



Update: Libra, Bitcoin and Cryptos

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Blockchain/Cryptocurrency: What's Been Going On?

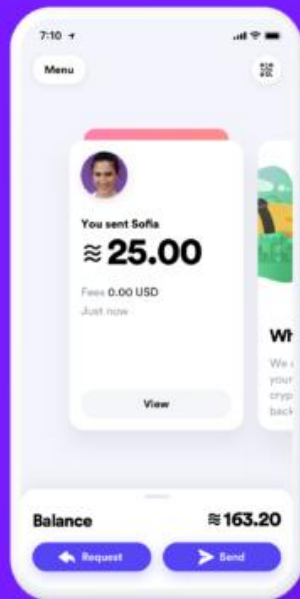
Four Key Takeaways

1. **Facebook/Libra:** Governments have concerns. So do some other crypto-enthusiasts. But some like it.
2. **Bitcoin/Crypto prices rebound—Results:**
 - a. **Bitcoin trading increasingly using USD Tether:** Cryptocurrency demand and cheaper trading costs versus fiat have increased “reported” volumes of BTC to Tether.
 - b. **Claims of more institutional activity:** Anecdotally, there is a resurgence in institutional interest.
 - c. **Activity:** Trading volumes have rebounded, but well below peaks, and even below volumes when last at these price levels.
3. **ICOs have largely stopped—now there are IEOs (Initial Exchange Offerings):** Initiatives now issuing through exchanges which handle KYC, etc. More centralization through exchanges.
4. **Environmental issues tied to Bitcoin mining likely to reemerge.**

Breaking It Down: Libra & Calibra

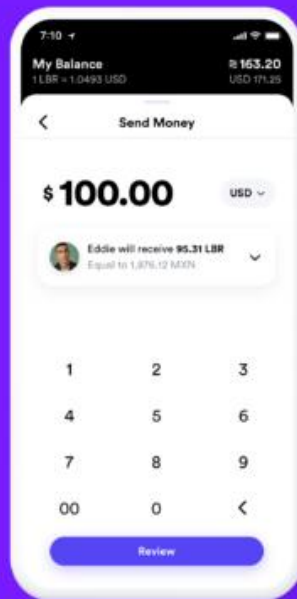
What is Libra?

In June, [Facebook](#) announced the plan to launch a global and **digitally native reserve-based cryptocurrency** with the goal of enabling money transfer in a low cost and secure way. Libra will function as a “stablecoin,” meaning that it will be backed by a reserve of real assets.



What is Calibra?

The **digital wallet that will store the Libra currency**. This wallet will be offered for use via Facebook as well as Facebook's messenger apps (including WhatsApp).



Breaking It Down: The Libra Association

What is the Libra Association?

An independent, not-for-profit membership organization which will oversee the development of the token.

- Each founding member paid a minimum of \$10mn to join
- Each founding member gained one vote in the Libra Association council
- Each founding member may be entitled to **share part of the dividends from interest earned on the Libra reserve** (proportionate to their investment)

At creation, there are 28 founding members (right).




Libra: Our Perspective vs. Media Perspective

Our Perspective


- We believe Libra will face challenges and regulatory hurdles. The Mastercard executive handling the Libra relationship said in a Reuters article, “[Facebook's cryptocurrency ambitions face privacy concerns, political backlash](#)” that there have been discussions with lenders who are waiting to see how regulators and consumers respond to the project before deciding whether to join. Despite investing ~\$10mn each into the partnership, we believe the companies view this opportunity cautiously.
- Libra may be able to improve cross border commerce but it will look a lot like other efforts to hold money “on platform” such as gift cards, legacy PYPL, SQ Cash App, etc. The difference is that FB courted “partners” to put up capital to allow faster and more stable rates on cross border, making cross border commerce better for consumers.

Media Perspective


Metro
 Donald Trump 'not a fan' of cryptocurrencies, Bitcoin, Facebook Libra
 'Similarly, Facebook Libra's "virtual currency" will have little standing or ... headlines that Libra is only associated with Facebook, but that is not ...
 8 hours ago




TNT Magazine
 Why the Future Is Private with Facebook's Libra
 Libra, Facebook's first cryptocurrency is already making the headlines right after its launch. It will allow you to make international payments via ...
 3 hours ago




Nasdaq
 Is The Mainstream Adoption of Blockchain Overhyped?
 As bitcoin's bull run dominates headlines, critics including US ... such as Facebook's Libra project dominate the headlines, as well as the FCA ...
 11 hours ago



TheStreet.com
 Another Day, Another Market High? Jim Cramer on the Markets, Libra and Prime Day
 Real Money Stock of the Day Facebook's Libra, the digital currency that ... this summer, has been hitting the headlines throughout the week.
 6 hours ago



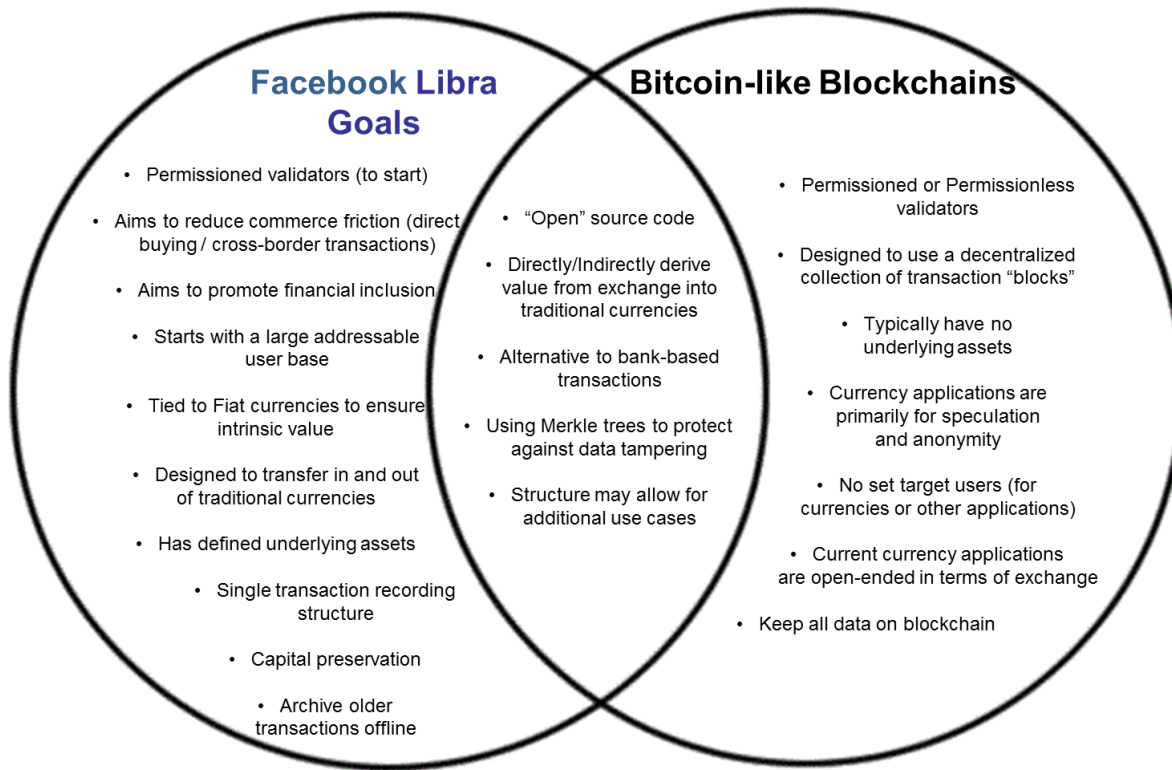
Forbes
 The Real Threat From Facebook's Libra Coin
 Facebook's Libra cryptocurrency is generating an immense amount of hype. Some hail it as the beginning of the end of sovereign fiat ...
 1 week ago



Libra: The Payments Perspective

- We do not see **Libra as a major threat to the networks (e.g. Visa, Mastercard)**. However, we do think that **V/MA's participation in the Libra group increases the political and regulatory risk** for both companies.
- Both companies support Libra as founding members of the Libra Association and each invested ~\$10mn, giving them a say in the platform's direction.
- We do not see the platform's digital wallet, Calibra, taking share from PYPL since it is entering an already crowded space.
- We think that **Libra is less of a true blockchain-based currency, and more of a secured intermediary** between traditional currencies and certain marketplaces, at least based on the released details. This is also known as stablecoin.
- WeChat/Tencent have transformed the Chinese payments industry with their digital wallets. However, both platforms utilize Chinese Yuan, instead of their own currency or a stablecoin.
- Other blockchain-based currencies tend to have no singular targeted use case, are primarily vehicles for speculation/often offer anonymous transacting rather than reducing payments friction, and tend to pursue decentralization. Libra is clearly designed to hold a relatively stable value, and is going to start at least with permissioned validation and backing from select partners.

