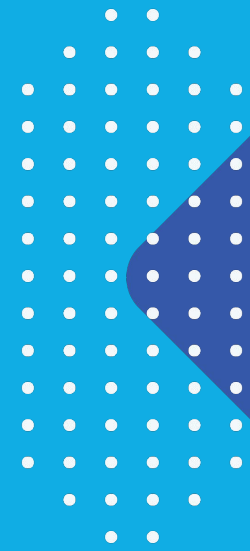


The flows of institutional money into the Grayscale Bitcoin Investment Trust have steadily grown YTD

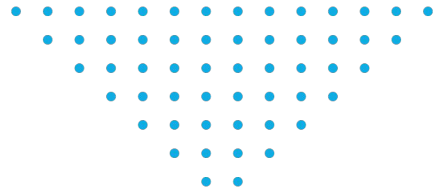
Chart #3: Grayscale Bitcoin Investment Trust (No. of Bitcoins)



Sources: Grayscale,
<https://www.theblockcrypto.com/tiny/cme-bitcoin-futures-saw-new-records-in-both-volume-and-open-interest-in-may-adding-over-200-new-trading-accounts/>

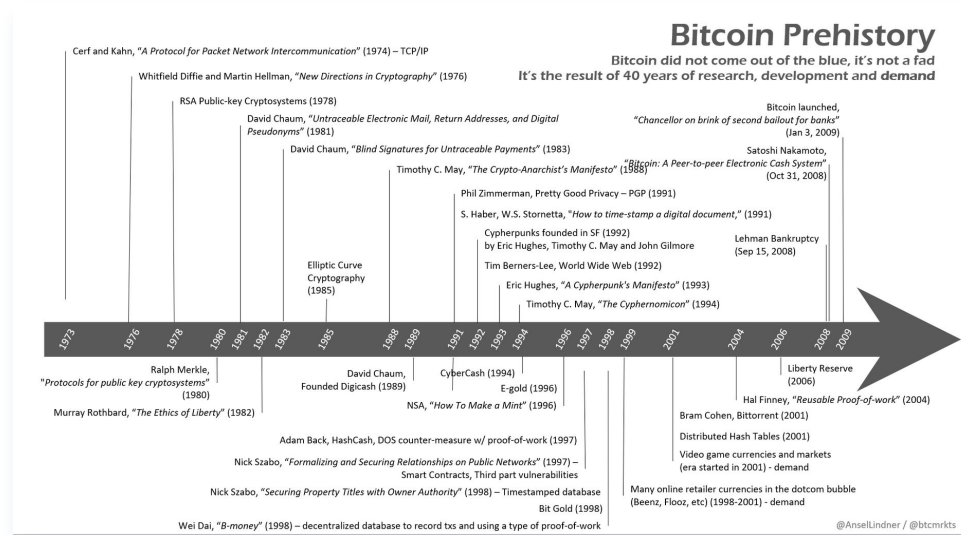


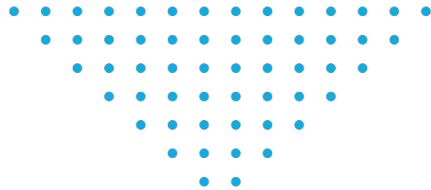
06 Wrap-up



Should Bitcoin be viewed as the
“**MySpace of cryptocurrency**”?

With the numerous prior attempts at developing a successful cryptocurrency, and decades of technology advance since electronic p2p cash was first conceived in 1983 by David Chaum, Bitcoin is better viewed as the “**Facebook of cryptocurrency**”

