



Update: Bitcoin, Cryptocurrencies and Blockchain

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Summary of the Last 6 Months

1. **Bitcoin/Cryptos: Rapidly morphing thesis**
2. **Bitcoin/Crypto prices fall—Results:**
 - a) **Not surprising:** trading volumes fall (generally), news flow/interest growth slows
 - b) **May look surprising but shouldn't be:** electricity consumption increases, still active (albeit slowly) ICO market (but moving to unregulated geos)
 - c) **Surprising:** New fund formation strong, futures grow
3. **ICO's are largely failing**, and failing fast. But not going to \$0. Nobody seems to be noticing accumulating massive losses.
4. **Blockchain trials spread within financial services, but benefits mainly unclear**
5. **Early blockchain application uses:** cross-border transfers, shipping and trade finance, reinsurance.

Bitcoin/Crypto: Rapidly Morphing Thesis

Overarching: A better world through decentralization

First: Bitcoin as digital cash: untraceable but full confidence in value (2009-2016)

Then: Bitcoin as antidote to incumbent financial system and central bank (2010-2017)

Then: Bitcoin as replacement for existing payment system (2010-2017)

Then: Bitcoin & Cryptos as new fundraising and capital allocation mechanisms (2015-2018)

Then: Bitcoin as store of value: Gold alternative (2017-2018)

Then: Bitcoin disruption advantaged refuge for depreciating currency (Spring – Summer 2018)

Now: Bitcoin & Cryptos as new institutional investment class (2017-Present)

Bitcoin/Crypto: Rapidly Morphing Thesis

Digital Cash: Untraceable but full Confidence

2009

2016

Incumbent Financial System Antidote

2010

2017

Replacement Payment System

2010

2017

New Fundraising and Capital Allocation Mechanisms

2015

2018

Store of Value

2017

2018

Disruption Advantaged Refuge for Depreciating Currency

Spring

2018

Summer

New Institutional Investment Class

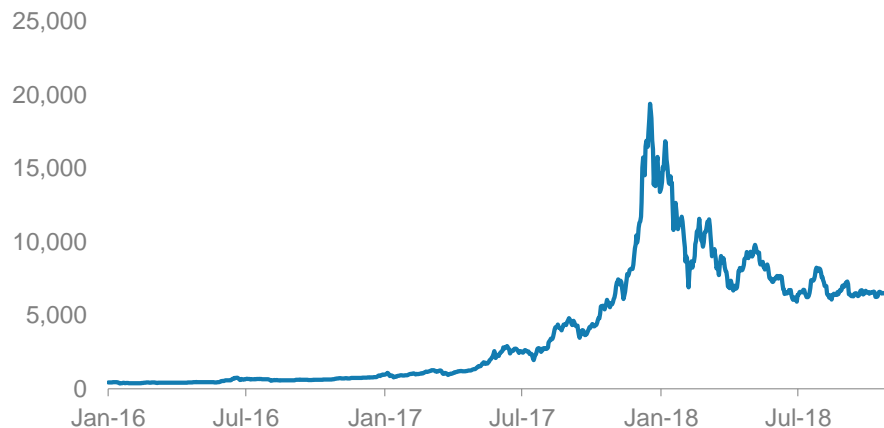
2017

Present

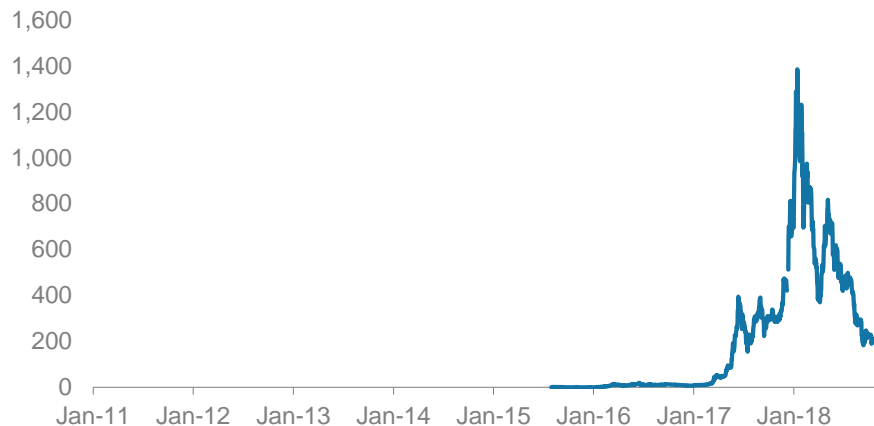
Size of the Cryptocurrency market and liquidity

- Bitcoin and Ethereum Value

Bitcoin value (\$)



Ethereum value (\$)

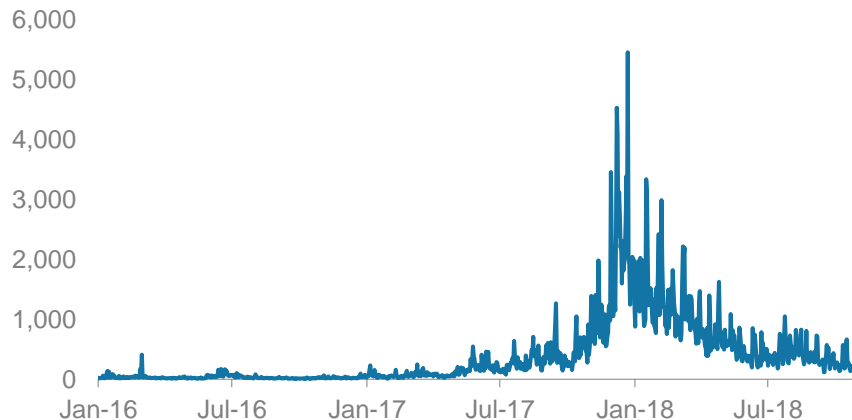


Source: blockchain.info, Morgan Stanley Research

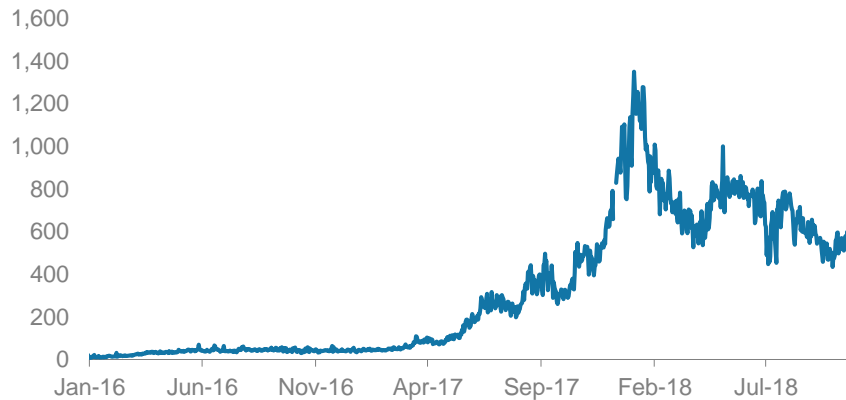
Size of the Cryptocurrency market and liquidity

- Trading volumes falling with prices

Bitcoin Daily Trading Volume (\$mn)



Ethereum Daily Transaction Count (thousands)



Source: blockchain.info, Morgan Stanley Research

Size of the Cryptocurrency market and liquidity

- 54% of total cryptocurrency value is in bitcoin
- Over \$200bn spread over 2000 coins/digital assets

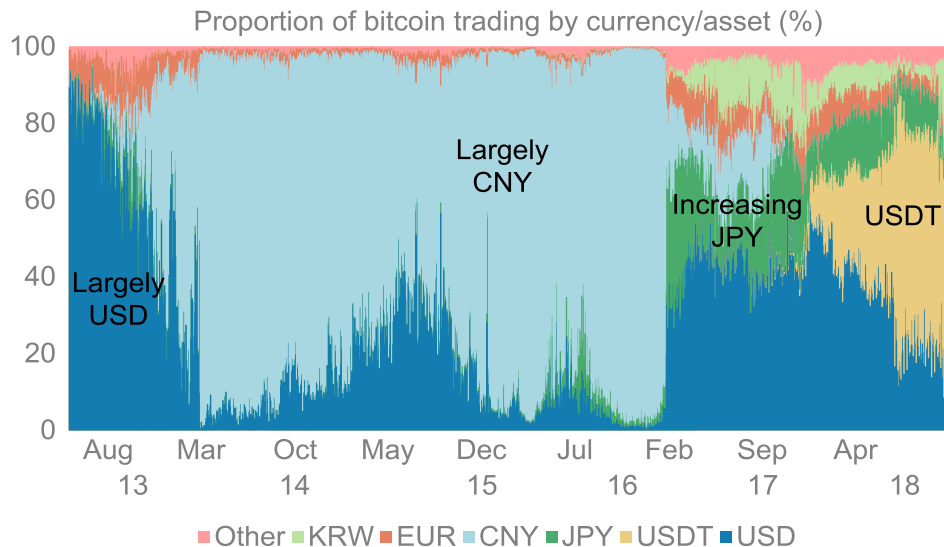
| # | Name | Symbol | Price (USD) | Total Float (USDbn) | Total Float (%total) | Volume 24h (USDmn) | Supply (USDmn) | Supply (%max) | Max coins (mn) | Mined? |
|----|--------------|--------|-------------|---------------------|----------------------|--------------------|----------------|---------------|----------------|--------|
| 1 | Bitcoin | BTC | \$6,477 | 112 | 54 | 3281 | 17.3 | 83% | 21 | Y |
| 2 | Ethereum | ETH | \$204 | 21 | 10 | 1176 | 102.8 | N/A | No | Y |
| 3 | XRP | XRP | \$0.46 | 18 | 9 | 281 | 40206 | 40% | 100000 | N |
| 4 | Bitcoin Cash | BCH | \$440 | 8 | 4 | 254 | 17.4 | 83% | 21 | Y |
| 5 | EOS | EOS | \$5 | 5 | 2 | 333 | 906.2 | N/A | No | Y |
| 6 | Stellar | XLM | \$0.23 | 4 | 2 | 37 | 18895 | N/A | No | N |
| 7 | Litecoin | LTC | \$52 | 3 | 1.5 | 285 | 58.9 | 70% | 84 | Y |
| 8 | Tether | USDT | \$0.99 | 2 | 0.9 | 1797 | 1926.4 | N/A | No | N |
| 9 | Cardano | ADA | \$0.07 | 2 | 0.9 | 13 | 25927 | 58% | 45000 | Y |
| 10 | Monero | XMR | \$106 | 2 | 0.8 | 12 | 16.5 | N/A | No | Y |

Source: Coinmarketcap.com, Morgan Stanley Research

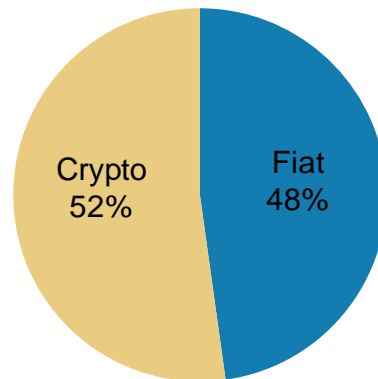
What is bitcoin traded against?