Libra: The Payments Perspective



Libra: The Internet Perspective

- With opportunities like Instagram commerce growing to ~\$4bn+ annually and future opportunities through FB/Messenger/WhatsApp, it is important for the company to create a frictionless, scaled payment option. Additionally, we believe FB is likely to have to fund rewards to drive Libra user adoption. ([What's in the Horoscope? 6 Questions on FB's Libra Cryptocurrency](#))

Libra: The Banking Perspective

- **What legitimate corporate or consumer global payments need** exists that a FB-led crypto consortium can uniquely fill? **In our view, none.** In the US, consumers can already send each other funds peer-to-peer (P2P) with either Zelle or PayPal and corporates can send money via the clearing house real time payment network that started last year. ([Large Cap Banks: What Large Cap Bank Investors Are Asking: Does FB Really Want to Reinvent the Fed?](#))
- **Stablecoin challenges Central Bank Authority** while utilizing Central Bank assets as backing for transaction. Expect significant regulatory response. Vice Chair Quarles (who doubles as Chair of the Financial Stability Board) said one of the mandates coming out of the G20 meeting in July is for the FSB to look at stablecoins... “[we will be deeply engaged over the next several months](#)” on this topic (at 1:21:50)
- **Concern around Libra as a tool for money laundering.** The Libra white paper states that “Libra Blockchain is pseudonymous and allows users to hold one or more addresses that are not linked to their real-world identity.” Inconsistent with Anti-Money Laundering/Bank Secrecy Act rules. Banks that have not met these criteria have faced significant fines and costs to ensure their information systems meet regulatory standards.
- **Unproven claims on efficiency.** Users will be charged when exchanging fiat into Libra and vice versa. Will this be more efficient than the FX with \$5T+ in daily average trading volume?
- **Will JPM ultimately have a better mousetrap?** JPM’s [Interbank Information Network](#) (IIN), powered by Quorum, a permissioned variant of the Ethereum blockchain, currently offers AML/KYC connectivity between 259 banks across the globe. We expect that payments will eventually be turned on too by leveraging [JPM Coin](#). Perhaps the Libra discussion encourages that to happen sooner.

Libra: The Congressional Perspective

June 18

Welcome to the official



White Paper

Waters Statement on Facebook's Cryptocurrency Announcement

Washington, DC, June 18, 2019

“Given the company’s troubled past, I am requesting that Facebook agree to a moratorium on any movement forward on developing a cryptocurrency until Congress and regulators have the opportunity to examine these issues and take action. Facebook executives should also come before the Committee to provide testimony on these issues.”

Source: financialservices.house.gov, Morgan Stanley Research

July 2

Committee Democrats Call on Facebook to Halt Cryptocurrency Plans

Washington, DC, July 2, 2019

“Because Facebook is already in the hands of over a quarter of the world’s population, it is imperative that Facebook and its partners immediately cease implementation plans until regulators and Congress have an opportunity to examine these issues and take action. During this moratorium, we intend to hold public hearings on the risks and benefits of cryptocurrency-based activities and explore legislative solutions. Failure to cease implementation before we can do so, risks a new Swiss-based financial system that is too big to fail.”
– Maxine Waters (Chairwoman House Financial Services Committee)

Libra Regulation: What to Expect Next?

Key Dates:

- **July 16th:** The U.S. Senate Banking Committee hearing
- **July 17th:** House Financial Services Committee hearing

Libra Representation:

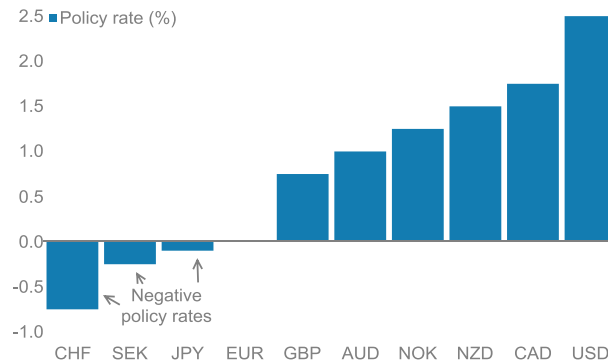
- David Marcus – Head of Calibra at Facebook
- On Tuesday July 9th, Marcus responded to questions from the U.S. Senate Banking Committee by [saying](#), “We understand that big ideas take time, that policymakers and others are raising important questions, and that we can’t do this alone. We want, and need, governments, central banks, regulators, non-profits, and other stakeholders at the table and value all of the feedback we have received.”

Libra: Currency Creation and the Reserve that Backs Libra

- Libra is to be backed by a portfolio of assets called the “[reserve](#)” which is why it can be called a **stablecoin**.
- When the **reserve** is first created the **funds come from two places**:
 - 1) Investors buy a separate investment token (give Facebook fiat in return for token)
 - 2) Any users convert fiat to Libra (give Facebook fiat in return for Libra)
 Reserve size will grow with more users converting their fiat to Libra
- **The reserve will be allocated** into low volatility liquid assets denominated in multiple currencies such as:
 - Bank deposits
 - Short dated government securities
 - Anything else with low volatility

Which currencies could be included?

- Require: High credit rating, low inflation, low volatility, liquid, front-end rates markets. The cash flow from these investments are paying for the operation of Libra so positively yielding assets are required on average. Limited to USD, CAD and GBP in DM and potentially some low inflation EMs. EUR likely included but interest is negative so other currencies’ asset yields need to compensate for that.
- Libra compares the system with the HKMA’s currency board but notes the HKMA only manage versus one fiat currency, the US dollar, Libra will have several.



Libra: What Owners of Libra Can and Can't do with the Currency

- ✓ Exchange Libra for products and services from vendors on the Libra blockchain.
- ✓ Exchange Libra for select fiat currencies via authorized resellers (like market makers) for a spread relative to the value of the reserve.
- x No interest received even if deposit rates are high for one of the currencies in the reserve. E.g. US deposit rates are currently over 2%. The interest earned goes towards Facebook's costs for running the system and to pay dividends to initial investors.
- **FX:** If a user wants to convert their Libra to local fiat currency (e.g. EUR) they will be exposed to the daily fluctuations of their local fiat currency to the value of the reserve. As most currency pairs trade versus US dollar, we assume in the end the user is just exposed to the fluctuations of the US dollar.
- **Volatility:** The user will also be exposed to the daily liquidity of the reserve relative to the "authorised reseller" or market maker that they go to. On days of high fiat currency volatility (e.g. 3% move in EURUSD) then the user will be exposed to those changes depending on how frequently during the day the authorised reseller adjusts their exchange rate for Libra.

