



BIG IDEAS BY ARK INVEST 2020

January 14, 2020 | For Informational Purposes Only

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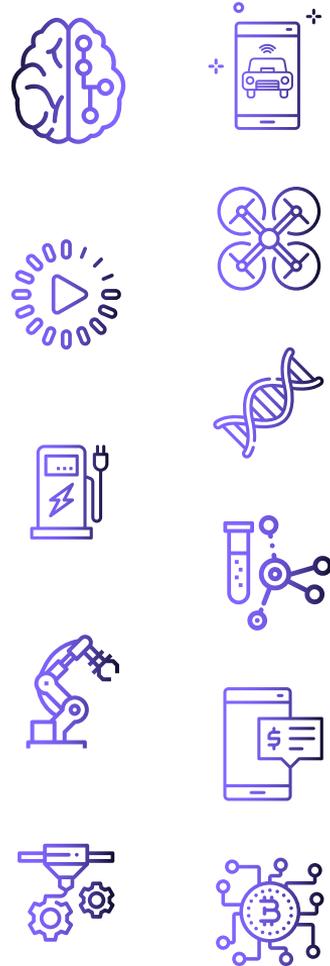
Introduction to ARK's Big Ideas

ARK Invest aims to identify large-scale investment opportunities by focusing on public companies that are the leaders, enablers, and beneficiaries of disruptive innovation. While we believe innovation is the key to growth, the opportunities it creates often are missed or misunderstood by traditional investment managers who are more focused on sectors, indexes, short-term earnings, or price movements.

ARK seeks to gain a deeper understanding of the convergence, market potential, and long-term impact of disruptive innovation by researching a global universe that spans sectors, industries, and markets. Today, we seem to be witnessing an acceleration in new technological breakthroughs.

To enlighten investors on the impact of these breakthroughs and the opportunities they will create, we began publishing Big Ideas in 2017. This annual research report highlights the latest developments in innovation and offers some of our most provocative research conclusions for the coming year.

We hope you enjoy our “Big Ideas” for 2020.





Digital Wallets

According to ARK's research, digital wallets will be valued at a premium to retail banks and, thanks to their low cost of customer acquisition, will offer banking services to low income earners in a way that traditional banks cannot.

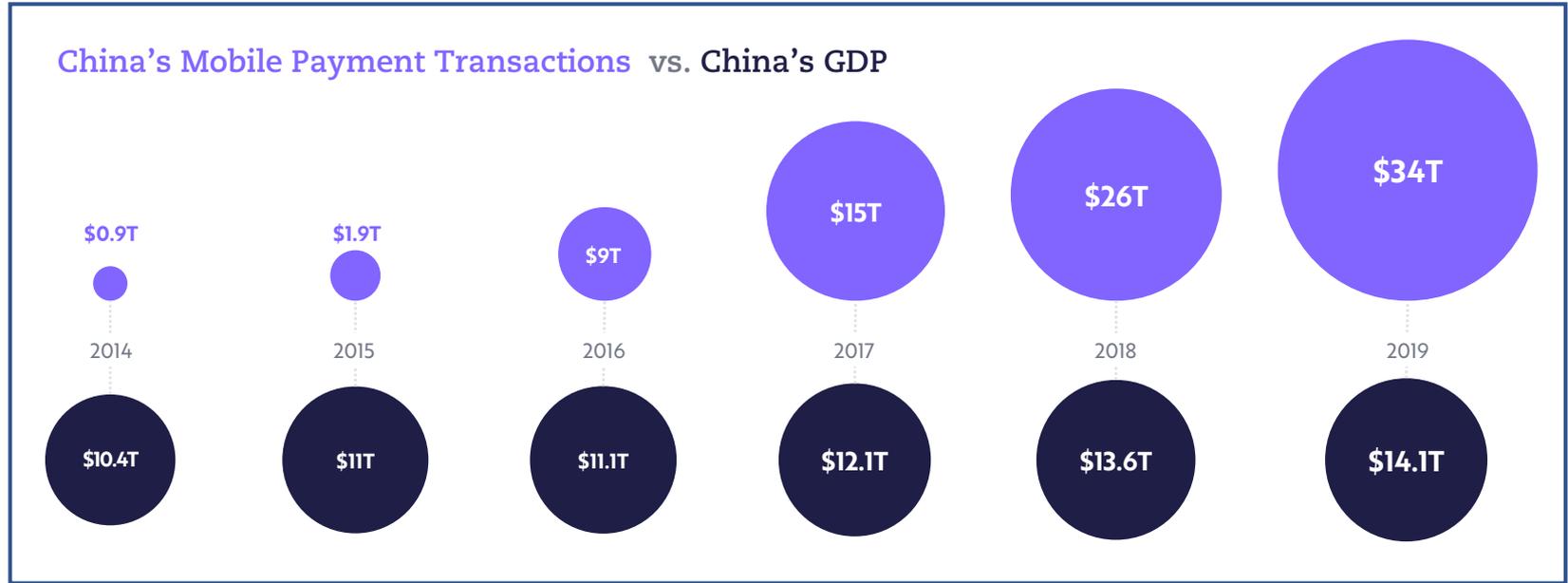
Given ARK's estimate of 220 million digital wallets in the US by 2024, if every user were to be valued according to the lifetime value of traditional bank customers, the digital wallet opportunity could be worth more than \$800 billion.