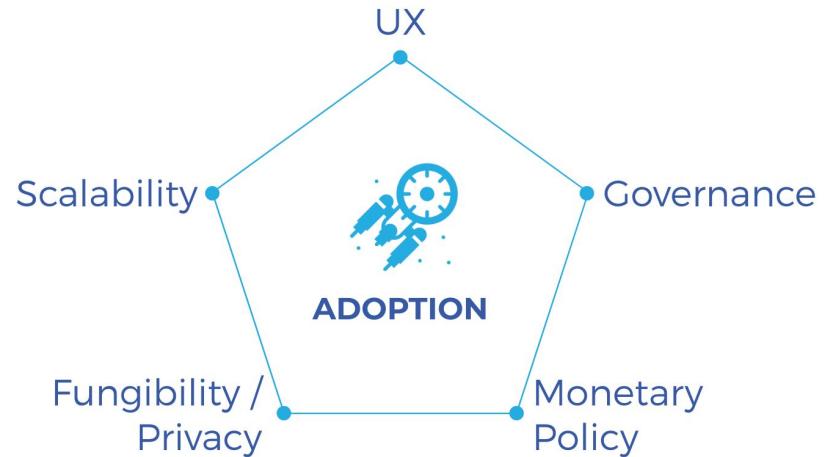




The degree of cryptoasset adoption in just a decade represents nothing short of a **minor economic miracle**

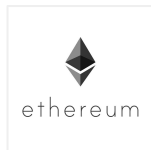
However, just as Facebook continued to evolve after its launch, **cryptocurrency must also evolve** to continue growing

There are **five key**
'internal' challenges
facing cryptocurrency to
secure continued growth

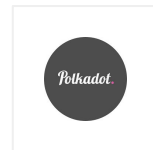
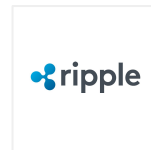


Select cryptotassets addressing various **endogenous challenges** to wider adoption

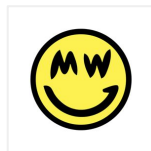
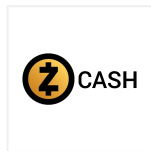
Scalability