Libra: The Macro Economic/Exchange Rate Considerations

- The design of the Libra infrastructure assumes the following for the countries where users are located/fiat currencies exchange for Libra:
 - Inflation remains low (assume < 2.5%)
 - Fiat currency volatility is low versus US dollar
 - Central bank rates remain low.
- The system incentivises spending within the ecosystem over saving in Libra.
For example when a country's inflation rate starts to rise:
 - Within the current central bank system, bank deposit rates theoretically would rise with inflation. A saver can thus receive interest by depositing money in a bank. The value of the currency is thus eroded less than...
 - Within the Libra system, Facebook will take the fiat currency and earn the interest by depositing it in the bank. Facebook receives the interest and the user receives only access to the Libra network. Libra currency valuation from the users' perspective will decline over time.
- Libra wants to focus on **capital preservation** but as long as Libra is backed by fiat currency and real deposit rates are positive (interest received is higher than rate of inflation) then from a currency perspective the only benefits the user gains are the use of the payment network and possibly discounts from vendors.
Conclusion: Libra aims to be an alternative payment vehicle (currency) to the US dollar and other fiat but instead of offering interest rates for depositing/lending, they will offer payment services on the network (either for discounts/speed of transaction).

Questions for Further Exploration

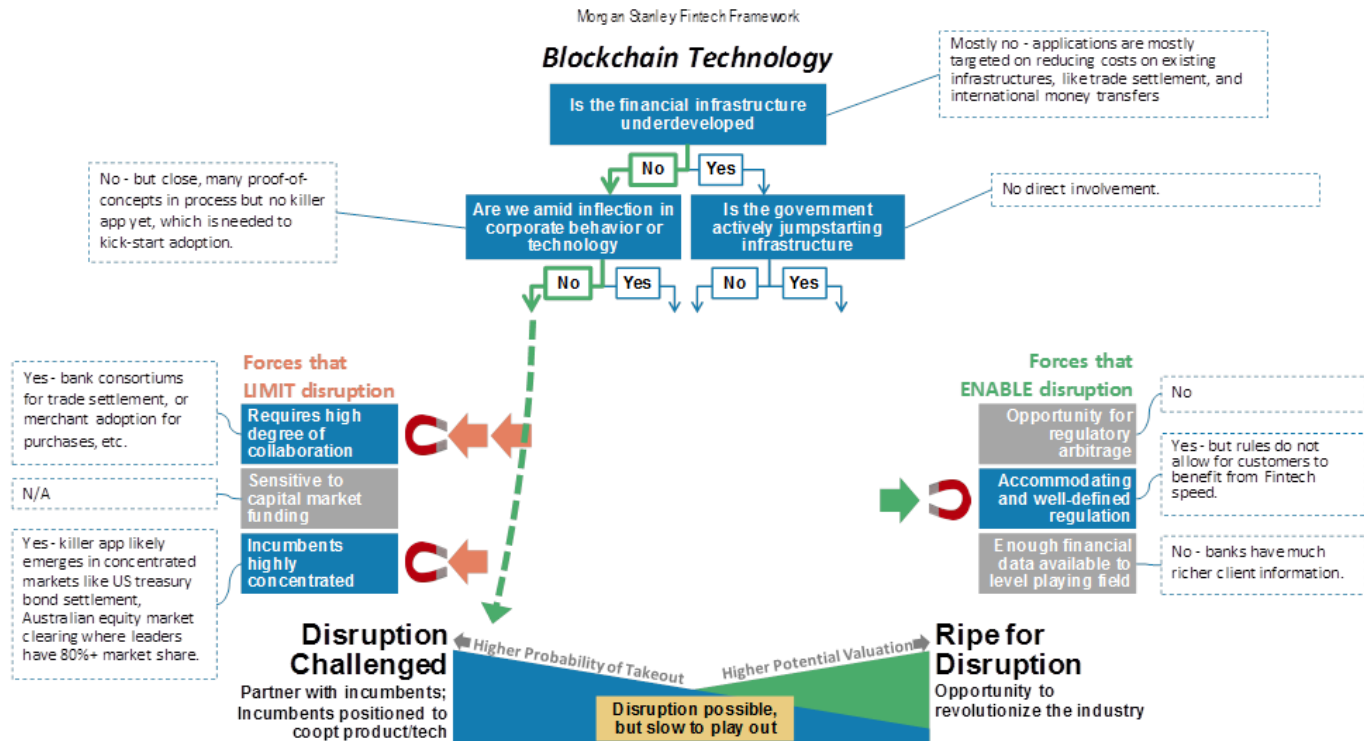
- How likely is Libra able to work through its regulatory struggles? Will the cryptocurrency survive if any of their partners back out? We expect to hear analysts question Visa and Mastercard's involvement during the upcoming earnings cycle.
- Binance, one of the world's largest cryptocurrency exchanges by trading volume, will soon launch its capability for futures trading. How will Binance continue to dominate the space despite hacks and other regulatory issues?
- On April 25th, the [New York Attorney General](#) sued Bitfinex and Tether for all documents pertaining to an alleged ~\$850mn loss. USDT is the most widely used stablecoin but after Binance suffered a \$40mn hack, the company suspended deposits and withdrawals for a week. What would happen to crypto markets should USDT availability dry up?
- As we see a shift in funding from ICOs to IEOs, how will this impact the overall space? Where will IEOs look for funding and would institutions play a part in this? Will lack of technology development cause Bitcoin dominance to rise and see reduced trading in altcoins?

Bitcoin & Cryptocurrency Update

Bitcoin Market Update

- **Prices:** Bear market has ended for now (BTC \$4k-11k in 2019), reported exchange volumes are up (maybe?)
- **Trading pair:** USDT (Tether) is the dominant trading pair versus bitcoin (75%)
- **BTC trading volumes** (according to [CoinMarketCap](#)) no longer dominated on a few larger exchanges but many exchanges competing for trading...
- ...but reported **volumes** may be incorrect if the [Bitwise report sent to the SEC](#) is confirmed. Bitwise claims that around 90% of bitcoin trading volumes are fake and that only the 10 exchanges with a BitLicense from New York should be used. Our analysis doesn't offer an opinion on this just something to be wary of when looking at increased trading volumes.
- Bitcoin price and volume gaining dominance versus **alt-coins** (65% now vs 51% in Jan 19).
- **CME futures** volumes rising to a peak in May 2019.
- **Transaction speed:** Segwit adoption rates stagnated at 50%. Lightning network usage growing.
- **5,162 Bitcoin/crypto ATMs** installed with 60% in the US ([coinatmradar](#)).

Blockchain Through the MS Fintech Gauntlet



Bitcoin/Crypto: Rapidly Morphing Thesis

Rise of IEOs



New Institutional Investment Class



Disruption Advantaged Refuge for Depreciating Currency



Store of Value



New Fundraising and Capital Allocation Mechanisms



Replacement Payment System



Incumbent Financial System Antidote



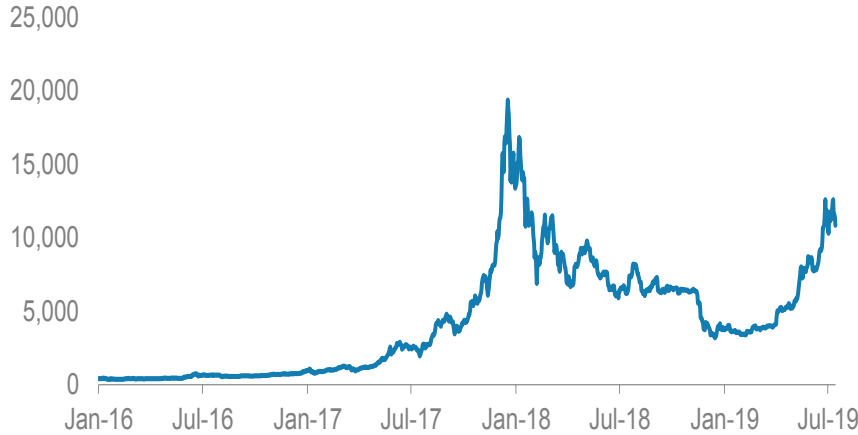
Digital Cash: Untraceable but full Confidence