Moving increasingly towards trading vs the stable coin USD-Tether (USDT).

Half of bitcoin trading is versus a digital asset now.



Latest (25-Oct-18, 1m av)



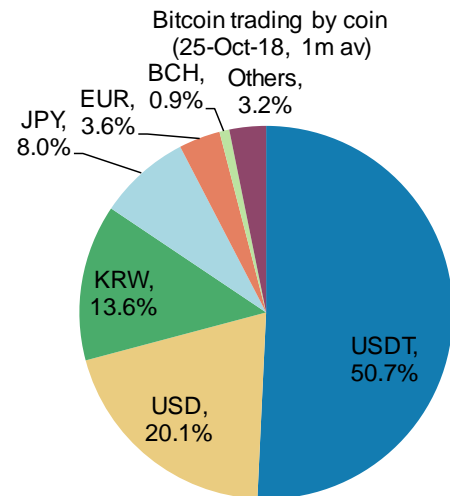
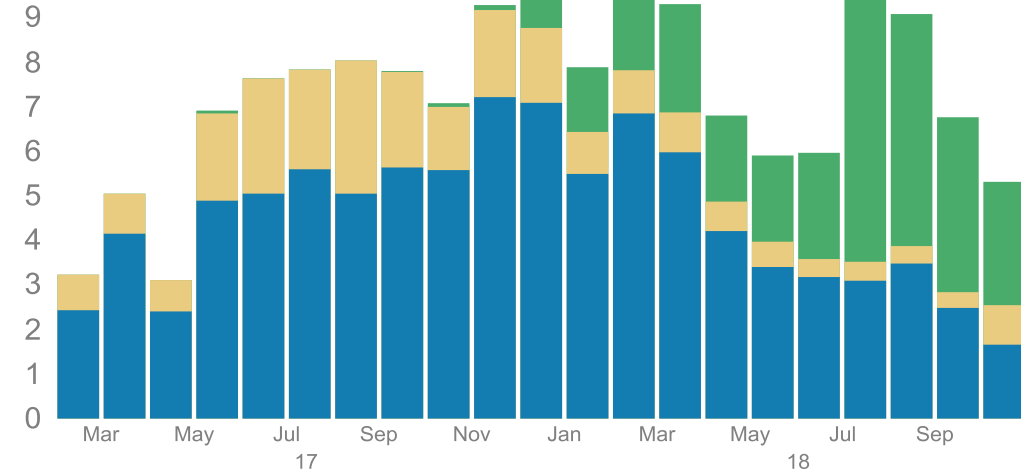
What is bitcoin traded against?

2017 saw a transition away from DM fiat currencies towards stable coins.

EM fiat currencies are a small proportion of total trading volumes.

11 Bitcoin trading by currency (million bitcoin units)

■ Crypto ■ EM ■ DM



Rise of the Stable Coin

Definition: Digital coin/cryptocurrency that has aims to have a stable value versus a known counterpart, keeping volatility low. Typically valued against fiat currencies, commodities and crypto assets.

Examples

- **USDT (US Dollar Tether)** – trades around 1 US dollar. Company issues USDT into the market and puts one USD into a bank. All issued digital coins are backed by USD.
- **USDC (USD Coin)** – trades around 1 US dollar. Created by Coinbase and Circle. Aims to provide a liquid digital solution for trading crypto-assets that follows the US financial regulation.
- **DGX (Digix Gold Coin)** – trades with one gram of gold in USD. Gold is held in Digix's Singaporean bank and audited by a French certification company.

Why not just trade the counterpart (USD, gold, etc)? Benefits from blockchain technology so some consider as a digital store of value. Easier to get digital exposure to assets like gold which are expensive to transport and store.

Rise of the Stable Coin

What developments to watch?

USDT took an increasing share of BTC trading volumes as cryptocurrency prices started falling. This occurred because many exchanges only trade crypto->crypto and not crypto->fiat. Trading crypto->fiat requires going through the banking sector which charges a higher fee. Also as bitcoin prices fell, so did most all other coins so if owners wanted to come out of bitcoin holdings, they needed to go to another asset which was closer to the valuation of the US dollar.

Many large cryptocurrency exchanges and companies are creating their own stable coins, part of the next wave of development over coming years.

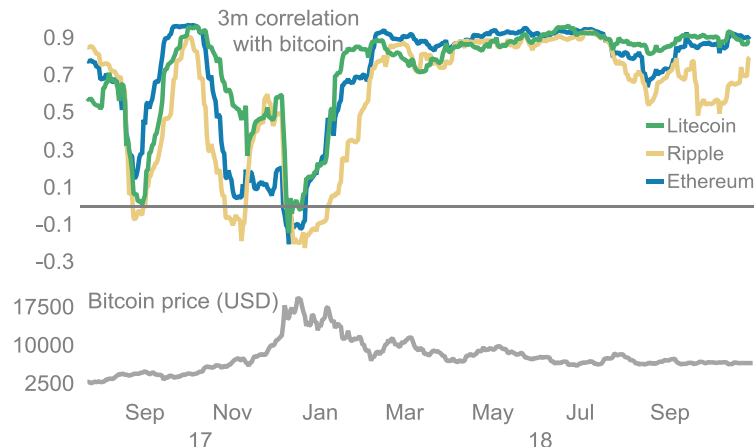
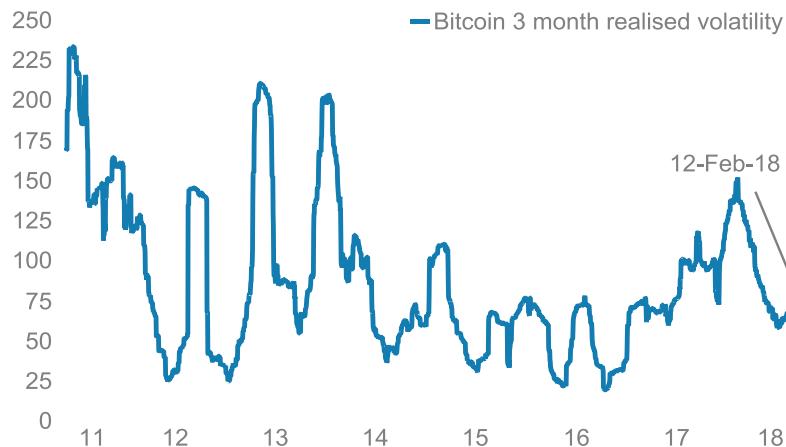
Similar to the FX world, not all stablecoins will survive so we watch for ones with the lowest transaction costs, highest liquidity and defined regulatory structure which will all increase adoption.

Types of stable coins



Why is bitcoin stable?

- The realised volatility of bitcoin has fallen to the lowest level since the start of 2017.
- As the cross crypto correlation stays high.
- Price stability comes as markets wait for the next technological development that increases adoption of the underlying asset or derivative.

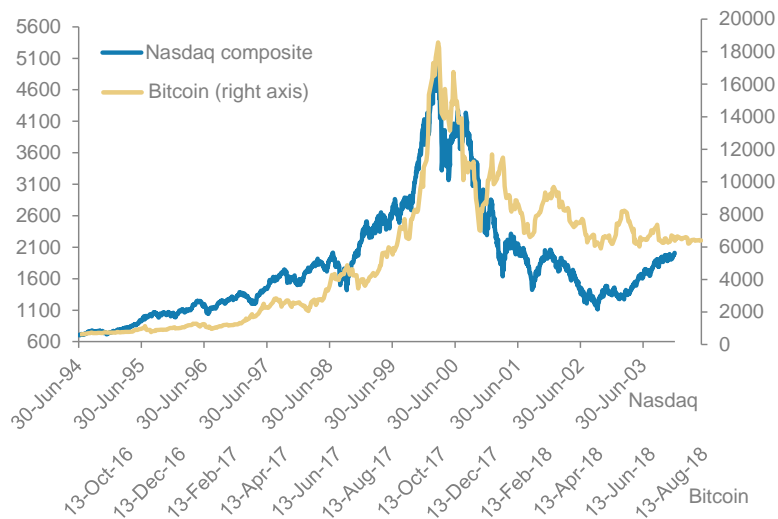


Bitcoin bear market: eased for now?