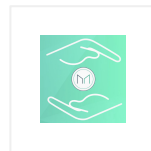
Interoperability



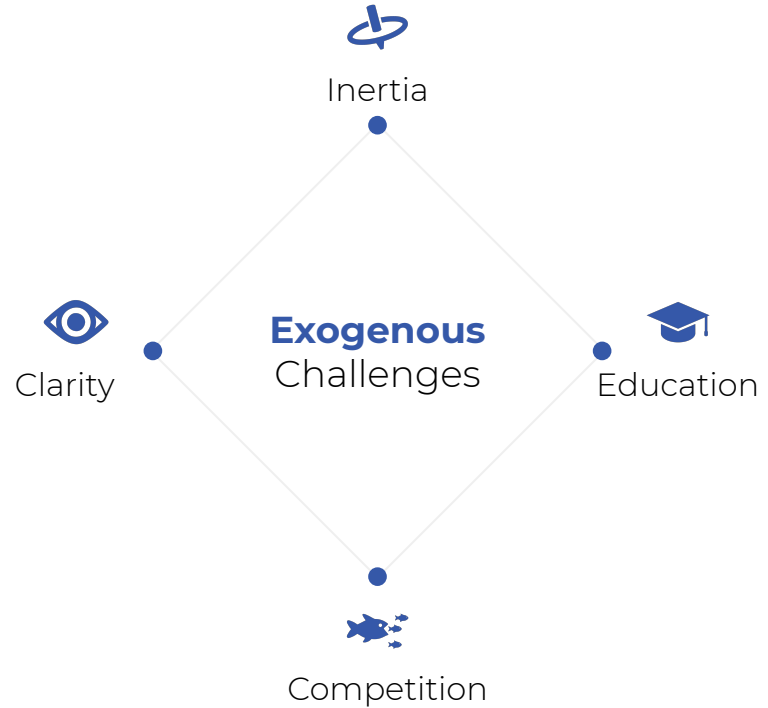
Fungibility

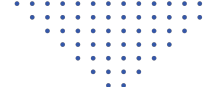


Stability



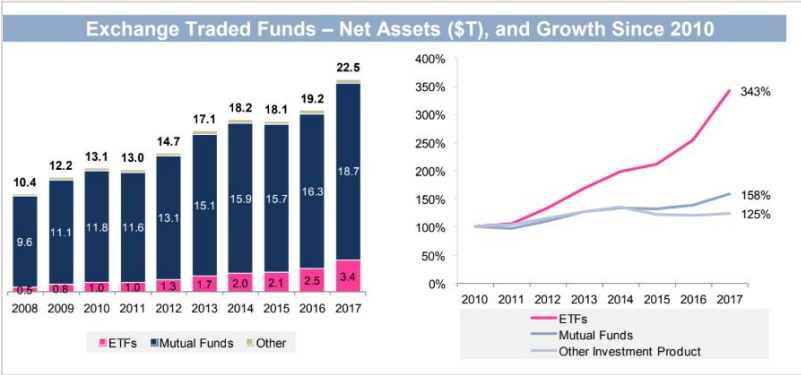
Significant external challenges around **education, competition, and overcoming simple inertia**, serve as obstacles to billions of cryptoasset users





Regulators will continue to play a key role in rate and progress of **crypto adoption**

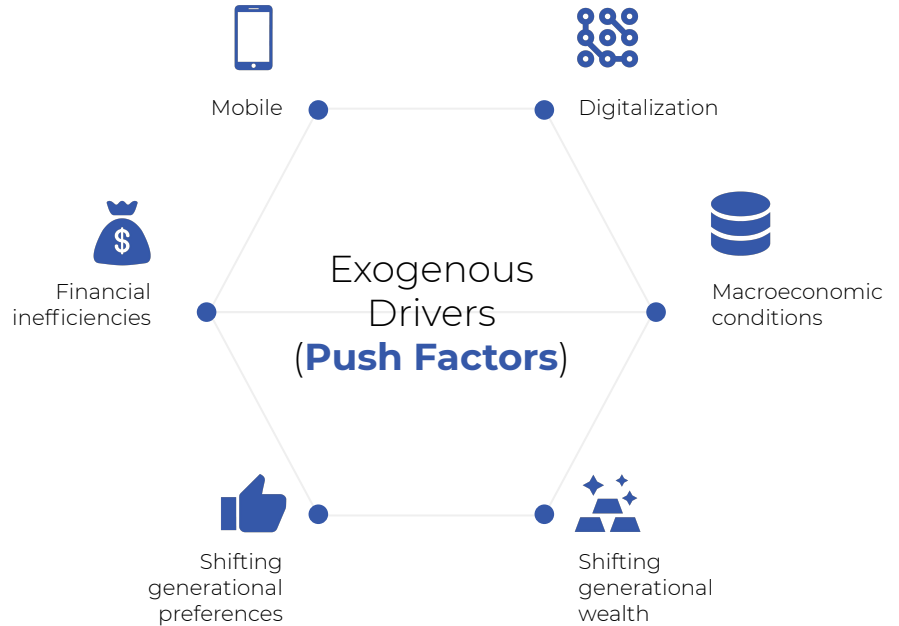
Once approved, a Bitcoin ETF will aid legitimacy and exposure to cryptoassets