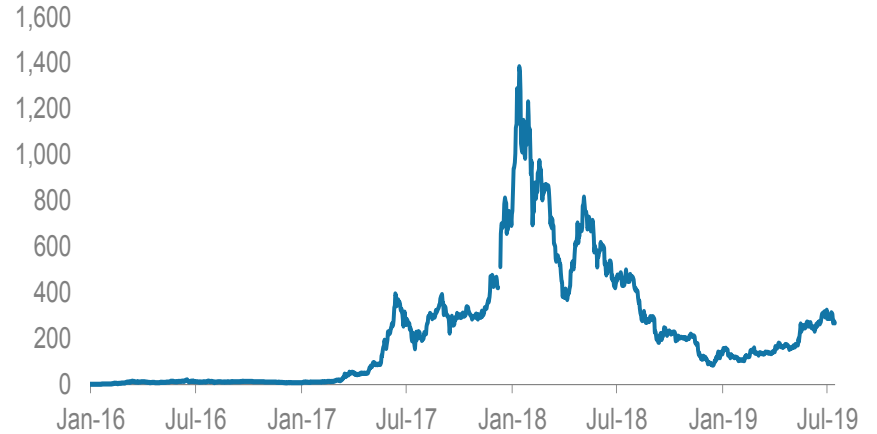
Size of the Cryptocurrency Market and Liquidity

- Bitcoin and Ethereum Value

Bitcoin value (\$)



Ethereum value (\$)

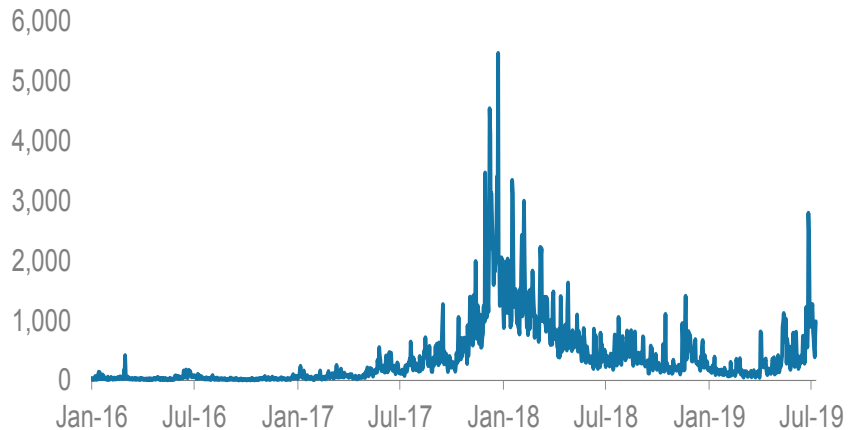


Note: Price fall is not surprising as Ethereum is not being used as heavily for ICO/IEO

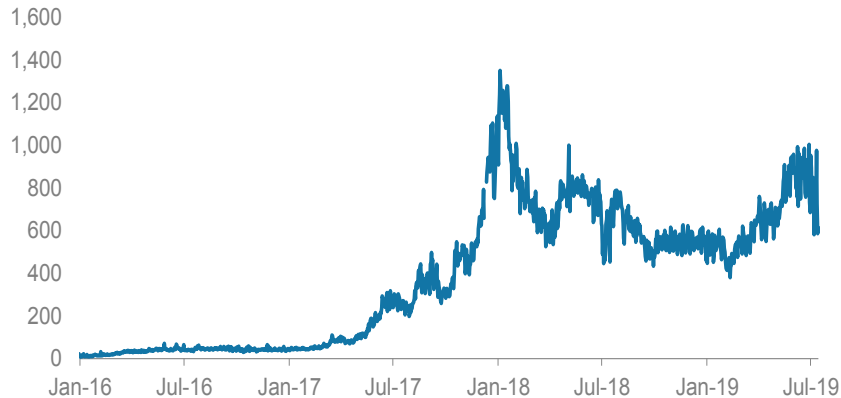
Size of the Cryptocurrency Market and Liquidity

- Trading volumes falling with prices

Bitcoin Daily Trading Volume (\$mn)



Ethereum Daily Transaction Count (thousands)



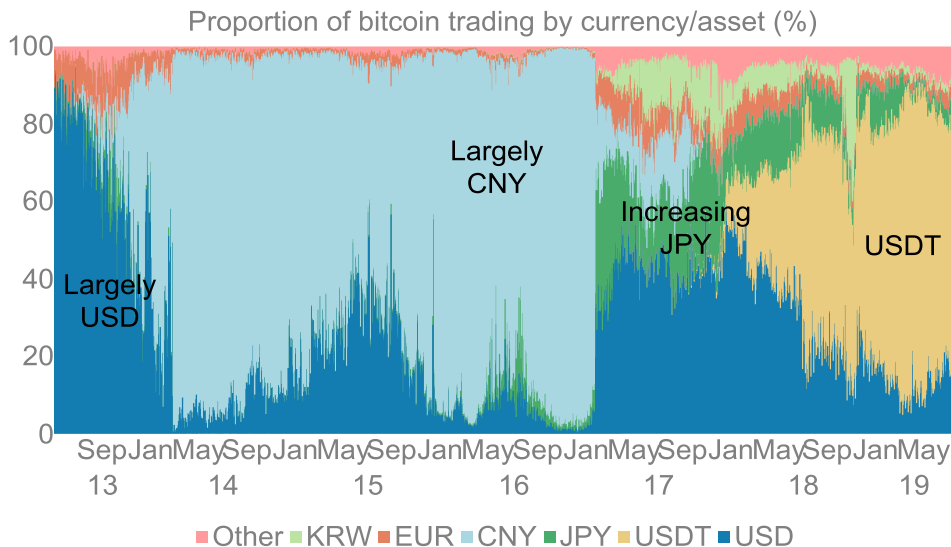
Size of the Cryptocurrency Market and Liquidity

- 66% of total cryptocurrency value is in bitcoin
- Over \$290bn spread over 2300 coins/digital assets

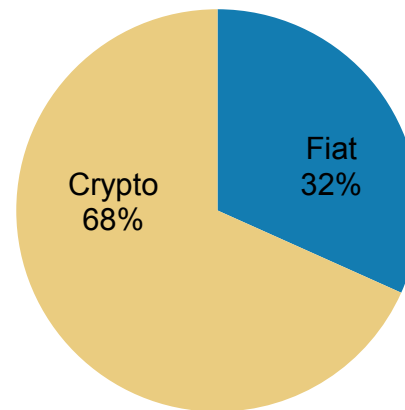
#	Name	Symbol	Price (USD)	Market Cap (USDbn)	Market Cap (% total)	Volume 24h (USDmn)	Supply (USDmn)	Supply (% max)	Max coins (mn)	Mined?
1	Bitcoin	BTC	\$10,367	185	66	25184	17.8	8500%	21	Y
2	Ethereum	ETH	\$228	24	9	10364	106.9	N/A	No	Y
3	XRP	XRP	\$0.31	13	5	1686	42566.6	4300%	100000	N
4	Litecoin	LTC	\$89	5.6	2	3971	62.7	7500%	84	Y
5	Bitcoin Cash	BCH	\$292	5.2	2	2333	17.9	85	21	Y
6	EOS	EOS	\$4.00	4.0	1	3024	923.3	N/A	No	Y
7	Binance Coin	BNB	\$28	4.0	1.4	358	141.2	N/A	No	Y
8	Tether	USDT	\$1.00	3.9	1.4	27560	3916.7	N/A	No	N
9	Bitcoin SV	BSV	\$124.00	2.2	0.8	513	17.9	8500%	21	Y
10	Stellar	XLM	\$0	1.7	0.6	279	19426.2	100	No	N

What Is Bitcoin Traded Against?