In China, Mobile Payments Are 2.5x the Size of GDP

Third-party mobile payment transactions in China grew from 10% of GDP in 2014 to nearly 250% in 2019, compounding at a 107% annual growth rate. In ARK's view, global mobile payments will be a multiple of today's \$87 trillion in global GDP.

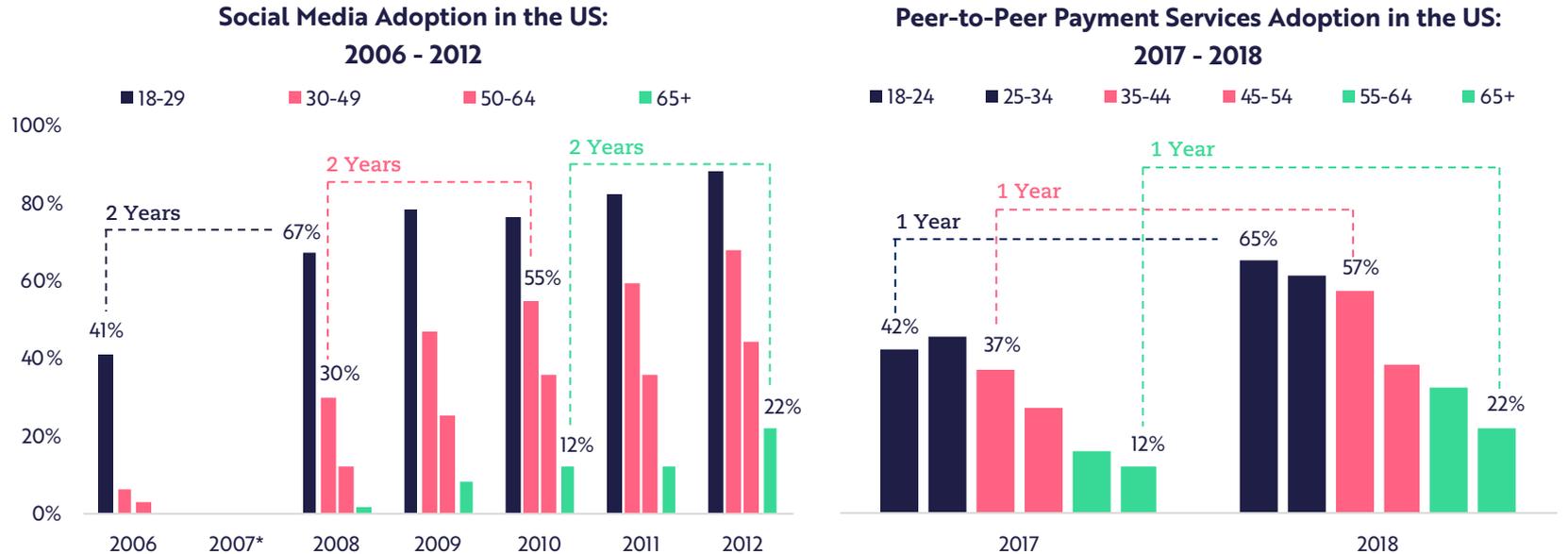


Forecasts are inherently limited and cannot be relied upon.
Source: ARK Investment Management LLC, 2019; ARK Estimates; "World Economic Outlook Database, October 2019". IMF.org. International Monetary Fund. 15 October 2019; "GDP – China". World Bank.org. World Bank. 13 December 2019; "China's Third-Party Mobile Payment Market Soared 58.4% in 2018". IResearchChina.com IResearch. 6 May 2019.