Breakdown of the bear market

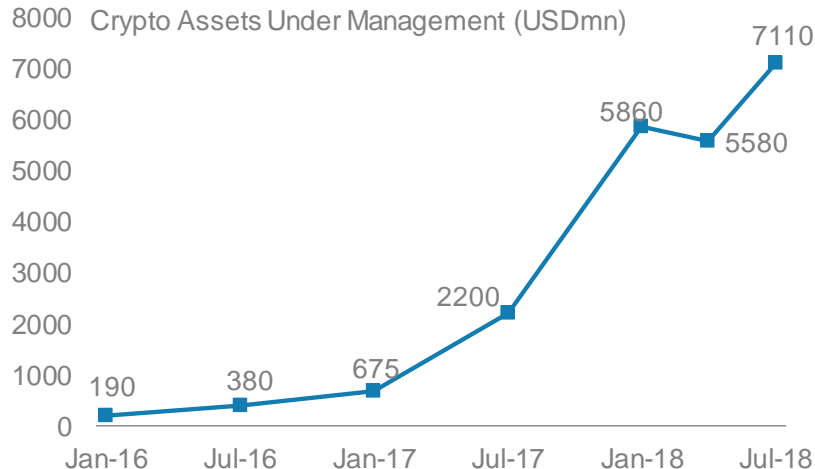
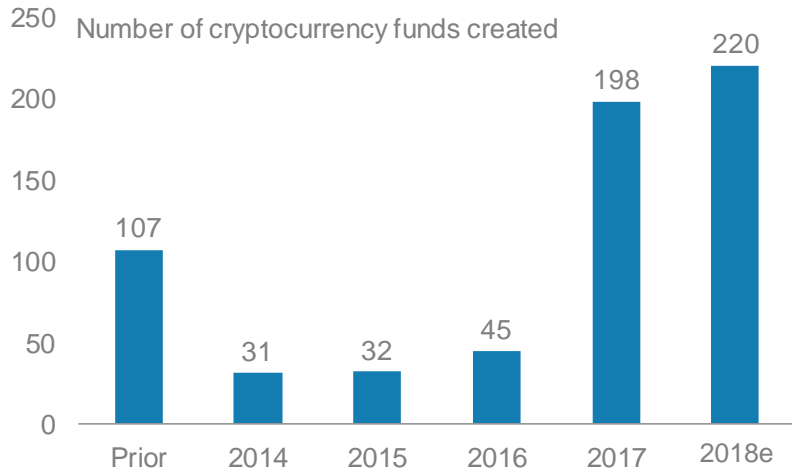
| Peak | Trough | Peak | Trough | Peak-Trough | Trough-Peak | Peak-trough | Trough-peak |
|-----------|-----------|-------|--------|-------------|-------------|-------------|-------------|
| 18-Dec-17 | 22-Dec-17 | 19511 | 10776 | 4 | | -45% | |
| 05-Jan-18 | 17-Jan-18 | 16933 | 9186 | 12 | 14 | -46% | 57% |
| 29-Jan-18 | 06-Feb-18 | 11785 | 5922 | 8 | 12 | -50% | 28% |
| 06-Mar-18 | 06-Apr-18 | 11671 | 6514 | 31 | 28 | -44% | 97% |
| 04-May-18 | 29-Jun-18 | 9795 | 5791 | 56 | 28 | -41% | 50% |
| 25-Jul-18 | 14-Aug-18 | 8480 | 5887 | 20 | 26 | -31% | 46% |
| 05-Sep-18 | 26-Oct-18 | 7406 | 6383 | 51 | 22 | -14% | 26% |
| Average | | | | 26 | 22 | -39% | 51% |

Bitcoin has tracked the peaks and troughs from Nasdaq in the year 2000. Question now is whether the bear market is coming to an end in the way the Nasdaq's did?



Retail investors stay put as institutional investors get involved

- Cryptocurrency fund AUM US\$7.11bn (CryptoFundResearch estimate).
- Types: 48% hedge fund, 48% venture capital, 3% private equity.
- Location: 50% US, 9% China/Hong Kong, 6% UK.



Source: CryptoFundResearch, Morgan Stanley Research

Previous fundraising via ICOs is being liquidated

- A large proportion of newly created digital coins (ICOs) were issued in exchange for ETH (Ether).
- Companies issuing new coins planned to use the funds to pay for research and development.
- ETH valuation losses this year have caused some companies to liquidate ETH (into USD), putting downward pressure on the coin.
- Next development watched is the creation of STO (security token offerings or regulated ICOs)



Source : [Santiment.net](#), Morgan Stanley Research

Bitcoin Thesis Evolution

Thesis break down: Bitcoin as Digital Cash

2009

2016

- By 2016, pretty clear that having a permanent record of transaction eliminates the anonymity

Response: Monero, Zcash, Bitcoin Private, etc.

Bitcoin Thesis Evolution

Thesis break down: Bitcoin as Digital Cash (cont.)

2009

2016

Hacks and losses: Sorry about that, no recourse

- Coinrail, Jun 2018, \$40mn
- WSJ flagged 271 ICOs, which cumulatively raised over \$1bn, for having plagiarized investment documents, missing/fake executive teams, etc. Investors have claimed \$273mn of losses in these projects.
- Titanium, April 2018, \$21mn
- LoopX, Feb 2018, \$4.5mn
- PlexCoin, Dec 2017, \$15mn
- NiceHash, Dec 2017, \$63mn
- Bitfinex, Aug 2016, \$72mn
- Mt. Gox, Feb 2014, \$487mn

Over \$630mn total, not including other cryptocurrencies

Response: Coinbase, others start to assume bank type responsibilities

Bitcoin Thesis Evolution

Thesis break down: Incumbent Financial System Antidote

2010

2017

Investment tenet: **Limited quantity—21M**

- Why it is failing: Anybody can create a “hard fork” of the open source code, which in turn can create a new currency for those that already hold Bitcoin. We view these hard forks as being like stock splits or new class creations.

Bitcoin's Hard Forks:

1 Aug 2017—Bitcoin Cash
24 Oct 2017—Bitcoin Gold
24 Nov 2017—Bitcoin Diamond
12 Dec 2017—UnitedBitcoin
12 Dec 2017—Bitcoin X
12 Dec 2017—Super Bitcoin
28 Feb 2018—Bitcoin Private

But unlike a stock split, the fork is not lowering the price per Bitcoin

Bitcoin Thesis Evolution

Thesis break down: Replacement Payment System

2010

Investment tenet: **New electronic payment system for underbanked—only need a phone.**

Why it is failing: Financial inclusion is of increasing priority for all payment players. The new QR-based payment schemes in India show that reaching the underbanked can be done much less expensively than Bitcoin.

2017

Investment tenet: **Become part of the global financial system fabric.**

Why it is failing: the high costs of operating a fully trustless system is pushing early players to balkanize systems into trusted blockchains/distributed ledgers.

Bitcoin Thesis Evolution

Thesis break down: Replacement Payment System (cont.)

2010

2017

Virtually no acceptance among US eCommerce merchants

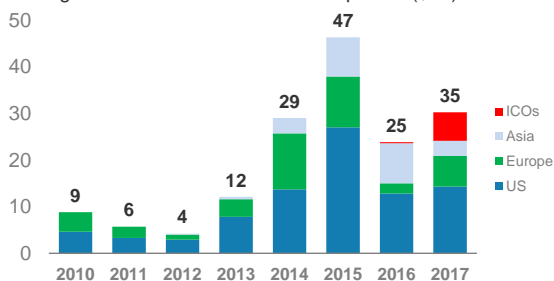
Bitcoin acceptance among top 500 eCommerce merchants



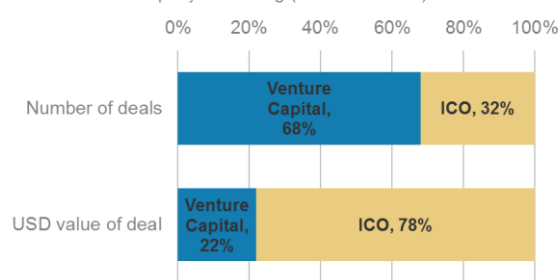
Bitcoin Thesis Evolution

Thesis break down: New fundraising and capital allocation mechanisms

Total global investment in fintech companies (\$bn)



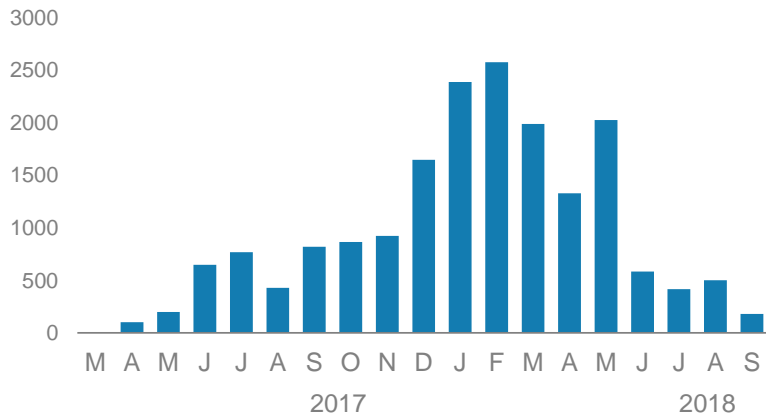
Blockchain company borrowing (2012-Feb 2018)



2015

2018

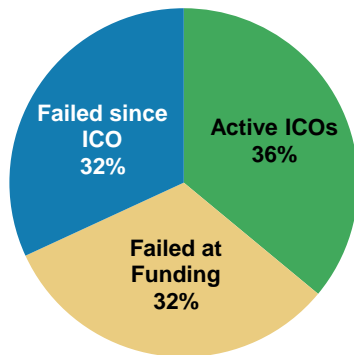
Estimated ICO Capital Raised Over Month (USDmn)



Bitcoin Thesis Evolution

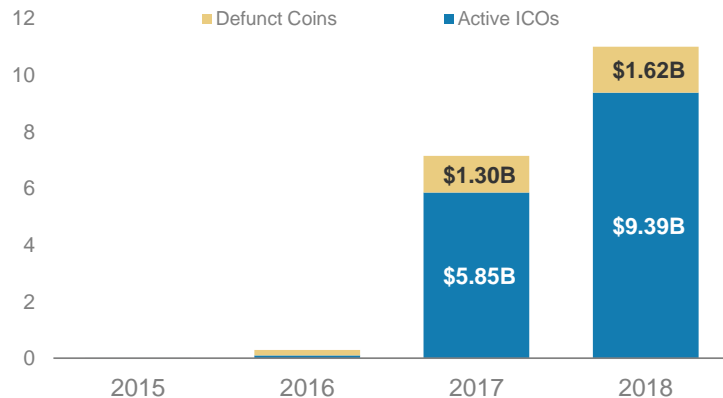
Thesis break down: New fundraising and capital allocation mechanisms (cont.)