- Most trading is versus stablecoin USD-Tether (USDT) as transaction costs are lower than vs fiat.
Two thirds of reported bitcoin trading is versus a digital asset now



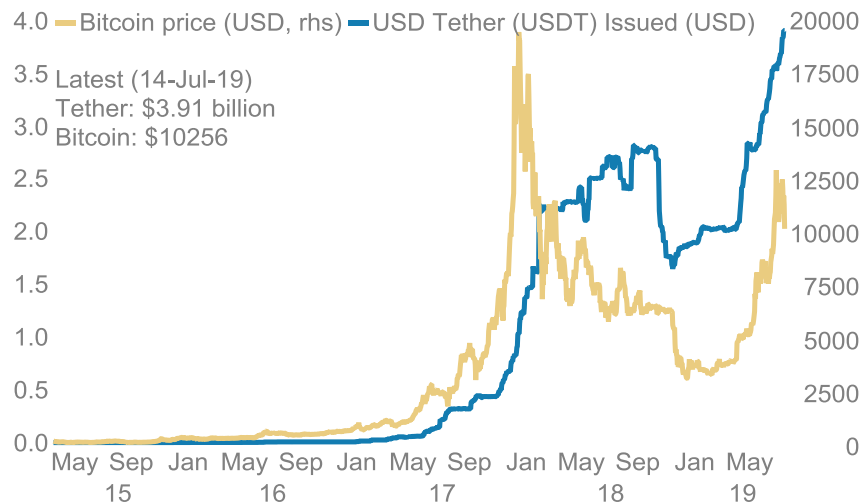
Latest (14-Jul19, 1m av)



Source: CryptoCompare, Morgan Stanley Research

Rise of the Stablecoin

- Definition: Digital coin/cryptocurrency that aims to have a stable value versus a known counterpart, keeping volatility low. Typically valued against fiat currencies, commodities and crypto assets.
- Most widely used is **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.
- Chart shows the growth of USDT demand and coins in circulation this year. Demand started rising in April 2019.
- 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 Stablecoin

What developments to watch?

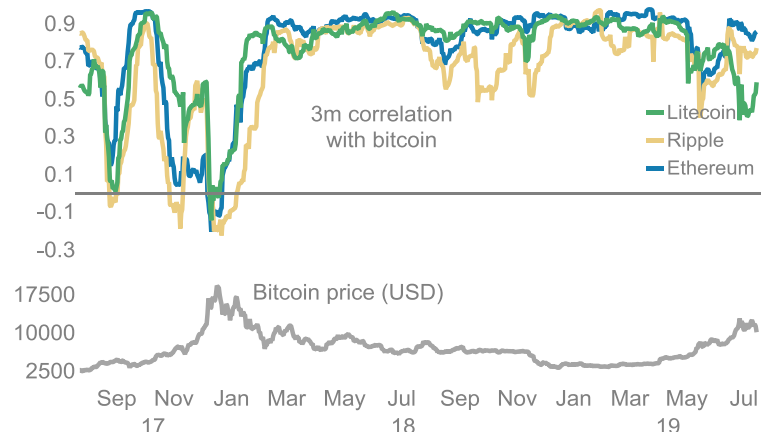
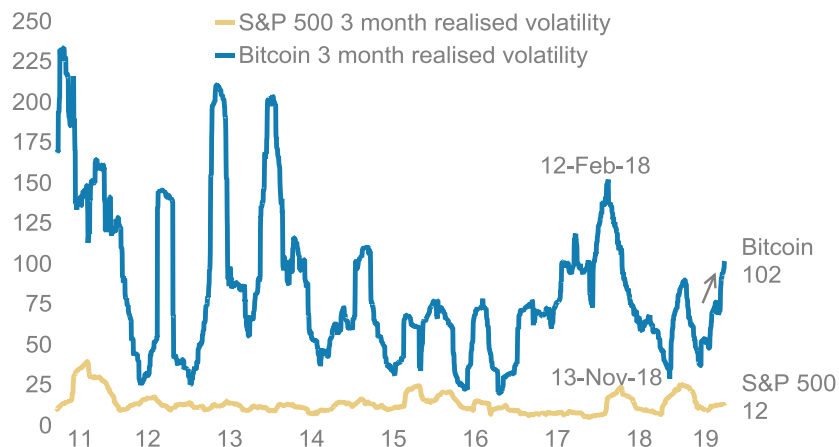
- USDT has taken the dominant share of BTC trading volumes over the past year. This occurred because many exchanges only trade crypto->crypto and not crypto->fiat. Trading crypto->fiat requires going through the banking sector which charges a higher fee.
- **Competitors to USDT** are coming along from each of the exchanges (e.g. BNB from Binance and HUSD from Huobi).
- Many large cryptocurrency exchanges and companies are creating their own stablecoins, part of the next wave of development over coming years (see pages 4-15 on Libra).
- G20 mandated FSB to look at stablecoins. Expect regulatory response after the next several months of deeply engaged review.
- 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 increase adoption.

Types of stablecoins



Bitcoin Is on the Move – How Have Other Coins Reacted?

- Realised volatility of bitcoin has picked up as prices rally. Volatility is much higher than the S&P 500.
- Cross crypto correlations has stayed high but the sensitivity of alt-coin moves to a 1% move in bitcoin have fallen. This is reflective of the slowing technological development and adoption of these alt-coins.
- Bitcoin correlation with gold and USD isn't always high and the statistical relationship is unstable.



Bitcoin Bear Market: Over and Start a New One?

Breakdown of the bear market

Dates			Bitcoin Price			Days		% change	
Start of rally	Peak	Trough	Start of rally	Peak	Trough	Start-Peak	Peak-Trough	Start-Peak	Peak-Trough
09-Apr-11	08-Jun-11	17-Nov-11	0.74	29.6	2.25	60	162	3900%	-92%
02-Oct-13	04-Dec-13	14-Jan-15	110	1240	157	63	406	1030%	-87%
11-Jan-17	06-Mar-17	24-Mar-17	778	1281	927	54	18	65%	-28%
27-Mar-17	10-Jun-17	16-Jul-17	1046	2914	1809	75	36	179%	-38%
14-Sep-17	16-Dec-17	14-Dec-18	3155	19588	3136	93	363	521%	-84%
02-Apr-19	27-Jun-19		4126	13852		86		236%	
Average						69	197	1139%	-66%

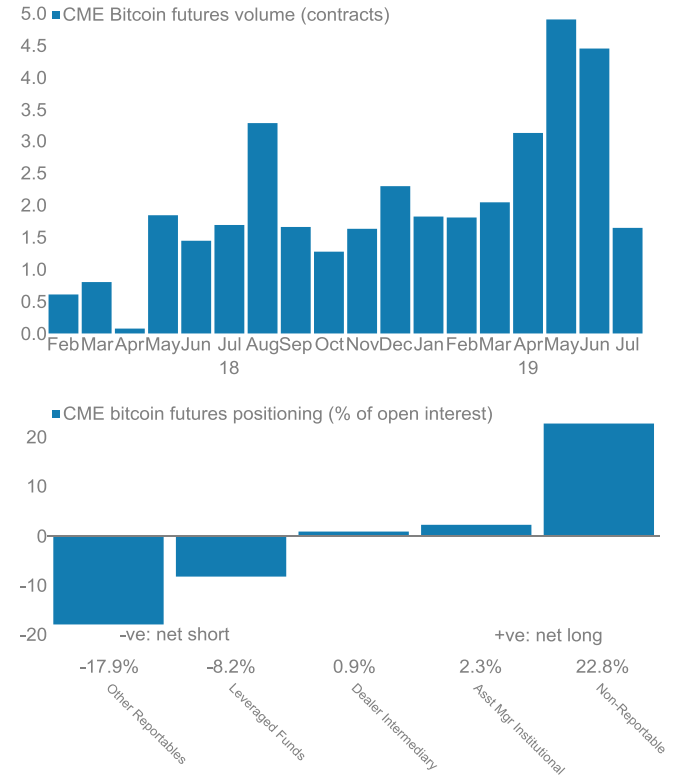
- The 2017-18 bitcoin bear market tracked the peaks and troughs from Nasdaq in the year 2000 quite well. BTC retraced 70% of the previous rally.