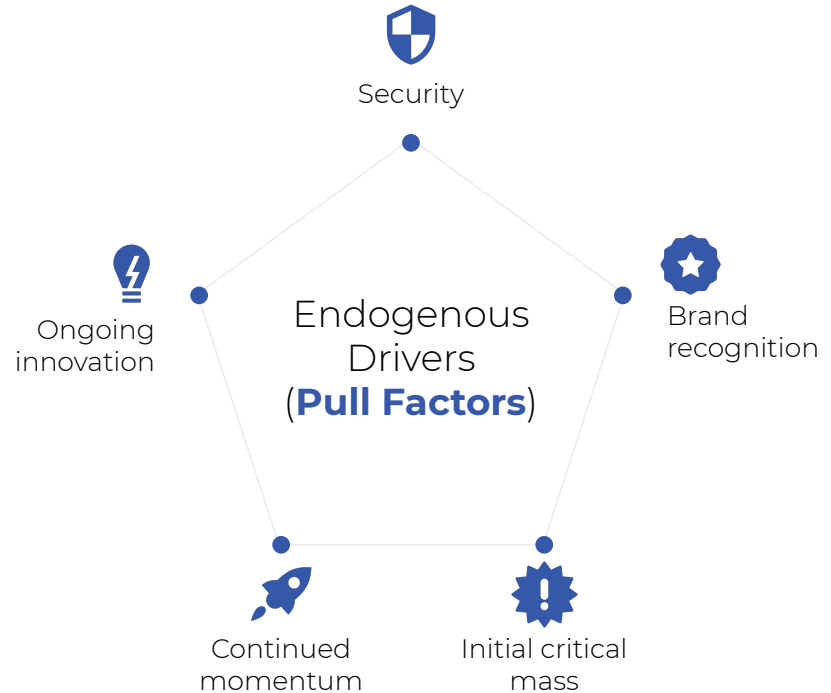
ETFs have been a growth engine for the asset management industry, adding \$3.4T in 10 years, given their low cost and ease of use within a financial advice framework, distributed at scale

Source: Cryptofundresearch

However, powerful external economic, social and demographic forces are also **increasing the attractiveness of cryptoasset adoption and use...**



...while further technology maturation and awareness are pulling cryptoassets **toward mainstream use and adoption**



Twitter CEO Jack Dorsey says bitcoin will eventually be the single global currency

- Dorsey told the U.K.'s Sunday Times newspaper that bitcoin would likely become the single global currency within 10 years, "but it could go faster."
- Square's Cash app recently started letting people buy and sell bitcoin.

Ari Levy | @levynews
Published 1:52 PM ET Sun, 25 March 2018 | Updated 8:13 AM ET Mon, 26 March 2018



Fiat Currency Will be Laughable in Five Years Says Billionaire Tim Draper

30402 Total views 1777 Total shares



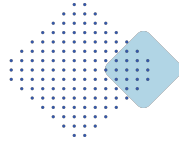
...no longer sound
wildly different from
the **views of some
regulators**



“Let me repeat that: these currencies are not going away and they will proliferate to every economy and every part of the planet. Some places, small economies, may become dependent on virtual assets for survival. And, these currencies will be outside traditional monetary intermediaries, like government, banks, investors, ministries, or international organizations.

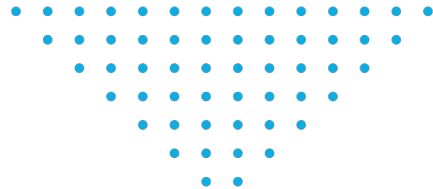
We are witnessing a technological revolution. Perhaps we are witnessing a modern miracle.”

Rosti Behnam
CFTC Commissioner



“You can make a lot of money by **being right** about something most **people think is incorrect**”

–Fred Wilson, *Union Square Ventures*



Questions or comments?

Please email us at research@blockchain.com



Blockchain **Key Statistics**

01 | **Industry Pioneers**

Founded in 2011



39M+

Wallets



200K+

Transactions
per day



\$200B

Transacted
volume

02 | **Most Popular**

Consumer Finance Data
Platform with Digital
Currency Expertise



25%

of global
network
traffic (BTC)



36

buy/sell
countries (with
more on the way!)

03 | **First Application Software**

for Digital Currencies -
Largest Consumer
Wallet in World



Leadership & Backing



Peter Smith
CEO & Co-Founder
Blockchain



Antony Jenkins
Board Director
*Fmr Group CEO,
Barclays*



Jeremy Liew
Board Director
*Lightspeed
Ventures*

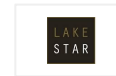


Bob Wigley
Board Director
*Fmr Chairman of
Merrill Lynch EMEA*



Arthur Levitt
Board Advisor
*25th Chairman of
the SEC*

\$70M+ FUNDING





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