2017 ICOs by Status



2015 2018

Capital Raised by ICOs (\$B)

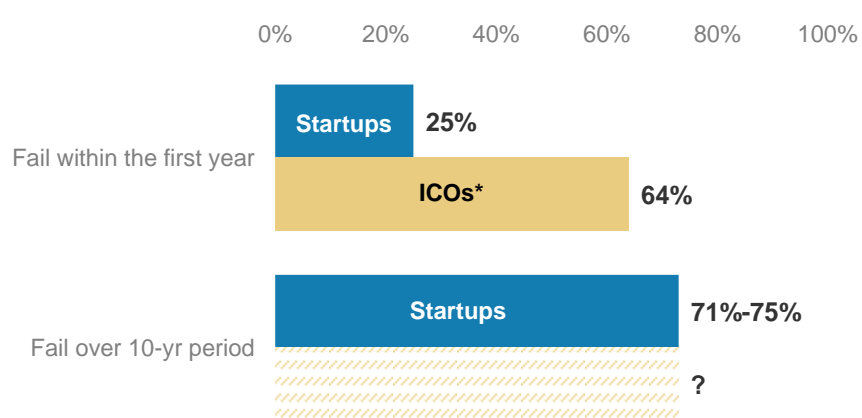


- Approximately 32% of ICOs failed after raising money in 2017. They managed to raise \$1.3B.

Bitcoin Thesis Evolution

Thesis break down: New fundraising and capital allocation mechanisms (cont.)

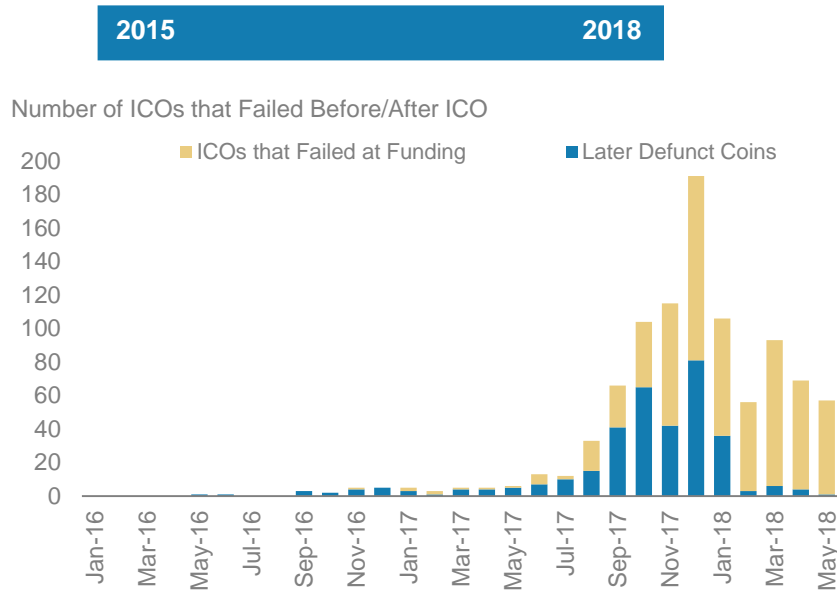
ICOs vs. Startups



Note: ICO failures includes ICOs who failed at funding and those that failed after their ICOs

- Approximately 64% of potential ICOs failed before or after their ICOs in 2017. This is a higher failure rate than seen among startups in the first year.

Source: DigRate, Morgan Stanley Research

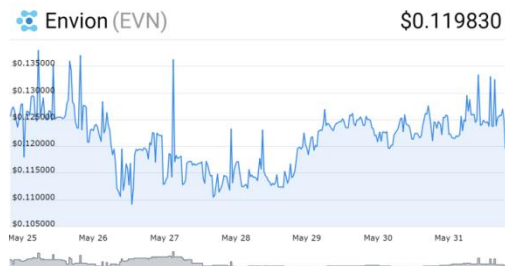


Bitcoin Thesis Evolution

Thesis break down: New fundraising and capital allocation mechanisms (cont.)

2015

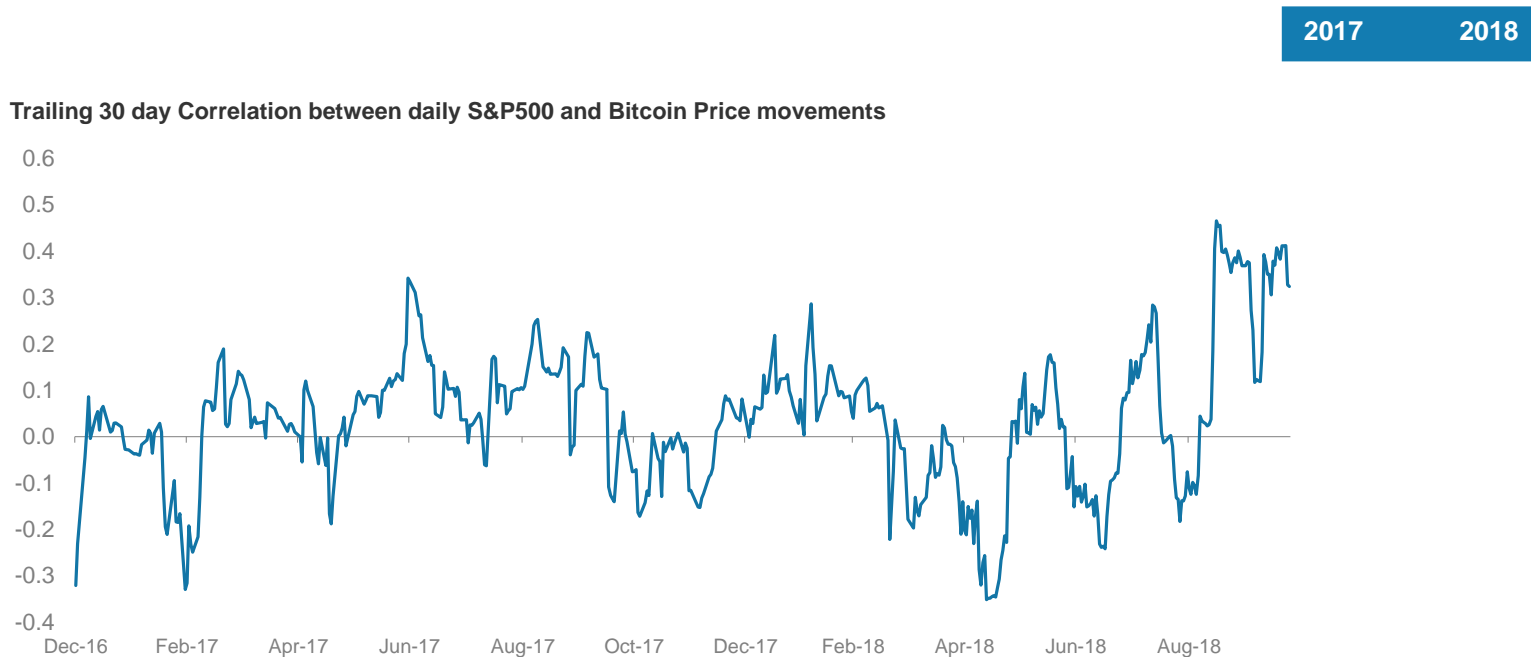
2018



Source: DigRate, CoinCodex, Morgan Stanley Research

Bitcoin Thesis Evolution

Thesis break down: Store of value



Source: bitcoinity.org, Thomson Reuters, Morgan Stanley Research

Bitcoin Thesis Evolution

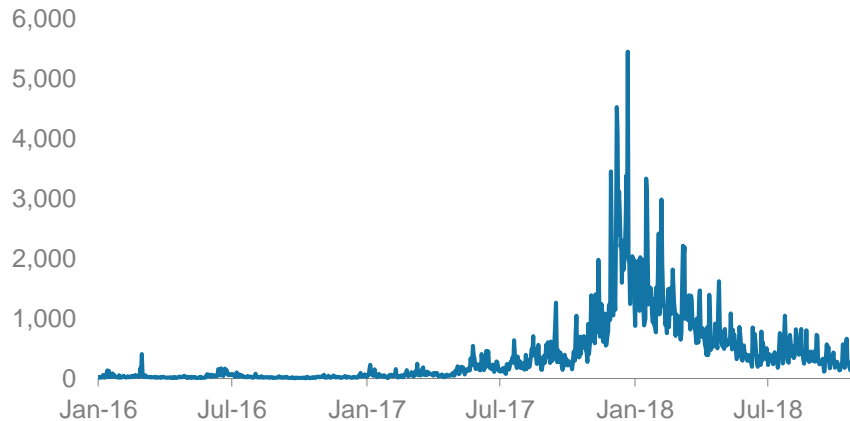
Thesis break down: Disruption Advantaged Refuge for Depreciating Currency

Spring 2018 Summer

Bitcoin value (\$)



Bitcoin Daily Trading Volume (\$mn)



Source: blockchain.info, Morgan Stanley Research

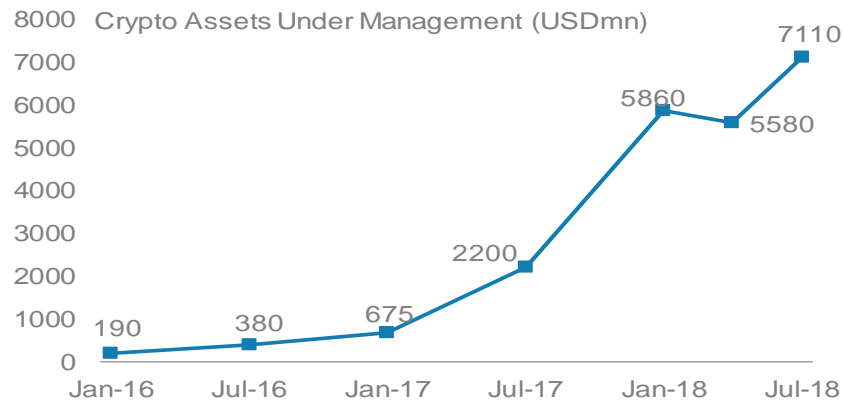
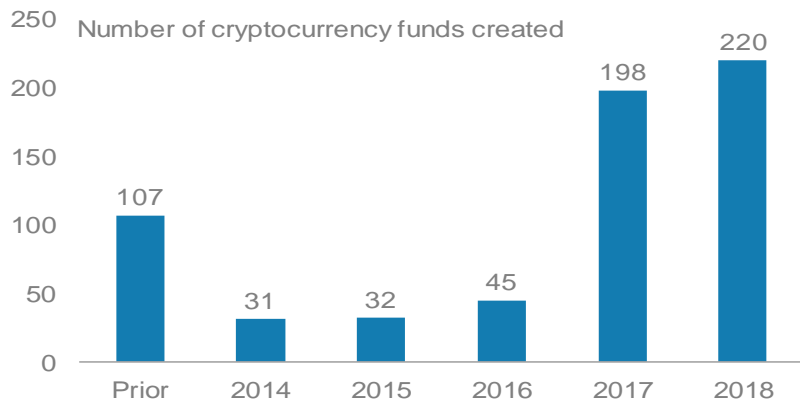
Bitcoin Thesis Evolution

Current Thesis: New Institutional Investment Class

- Cryptocurrency fund AUM US\$7.11bn (CryptoFundResearch estimate).
- Types: 48% hedge fund, 48% venture capital, 3% private equity.
- Location: 50% US, 9% China/Hong Kong, 6% UK.