Source: Bloomberg, Morgan Stanley Research

Bitcoin Futures Market – CME Volumes Growing

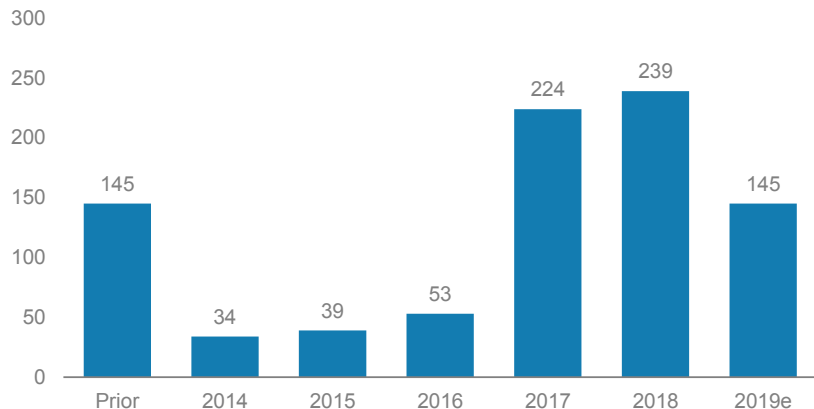
- CME bitcoin futures trading volumes rose steadily in 2019, peaking in May 2019. June saw around USD 9bn of bitcoin futures traded.
- The CBOE stopped its bitcoin futures contract in May (expired June 19th) as the CME (its competitor) took the majority of trading volumes.
- Currently it is mainly the non-traditional financial community involved in bitcoin futures. According to the CFTC, largest longs for non-reportables (we assume cryptocurrency exchanges) and shorts among the buy side not classified as leveraged funds or asset managers.
- All futures contracts are currently USD and cash settled. ICE crypto platform Bakkt is due to release a bitcoin settled futures contract later this year. The success of this contract could increase physical bitcoin demand.



Retail Investors Stay Put as Institutional Investors Get Involved

- Cryptocurrency fund AUM US\$14.35bn (CryptoFundResearch estimate).
- Types: 47% hedge fund, 50% venture capital, 3% private equity.
- Location: 48% US, 9% China/Hong Kong, 6% UK.

Number of Cryptocurrency Funds Created



Crypto Assets Under Management (USDmn)



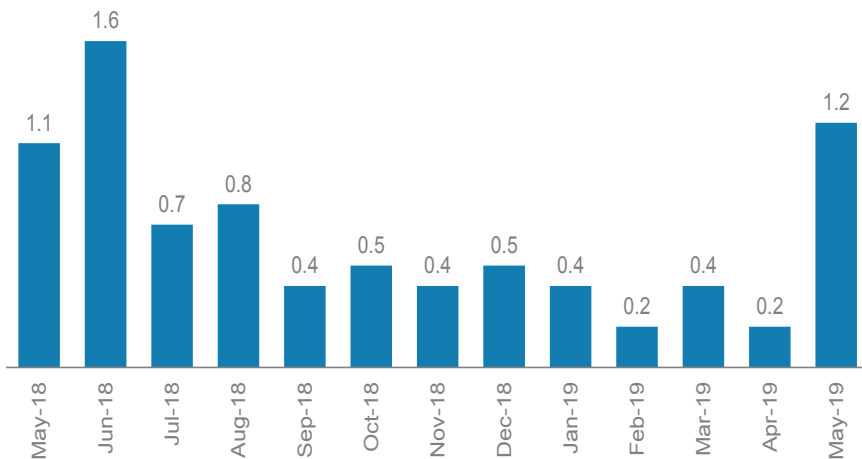
Source: CryptoFundResearch , Morgan Stanley Research

Fundraising – New Buzzword Is the IEO (No Longer ICO)

- Companies wanting to raise investment via issuing a new coin are moving away from **ICOs** (Initial Coin Offerings) where the company sells their coins on their own website and handles all the monetary transactions towards **IEOs** (Initial Exchange Offerings) where an exchange handles the issuance of the new coin and manages KYC/other regulatory burdens.
- Exchanges are rushing fast to offer IEOs with transactions occurring via their own coins. The coins are a competitor to **Ether (ETH)** whose blockchain and coin was historically the most widely accepted digital token in exchange for new coins via ICOs.
- E.g. Binance limits how many IEOs can be launched on its platform and asks coin issuers to buy the Binance coin BNB for the transaction. Exchanges offer legitimacy to the investor as the exchange is typically selective over which coins can be launched on their platform and does the KYC checks.
- Bittrex, BitMax, Huobi, KuCoin and OKEx all have their own **IEO platforms** and can be compared to the NYSE for stocks.
- **Expect centralisation**, not decentralisation as technology and costs on some of these exchanges attracts more coin issuance/trading to their platforms.

New Coin Issuance Has Been Low (Excluding the Bitfinex IEO Leo)

Total Funds Raised (\$bn)



- The bitcoin bear market depressed new coin issuance in late 2018 and early 2019.
- In May 2019, only USD0.2bn was raised via new coin issuance versus USD1.6bn in June 2018.
- Bitfinex issued \$1bn of the UNUS SED LEO coin in May which boosted new coin issuance significantly.
- According to [ICObench](#), USA based companies have raised the most via ICOs this year.

Top Digital Asset Exchanges by Volume

Trading volume (USD) including derivatives

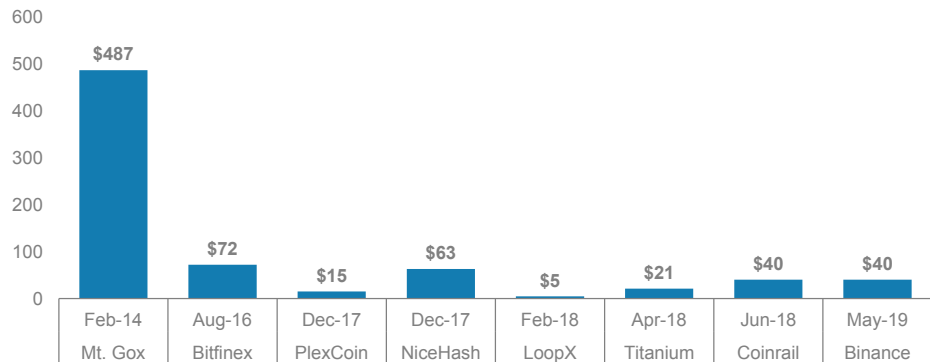
Name	24h Volume (\$bn)	7d Volume (\$bn)	30 d Volume (\$bn)
BitMax	\$11.7	\$69.1	\$215.3
BitMEX	\$5.9	\$36.4	\$179.0
OKEx	\$2.4	\$12.6	\$59.5
Binance	\$2.1	\$12.7	\$69.3
ZBG	\$2.1	\$10.9	\$53.9
BW.com	\$2.0	\$9.9	\$40.0
Huobi Global	\$1.9	\$11.0	\$53.1
Bit-Z	\$1.8	\$8.8	\$38.9
LBank	\$1.8	\$10.5	\$47.5
DigiFinex	\$1.7	\$9.2	\$48.4
Coinbase Pro	\$0.7	\$3.5	\$17.9

- Traders can use leverage to trade bitcoin on exchanges and the offering continues to be a competitive growth area for exchanges.
- For example BitMEX offers up to 100x leverage and others like Binance and Bitfinex hoping to offer soon. Leverage generally increases price volatility.
- The exchanges with the largest volumes are listed here. Even when adjusting for the leveraged derivatives, the largest exchanges transact multiples of the volumes traded through Coinbase. Note a [Bitwise report sent to the SEC](#) refutes volumes traded.
- We continue to expect the exchanges with lowest transaction costs and highest available leverage to dominate trading volume rankings.

Source: : coinmarketcap.com, Morgan Stanley Research. Data as of 1-Jul-19.

Bitcoin Thesis Evolution: Hacks & Losses

Hacks and losses: Sorry about that, no recourse (\$mn)



- 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.
- Over \$740mn total, not including other cryptocurrencies
- Response: Coinbase, others start to assume bank type responsibilities

New Institutional Class

As of July 2019 Update

- **JPM Coin**: JPM Coin is a digital coin representing \$1 held in designated accounts at JPM Chase. Issued on Quroum Blockchain, will be operable on all standard Blockchain networks. Prototype test underway with a small number of Institutional clients. Designed for B2B. Enables faster and cheaper settlements.
- **Virginia's Police Officers Retirement System & Employee's Retirement System**: Invested in Morgan Creek's new \$40mn cryptocurrency fund
- **University of Michigan Endowment**: Invested \$3mn to CNK Fund I in June 2018 and in February 2019 approved a partnership for a follow-on investment (amount unspecified)
- **Visa**: Alongside Blockchain Capital, Visa participated in a \$40mn investment round for Anchorage, a crypto startup

As of October 2018 Update

- **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

Bitcoin Breakeven

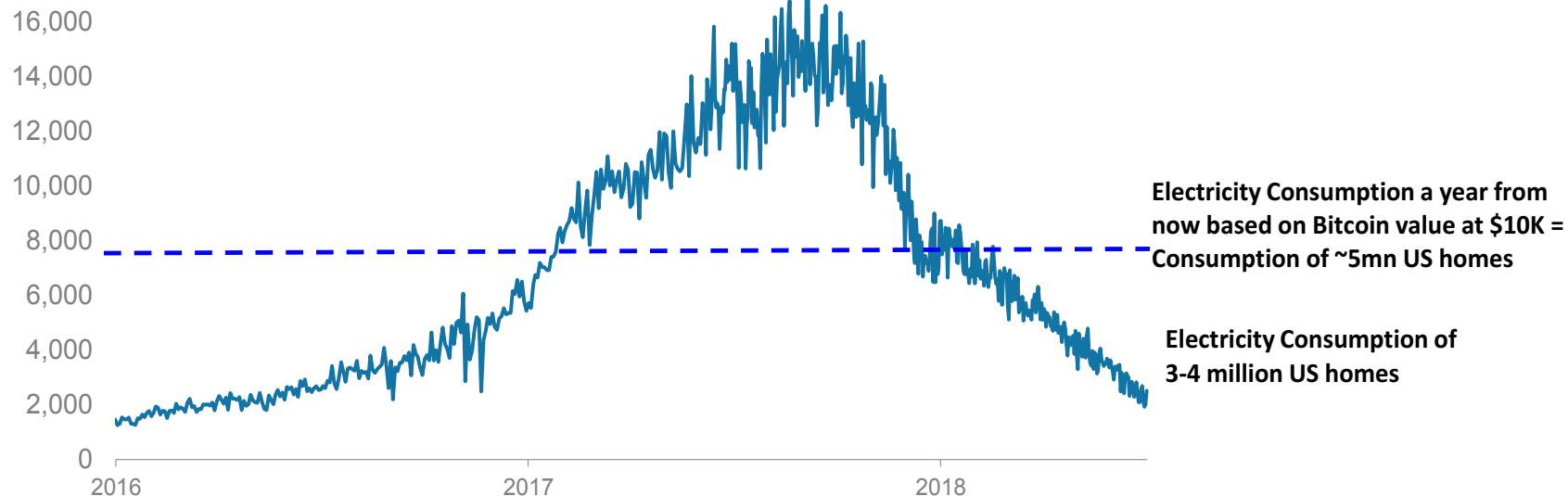
- If a regular miner uses the latest Bitmain Antminer S17 (7nm ASIC at TSMC), then the **current breakeven price would be ~\$5200**. That's assuming 1.5 year payback period with halving happening in Jun-20.
- At current Bitcoin prices of US\$11,000, the payback period would be ~4.5 months. That's assuming constant current profit per day ahead, and hardware cost of US\$1600.

BTC Energy Consumption

- We believe that an Antminer S17 would cost \$2,000 for one year of use, with a total electricity cost per year of \$426 (running on the lowest power, 1296 W or ~14,000 kWh).
- With 700,000 coins mined next year and an average BTC price of \$12,000 we believe that ~3,400,000 rigs will be online which will consume around 49bn kWh of electricity (around 4.7mn US homes)

Bitcoin and Environmentalism: Mutually Exclusive

Total Energy Consumption (Megawatts)

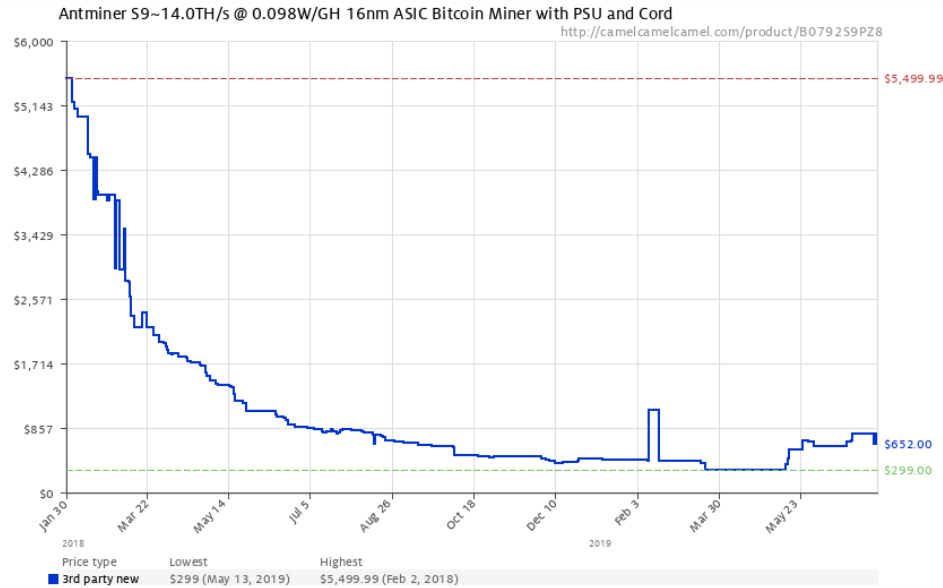


Note: Energy consumption estimated based on global mining hash rate multiplied by average Joule/gigahash/s energy usage, which we assume declines linearly from 1.5 in 2014 to 0.16 in December 2019

Source: blockchain.info, Morgan Stanley Research estimates

Falling Equipment Prices

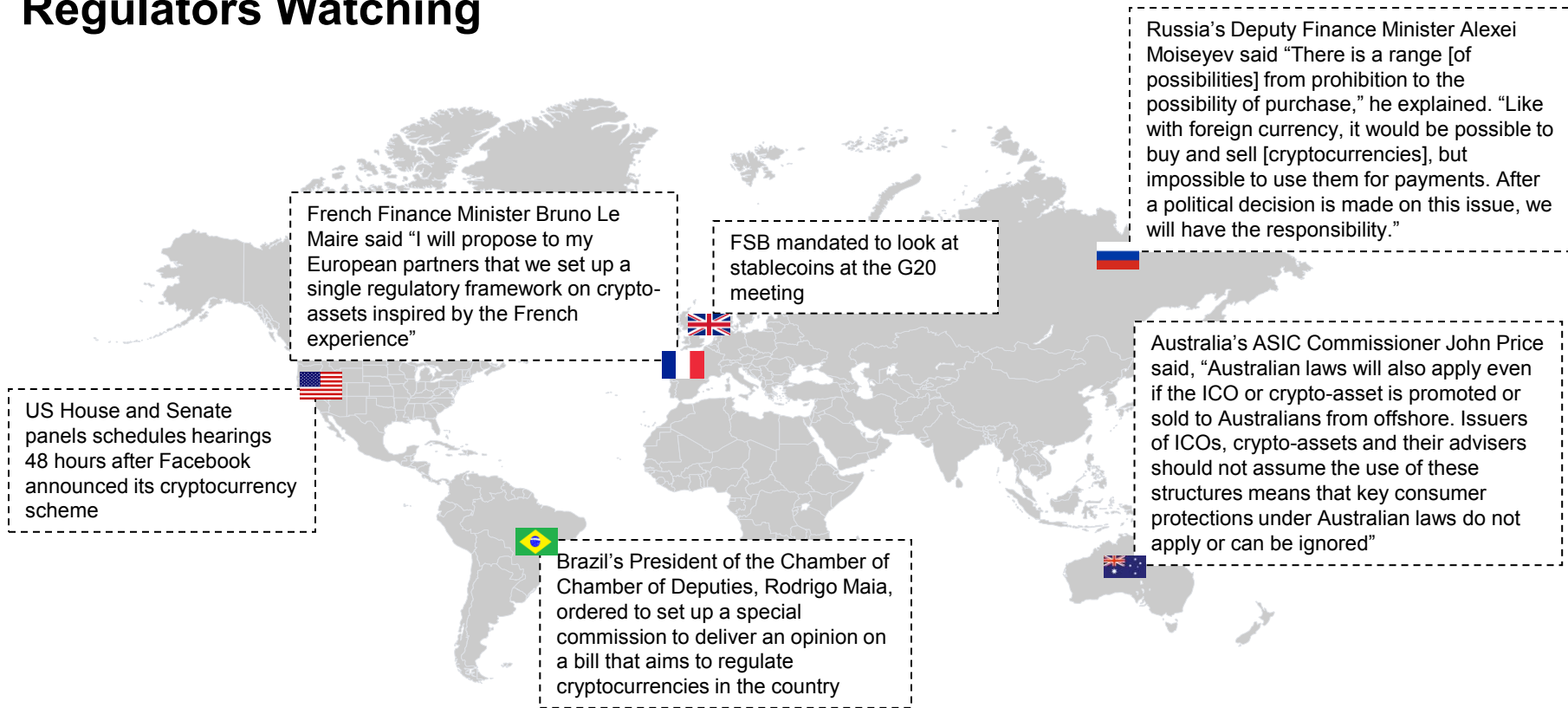
- Predictable. Will Drive Electricity Use Higher.