2017

Present



Source: CryptoFundResearch, Morgan Stanley Research

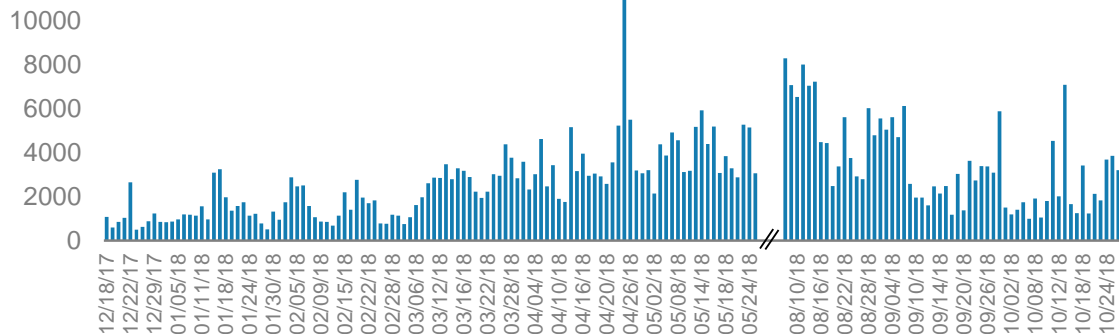
Bitcoin Thesis Evolution

Current Thesis: New Institutional Class

2017

Present

Daily CME Exchange Futures Volume

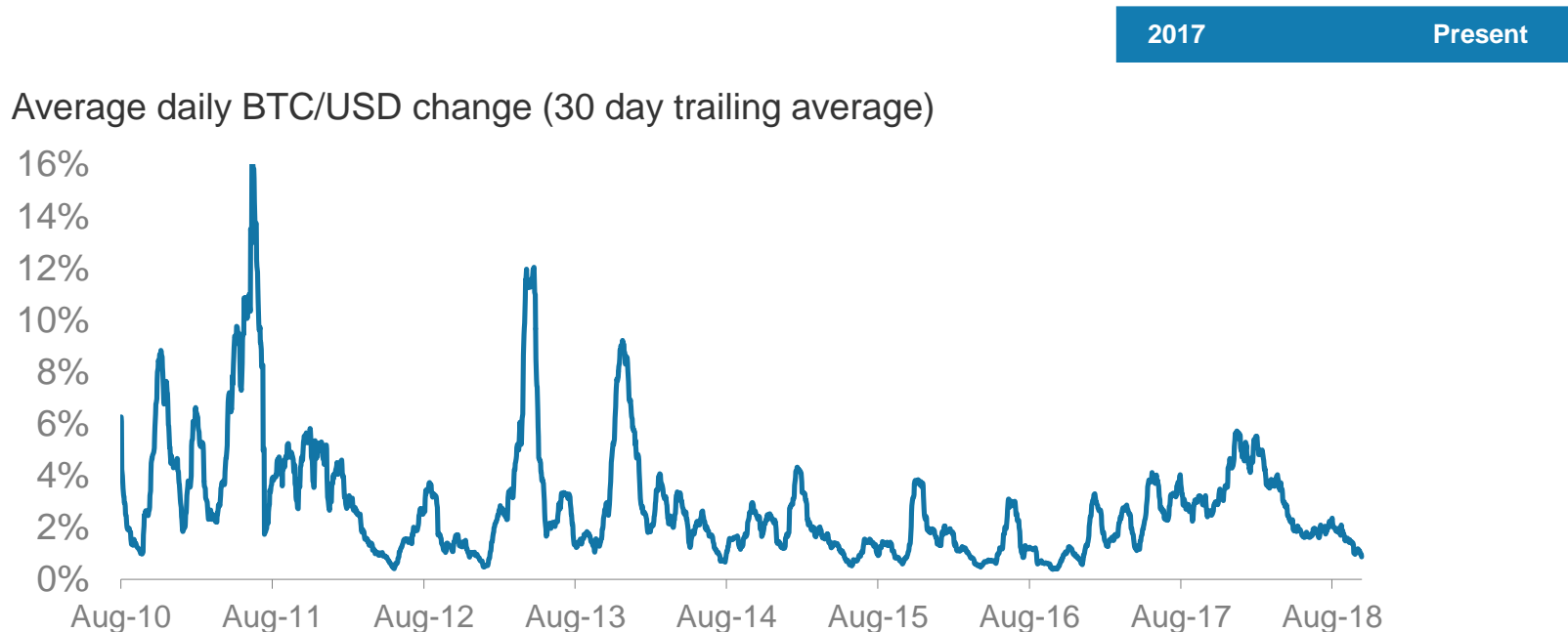


- **Contract Unit:** 5 bitcoins
- **Price Quotation:** USD per BTC
- **Final Settlement Procedure:** Delivery is by cash settlement by reference to the Final Settlement Price, equal to the CME CF Bitcoin Reference Rate (BRR) on the Last Day of Trading

Source: CME Group, Morgan Stanley Research

Bitcoin Thesis Evolution

Current Thesis: New Institutional Class



Source: bitcoinity.org, Morgan Stanley Research

Bitcoin Thesis Evolution

Current Thesis: New Institutional Class

- Fidelity Digital Asset Services: Crypto trading and storage service
- Bain Capital: Led \$15M Series B in Seed Cx Institutional Trading Platform
- Genesis Trading: Has lent more than \$500M in cryptos since March to institutions--\$130M outstanding now
- Goldman Sachs & Galaxy Digital (Novogratz crypto bank): Invest part of \$58.5M round in BitGo (crypto custodian)
- SETL: Granted license by France to operate CSD
- Vertex: Invests in Binance for a Singapore-based crypto exchange
- Coinbase: Raises \$500M at \$8B valuation to be crypto's Charles Schwab/Fidelity/Nasdaq
- Gemini Trust: Hires Nasdaq to conduct market surveillance

2017

Present

Source: Morgan Stanley Research

Bitcoin Thesis Evolution

Current Thesis: New Institutional Class

What's preventing more institutional investors to get involved?

2017

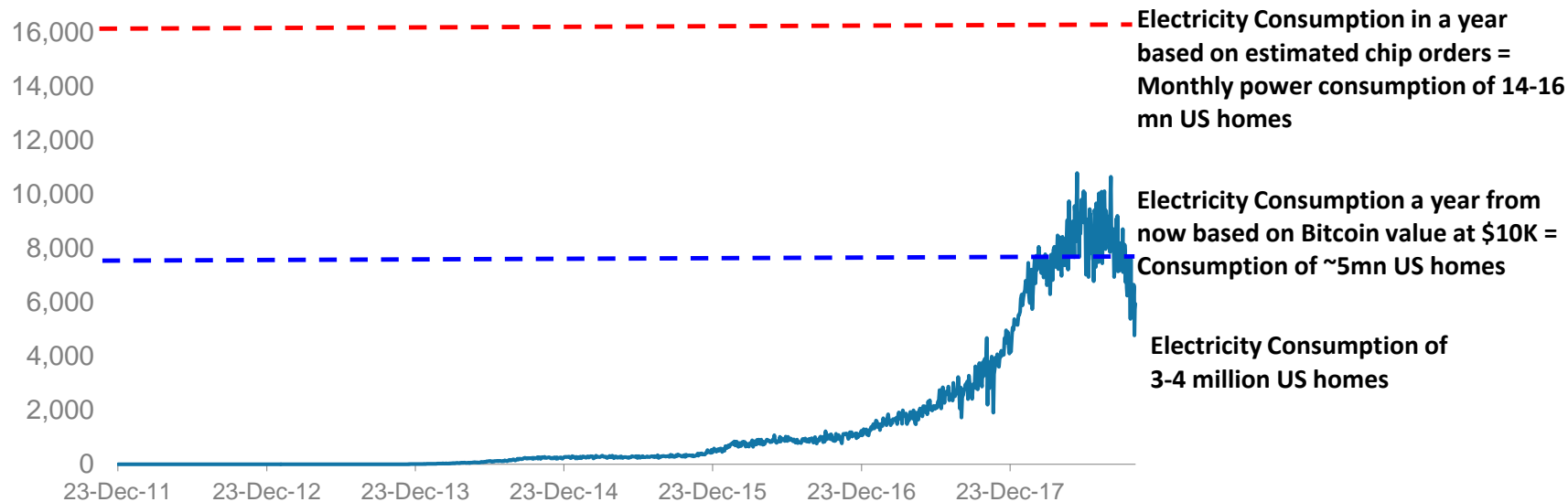
Present

From our client conversations we find three major obstacles preventing large scale investment in the cryptocurrency space:

- Underdeveloped regulation so asset managers don't want to take on the reputational risk
- Lack of a custodian solution to hold the cryptocurrency and private keys
- Lack of large financial institutions and asset managers currently invested

Bitcoin and Environmentalism: Mutually Exclusive

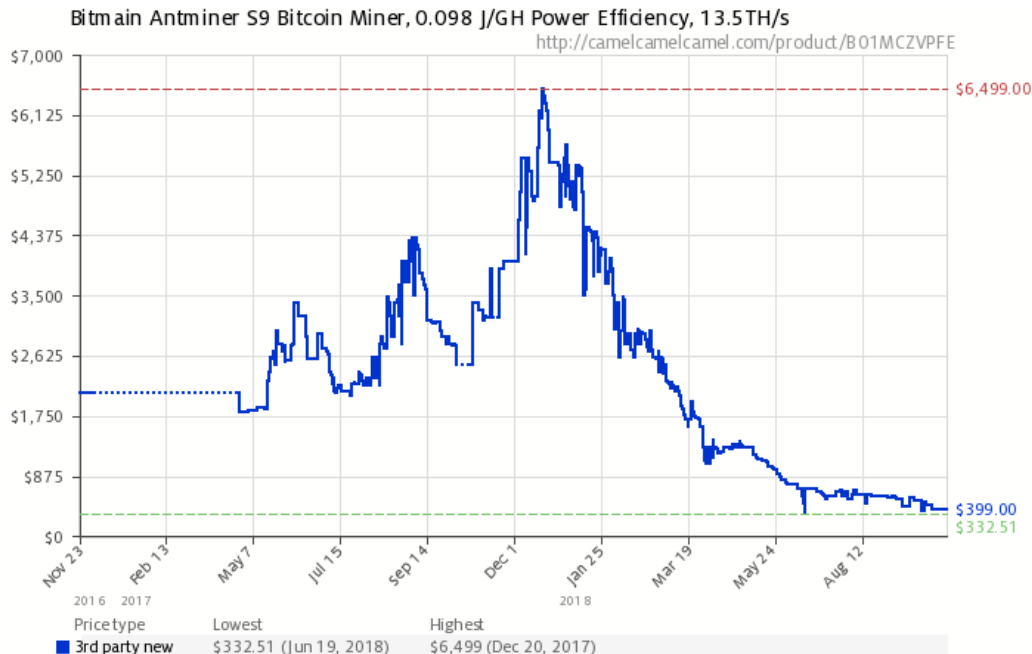
Total Energy Consumption (Megawatts)



Note: Energy consumption estimated based on global mining hash rate multiplied by average Joule/gigahash/s energy usage, which we assume declines linearly from 1.5 in 2014 to 0.16 in May 2018

Source: blockchain.info, Morgan Stanley Research estimates

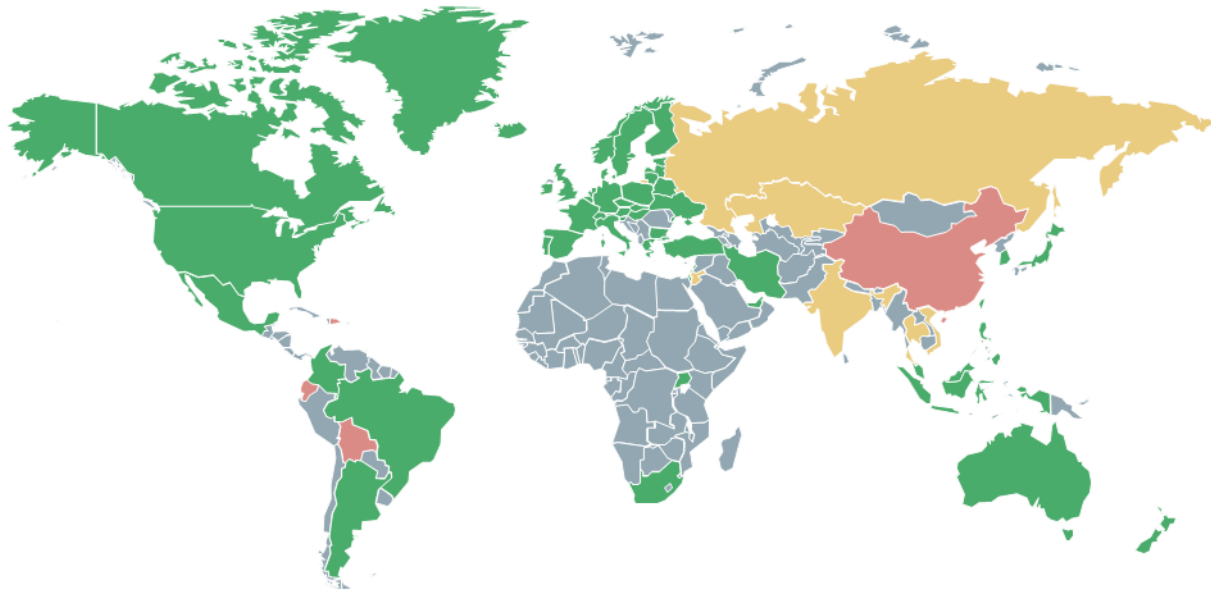
Falling equipment prices: Predictable. And will drive electricity use higher.



Source: camelcamelcamel.com, Morgan Stanley Research

Regulation of ICOs and Cryptocurrencies Globally

Degree of regulation varies significantly, with the US seeing moderate levels

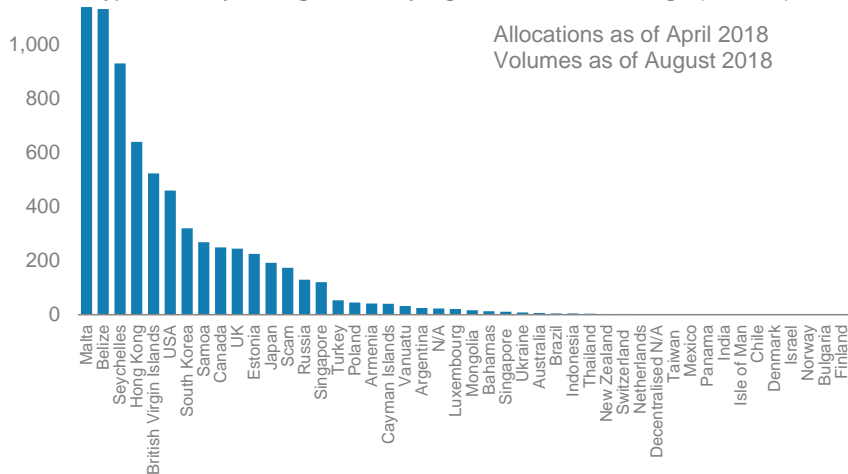


Note: Green area represent country where government has not provided guidance on regulation. Red area indicates that country has prohibited blockchain in some capacity. Source: Medium

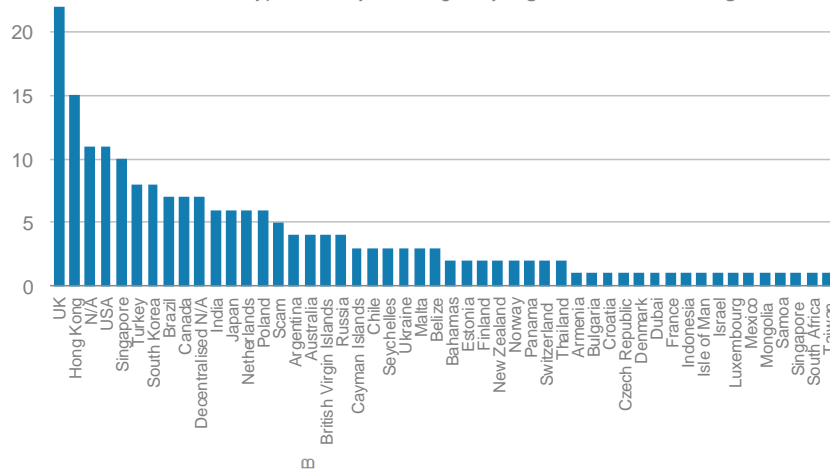
Crypto activity driven by regulation

Exchanges are legally moving to Malta (they call themselves Blockchain Island)

Cryptocurrency trading volume by legal location of exchange (USDmn)



Number of cryptocurrency exchanges by legal location of exchange



Source: CountMarketCap.com, company websites, Morgan Stanley Research. For the left chart Binance is in Malta and OKEx in Belize. Volume from one day in April but the relative exchange rankings are still comparable if several days are averaged

Regulators Watching Closely... in the US

- On cryptocurrency trading, “Central to determining whether a security is being sold is how it is being sold and the reasonable expectations of purchasers.”
-- William Hinman, head of the Division of Corporate Finance for the SEC
- “I personally think that cryptocurrencies are here to stay. I think there is a future for them. I’m not sure they ever come to rival the dollar or other hard currencies, but there’s a whole section of the world that really is hungry for functioning currencies that they can’t find in their local currencies. There’s 140 countries in the world, every one of them has a currency. Probably two-thirds are not worth the polymer or the paper they’re written on, and those parts of the world rely on hard currencies. Bitcoin [or another] cryptocurrency may solve some of the problems.”
-- Christopher Giancarlo, Chairman of CFTC

Regulators Watching Closely... in Europe

- “The subsequent question is what do we do with those ICOs that are outside the regulatory world. We will assess that as a board. We expect to report by the end of the year.”

-- Steven Maijor, Chair of European Securities and Markets Authority

- “The necessary computer processes for the mass implementation of cryptocurrencies are so expensive and energy-intensive that it could not work, but that (he) did not want to speak for the future (20 to 30 years)”

-- Olaf Scholz, Germany's Finance Minister

- “It could be more efficient to prohibit banks and other financial institutions from holding and selling cryptocurrencies, than to directly regulate crypto.”