Source: camelcamelcamel.com, Morgan Stanley Research

Blockchain/Cryptocurrency: Regulation Update

Regulators Watching



Source: Engadget, CNBC, FSB, Cointelegraph, Coindesk, Financefeeds, Morgan Stanley Research

Central Bank Response

- Monetary policy: Global central bank discussion around whether to introduce a digital version of paper notes and coins (cash) has concentrated on a few countries. Sweden is [currently looking for companies to build the infrastructure](#) for an e-Krona. A test e-Krona platform will be created in 2020. This will be to create central bank money.
- Switzerland's laws are rapidly changing to accommodate fintech and cryptocurrency investment. The national stock exchange group SIX is [currently developing a stablecoin](#) that would be backed by Swiss Francs, to facilitate transactions.
- A [BIS survey of central banks](#) showed that many are discussing and developing their own digital currencies and that most cryptocurrency (like BTC) usage isn't widespread.
- G20 mandated FSB to look at stablecoin. FSB will be deeply engaged over next several months. [G7 finance ministers meeting](#) (Jul 17-18) will discuss regulation for Libra and other stablecoins.

MS Research on Cryptos/Blockchain

- [What's in the Horoscope? 6 Questions on FB's Libra Cryptocurrency](#)
- [Update: Bitcoin, Cryptocurrencies and Blockchain](#)
- [Diversified Financials: Exploring global cryptocurrency regulations \(21 Aug, 2018\)](#)
- [Cryptocurrency: Why a Country May Be Interested in Digital Currency \(8 May, 2018\)](#)
- [Crypto Mining: After the Gold Rush \(1 May, 2018\)](#)
- [Cryptocurrency: Where are Exchanges Based? \(25 April, 2018\)](#)
- [Cryptocurrency: Features of a Bitcoin Bear Market \(March 19, 2018\)](#)
- [Global Utilities: Bitcoin demand > EV demand? \(10 Jan 2018\)](#)
- [Global Payments, Banking, and Technology: Bitcoin Decrypted: A Brief Teach-in and Implications \(18 Dec 2017\)](#)
- [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 \(18 Sep 2017\)](#)
- [MasterCard Inc: AI vs. Bitcoin: Buzzword Battle for Supremacy. Or eventual cooperation? \(21 Aug 2017\)](#)
- [Western Union Co: Circle and Ripple Bringing the Blockchain Risk \(19 Jun 2017\)](#)
- [Global Financials and Payments: Blockchain: Unchained? \(16 Jun 2017\)](#)
- [Global Financials and Payments: Fintech – A Gauntlet to Riches \(17 May 2017\)](#)

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(as of June 30, 2019)

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	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MISC
Overweight/Buy	1110	36%	282	42%	25%	515	37%
Equal-weight/Hold	1404	45%	312	47%	22%	656	47%
Not-Rated/Hold	13	0%	2	0%	15%	2	0%
Underweight/Sell	581	19%	73	11%	13%	229	16%
TOTAL	3,108		669			1402	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment

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COMPANY (TICKER)	RATING (AS OF)	PRICE* (07/12/2019)
James E Faucette		
Automatic Data Processing Inc (ADP.O)	E (11/14/2017)	\$165.13
Evertec Inc (EVTC.N)	E (08/08/2013)	\$33.11
First Data Corp. (FDC.N)	E (06/28/2017)	\$28.02
Fleetcor Technologies Inc (FLT.N)	E (07/11/2019)	\$292.16
Global Payments Inc (GPN.N)	E (10/03/2014)	\$164.22
GreenSky Inc (GSKY.O)	E (11/08/2018)	\$11.78
LendingClub Corp (LC.N)	E (07/19/2018)	\$16.25
MasterCard Inc (MAN)	O (03/28/2016)	\$279.54
On Deck Capital Inc (ONDK.N)	U (07/19/2018)	\$3.97
Paychex Inc (PAYX.O)	E (08/16/2017)	\$85.72
PayPal Holdings, Inc. (PYPL.O)	O (10/11/2017)	\$120.12
Square Inc (SQ.N)	E (03/28/2016)	\$82.28
Total System Services Inc. (TSS.N)	E (06/18/2013)	\$132.10
Visa Inc. (V.N)	O (03/28/2016)	\$180.33
Western Union Co (WU.N)	U (02/02/2015)	\$20.50
WEX Inc (WEX.N)	E (07/09/2014)	\$219.07
Worldpay Inc (WP.N)	E (03/20/2019)	\$130.76

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* Historical prices are not split adjusted.

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COMPANY (TICKER)	RATING (AS OF)	PRICE* (07/12/2019)
Betsy L. Graseck, CFA		
Ally Financial Inc (ALLY.N)	E (12/20/2016)	\$32.22
American Express Company (AXP.N)	O (04/25/2019)	\$127.96
Bank of America (BAC.N)	O (04/23/2013)	\$29.45
BB&T Corporation (BBT.N)	E (01/07/2018)	\$50.45
BNY Mellon (BK.N)	U (07/08/2019)	\$43.56
Capital One Financial Corporation (COF.N)	E (09/08/2017)	\$91.07
Citigroup Inc. (C.N)	O (11/14/2016)	\$71.77
Discover Financial Services (DFS.N)	O (01/28/2014)	\$81.29
Goldman Sachs Group Inc (GS.N)	E (11/21/2018)	\$213.94
J.P.Morgan Chase & Co. (JPM.N)	O (07/05/2017)	\$115.30
Northern Trust Corp. (NTRS.O)	U (11/28/2011)	\$91.34
PNC Financial Services (PNC.N)	E (07/25/2013)	\$142.19
Regions Financial Corp (RF.N)	E (02/11/2016)	\$15.22
Santander Consumer USA Holdings Inc (SC.N)	E (12/20/2016)	\$25.96
State Street Corporation (STT.N)	U (07/08/2019)	\$55.19
SunTrust (STI.N)	E (03/11/2019)	\$64.81
Synchrony Financial (SYF.N)	E (09/08/2017)	\$35.96
U.S. Bancorp (USB.N)	U (11/14/2016)	\$53.60
Wells Fargo & Co. (WFC.N)	E (07/02/2018)	\$47.36

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

* Historical prices are not split adjusted.