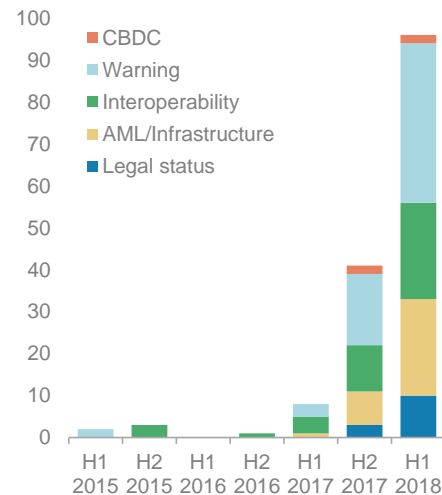
-- Andrea Enria, Chairperson, European Banking Authority

Regulators Watching Closely... Asia

- On Japan's FSA permitting the Japan Virtual Currency Exchange Association to police and sanction any exchanges, "It's a very fast moving industry. It's better for experts to make rules in a timely manner than bureaucrats do."
--Senior FSA Official, Japan
- "We have to carefully consider the regulatory approach for these platforms because they are new technology and may not qualify as securities. They do not fit in the custodian, audit or valuation requirements, for instance, normally expected under the Securities and Futures Ordinance."
-- Carlson Tong Ka-shing, outgoing chairman of Hong Kong's Securities and Futures Commission
- On issues surrounding cryptocurrency firms setting up local bank accounts in Singapore, "We should not be trying to create an extremely lax regulatory environment in order to attract that kind of business...What we are trying to do is to bring the banks and cryptocurrency fintech startups together to see if there is some understanding they can reach... Some of these [crypto] activities are indeed quite opaque. I would not blame the banks for not opening the bank accounts."
-- Ravi Menon, Managing Director of Monetary Authority of Singapore

Central Bank Response

- Monetary policy: Global central bank discussion around whether to introduce a digital version of paper notes and coins (cash) has reduced over recent months. Sweden is still to make a decision over whether to introduce an e-Krona but [provide an update on the technicalities of such a system](#). Other regions investigating include South Korean province Gyeongbuk to replace city-issued gift certificates, Thailand to facilitate bank liquidity and risk management and India starting research to see if a digital rupee would be less costly than paper cash. China's central bank continues to research the topic.
- The BIS has introduced a database of cryptocurrency related regulatory announcements which find that most new announcements are related to warnings about the markets (chart). Very few are about central bank digital currencies.



Source: [BIS](#), Morgan Stanley Research

Bank's Response to Bitcoin: Limited

Who clears Bitcoin futures?

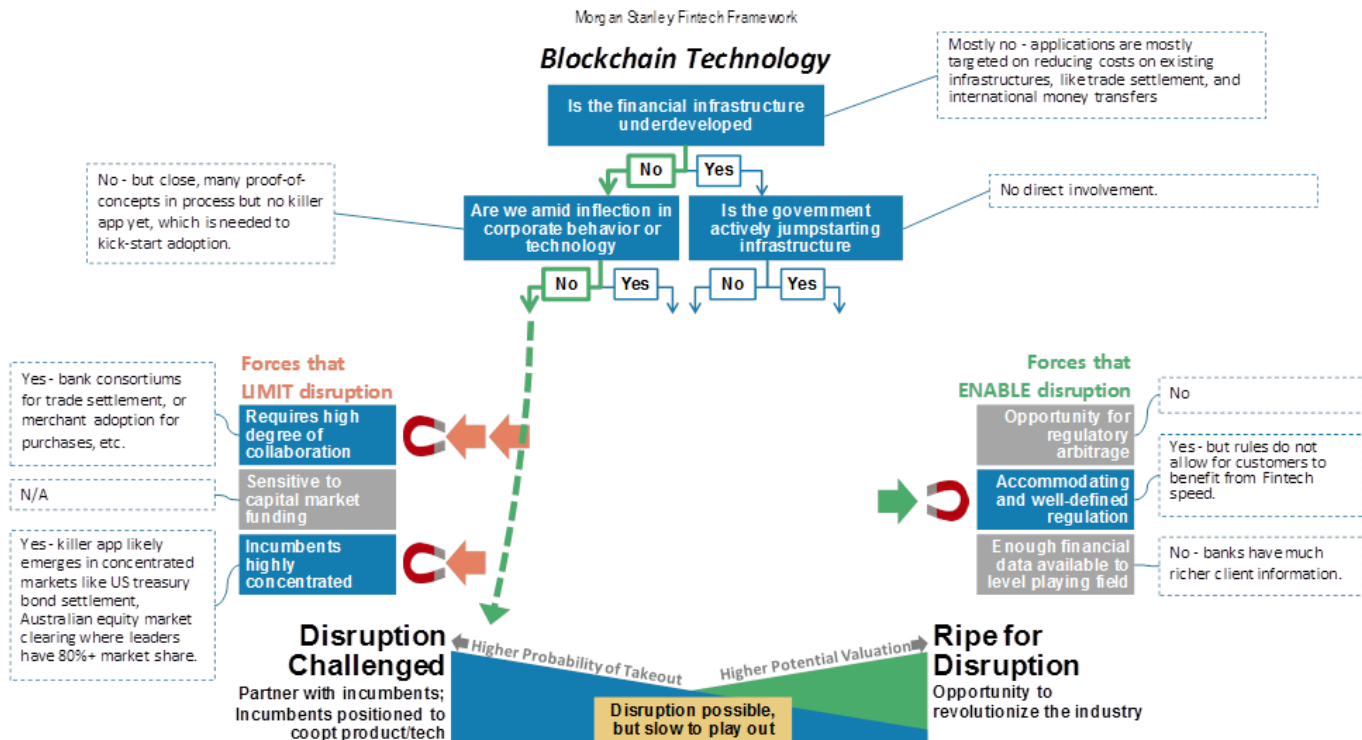
Yes

- ✓ GS
 - On a case-by-case basis
 - Requires 100% margin for some trades
 - Exploring the potential for market-making
- ✓ ABN Amro
 - Only for certain clients who request approval in writing
 - Assesses client's trading systems and track record in meeting risk limits
- ✓ Interactive Brokers
 - Allows investors to take a short position
- ✓ Wedbush Securities

No / Still Reviewing

- ✗ JPM
- ✗ BAC
- ✗ C
- ✗ RBC
- ✗ SocGen

Blockchain through the MS FinTech Gauntlet



Where Blockchain Works Best, First

- Trusted/known participants on both sides of transaction – e.g. B2B payments
- Transaction fee rates at risk from more efficient technology – Cross-border payments
- Trade settlement
- Client data handling – KYC, Client Onboarding etc. (although APIs may be more efficient)

Banks Around the Globe Testing Blockchain Across a Wide Range of Use Cases

| Europe | Use case | Status |
|-------------------|------------------------------|------------------------------------|
| ABN Amro | Escrow management solution | Commercially launched |
| Allied Irish Bank | Domestic interbank payments | Pilot |
| BNP Paribas | Trade finance | Pilot |
| Credit Suisse | Syndicated loans | Commercial launch expected in 2018 |
| Deutsche Bank | Know Your Customer | Proof of concept |
| Societe Generale | Agricultural commodity trade | Successful testing |

| North America | Use case | Status |
|-------------------------|---|------------------|
| Bank of America | Trade finance | Proof of concept |
| Bank of New York Mellon | US Treasury bond settlement | Rolled out |
| Citigroup | Digital payment solution for private securities | Pilot |
| Goldman Sachs | Equity swap trading | Testing |
| JP Morgan | Cross-border payments | Patent filed |
| Wells Fargo | Private label MBS securitization | Testing |

| Asia | Use case | Status |
|----------------------|-------------------------------------|--------------------|
| HSBC | Trade finance | Successful testing |
| Hana Financial Group | Digital loyalty network | Building |
| Korean Banks | Customer identification | Pilot |
| Mizuho FG | Derivatives trading | Successful testing |
| Woori | Cross border transaction processing | Pilot |

Banks' Response to Blockchain: Proofs of Concept Proliferate

Marco Polo Initiative

BNP, Commerzbank, ING, TradelX, R3

What: a solution for post-shipment trade financing powered by the TiX platform from TradelX and R3 Corda blockchain technology

Roll Out: Announced intentions to pilot

Fusion LenderComm

BNP, BNY Mellon, HSBC, ING, State Street

What: blockchain-based online marketplace for syndicated loans, offering real-time credit agreement, etc. directly from agent bank loan servicing platforms to lenders

Roll Out: Became commercially available in Apr. 2018

Distributed Ledge for Swap Trading

GS, JPM, Citi

What: tracks swaps contracts post execution, record amendments or terminations of the deals, stock splits and dividends.

Roll Out: Completed pilot

Key Infrastructure Use Cases of Blockchain by Banks



BNY Mellon

What: Blockchain-based platform for US treasury bond settlement. Serves as an internal backup to the core system

Roll Out: In use at BNY Mellon

Utility Settlement Coin

BARC, BK, CIBC, CS, DB, HSBC, MUFG, NEX, SAN, STT, UBS, Clearmatics

What: Asset-based digital cash instrument on blockchain technology for global institutional financial markets

Roll Out: Entering Phase IIIb of pilot



JPM launched with 75 participating banks

What: Leveraging Quorum, a permissioned variant of Ethereum developed by JPM, to deliver faster international payments for correspondent banks

Roll Out: Launched September 25, 2018



ASX, Australia's Stock Exchange

What: Retooling legacy systems from CHES to Distributed Ledger on Digital Assets Holdings Platform

Roll Out: Targeting Release 2Q 2021

Key Infrastructure Use Cases of Blockchain by Banks



Prudential

Product: Fasttrack Trade

What: teamed up with StarHub in Singapore to launch a blockchain-based digital trade platform for SMEs to be able to find business partners and distributors, make payments, and track goods

Announced: November 2017

Roll Out: In service



ING

Product: Zero-Knowledge Set Membership

What: cryptographic method that allows a party to prove to another party that a given system is true, without conveying additional information

Announced: November 2017

Roll Out: In service



Fidelity

Product: Trade Platform

What: plans to build a scalable infrastructure and the platform will custody bitcoin, ethereum and others. Fidelity will hold the cryptocurrencies in cold storage.

Announced: October 2018

Roll Out: Early 2019



Santander

Product: One Pay FX

What: a blockchain based app for cross-border FX, initially to be rolled out for Santander's customers in Spain, U.K., Brazil and Poland

Announced: May 2016 (Spain) April 2018 (others)

Roll Out: In service

Blockchain Use Cases by Corporates



MetLife Asia

Product: Vitana

What: world's first automated insurance product for gestational diabetes launched in Singapore. Utilizing blockchain to securely connect customers' electronic medical records via mobile device in order to issue an insurance policy within minutes

Announced: August 2018

Roll Out: In service



Pemex

Product: Beluga Pay

What: pilot program begins with one Pemex gas station that will allow payment via the cryptocurrency Beluga Pay. Target is to onboard over 100 gas stations using Beluga Pay.

Announced: November 2017

Roll Out: In service



Maersk

Product: TradeLens

What: Maersk and IBM announced intent to establish a joint venture to conduct global trade using blockchain. TradeLens is their distributed ledger technology (DTL) platform for supply chain. TradeLens currently has only one carrier on the platform, Pacific International Lines

Announced: January 2018

Roll Out: In service



Walmart

Product: Walmart Food Traceability Initiative

What: Walmart is asking suppliers to trace leafy green products back to the farm by using a blockchain technology platform built in collaboration with IBM

Announced: September 2018

Roll Out: September 2019

Blockchain's Final Stop?

amazon

The Amazon logo, featuring the word "amazon" in a bold, lowercase, sans-serif font. Below the text is a thick, orange curved arrow that starts under the 'a' and points towards the 'n'.

IBM

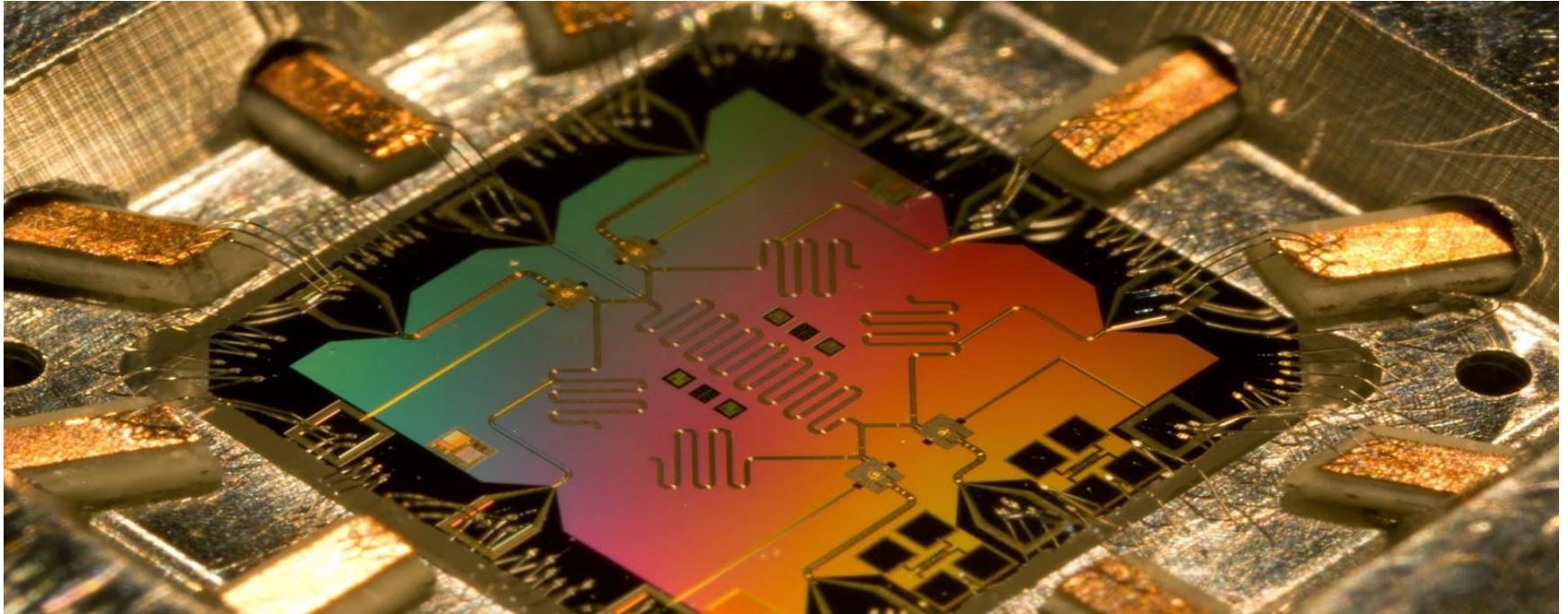
 Microsoft

The Microsoft logo, consisting of four colored squares (red, green, blue, and yellow) arranged in a 2x2 grid, followed by the word "Microsoft" in a grey, sans-serif font.

Source: Clipart.com, Morgan Stanley Research

AI and Blockchain are Mortal Enemies

Watch out for Quantum Computing



Source: clipart.com, Morgan Stanley Research

MS Research on Cryptos/Blockchain

- [Diversified Financials: Exploring global cryptocurrency regulations \(21 Aug, 2018\)](#)
- [Cryptocurrency: Why a Country May Be Interested in Digital Currency \(8 May, 2018\)](#)
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- [Brokers: Will Bitcoin Futures on CME & CBOE Open the Door for Discount Brokers? \(7 Dec 2017\)](#)
- [Freight Transportation: Blockchain in Freight Transportation: Early Days Yet but Worth the Hype \(24 Nov 2017\)](#)
- [Payments and Processing: Bitcoin, Ethereum, XRP: Decrypted! Takeaways \(21 Sep 2017\)](#)
- [Payments and Processing: Decrypted! 9 Key Questions Going into our Crypto/Blockchain Event \(18 Sep 2017\)](#)
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- [Western Union Co: Circle and Ripple Bringing the Blockchain Risk \(19 Jun 2017\)](#)
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|--------------------------|-------------------|---------------|----------------------------------|-------------------|----------------------------|---|--------------------------------|
| | COUNT | % OF TOTAL | COUNT | % OF TOTAL IBC | % OF RATING CATEGORY | COUNT | % OF TOTAL OTHER MISC |
| Overweight/Buy | 1178 | 37% | 308 | 42% | 26% | 562 | 40% |
| Equal-weight/Hold | 1378 | 44% | 343 | 46% | 25% | 625 | 44% |
| Not-Rated/Hold | 49 | 2% | 5 | 1% | 10% | 7 | 0% |
| Underweight/Sell | 554 | 18% | 83 | 11% | 15% | 224 | 16% |
| TOTAL | 3,159 | | 739 | | | 1418 | |

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Disclaimer (cont'd)

INDUSTRY COVERAGE: Payments and Processing

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (10/26/2018) |
|---------------------------------------|----------------|---------------------|
| James E Faucette | | |
| Automatic Data Processing Inc (ADP.O) | E (11/14/2017) | \$136.35 |
| Evertec Inc (EVTC.N) | E (08/08/2013) | \$23.95 |
| First Data Corp. (FDC.N) | E (06/28/2017) | \$21.60 |
| Fleetcor Technologies Inc (FLT.N) | O (10/16/2014) | \$188.40 |
| Global Payments Inc (GPN.N) | E (10/03/2014) | \$112.04 |
| GreenSky Inc (GSKY.O) | O (06/18/2018) | \$12.68 |
| LendingClub Corp (LC.N) | E (07/19/2018) | \$3.13 |
| MasterCard Inc (MAN) | O (03/28/2016) | \$197.49 |
| MoneyGram International Inc (MGI.O) | E (06/18/2013) | \$4.10 |
| On Deck Capital Inc (ONDK.N) | U (07/19/2018) | \$6.81 |
| Paychex Inc (PAYX.O) | E (08/16/2017) | \$64.01 |
| PayPal Holdings, Inc. (PYPL.O) | O (10/11/2017) | \$83.37 |
| Square Inc (SQ.N) | E (03/28/2016) | \$71.12 |
| Total System Services Inc. (TSS.N) | E (06/18/2013) | \$91.48 |
| Visa Inc. (V.N) | O (03/28/2016) | \$137.74 |
| Western Union Co (WU.N) | U (02/02/2015) | \$17.62 |
| WEX Inc (WEXN) | E (07/09/2014) | \$172.37 |
| Worldpay Inc (WP.N) | O (01/22/2018) | \$90.41 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

Disclaimer (cont'd)

INDUSTRY COVERAGE: Banking - Large Cap Banks

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (10/26/2018) |
|--|----------------|---------------------|
| Betsy L. Graseck, CFA | | |
| Ally Financial Inc (ALLY.N) | E (12/20/2016) | \$24.36 |
| American Express Company (AXP.N) | E (01/25/2016) | \$101.25 |
| Bank of America (BAC.N) | O (04/23/2013) | \$26.39 |
| BB&T Corporation (BBT.N) | E (01/07/2018) | \$46.48 |
| BNY Mellon (BK.N) | O (01/19/2018) | \$45.47 |
| Capital One Financial Corporation (COF.N) | E (09/08/2017) | \$85.75 |
| Citigroup Inc. (C.N) | O (11/14/2016) | \$64.21 |
| Discover Financial Services (DFS.N) | O (01/28/2014) | \$67.42 |
| Goldman Sachs Group Inc (GS.N) | O (10/26/2015) | \$212.36 |
| J.P.Morgan Chase & Co. (JPM.N) | O (07/05/2017) | \$103.42 |
| Northern Trust Corp. (NTRS.O) | U (11/28/2011) | \$88.49 |
| PNC Financial Services (PNC.N) | E (07/25/2013) | \$119.45 |
| Regions Financial Corp (RF.N) | E (02/11/2016) | \$16.06 |
| Santander Consumer USA Holdings Inc (SC.N) | E (12/20/2016) | \$17.63 |
| State Street Corporation (STT.N) | O (09/04/2018) | \$66.39 |
| SunTrust (STI.N) | O (01/07/2018) | \$59.56 |
| Synchrony Financial (SYF.N) | E (09/08/2017) | \$27.98 |
| U.S. Bancorp (USB.N) | U (11/14/2016) | \$50.91 |
| Wells Fargo & Co. (WFC.N) | E (07/02/2018) | \$51.25 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.