In the US, Digital Wallet Adoption is Occurring 2x Faster Than Social Media Took Off

With network effects that appear stronger than those of social media, digital wallets are penetrating different age groups in the US in half the time that it took social media 10 years ago. Children seem to welcome parents into their payment ecosystems.



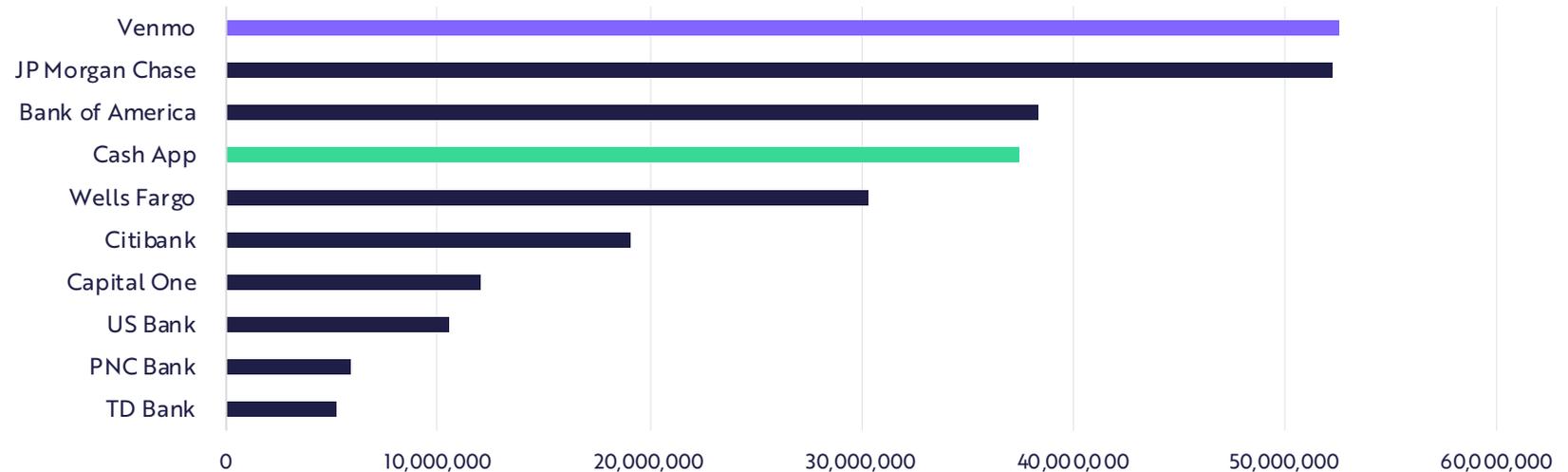
*Note: Pewresearch.org did not release data on the social media adoption in the US for the year of 2007
Source: ARK Investment Management LLC, 2019. "2018 TSYS U.S. Consumer Payment Study". TSYS.com TSYS. 18 April 2019; "Social Media Fact Sheet". Pewresearch.org. Pew Research. 12 June 2019.



Venmo Hosts the Largest Consumer Finance Application in the US

According to ARK's research and with more than 52 million annual active users, PayPal's Venmo has become the largest consumer finance application in the US. Square's Cash App ranks as number four, behind JP Morgan and Bank of America.

Top 10 Financial Institutions by Number of Active Digital Users (2019)*



*Data Source: Estimate of Annual Active Users for Venmo, Bank of America, Cash App, Citibank, Capital One, US Bank, PNC Bank, TD Bank. Estimate of Quarterly Active Users for JPMorgan Chase, Wells Fargo. This is not a recommendation in relation to any named securities and no warranty or guarantee is provided. Any references to particular securities are for illustrative purposes only. Source: ARK Investment Management LLC, 2019. Company information and ARK estimates. Estimate of Annual Active Users for Venmo, Bank of America, Cash App, Citibank, Capital One, US Bank, PNC Bank, TD Bank.



Digital Wallets Are Valued at a Discount to Banks

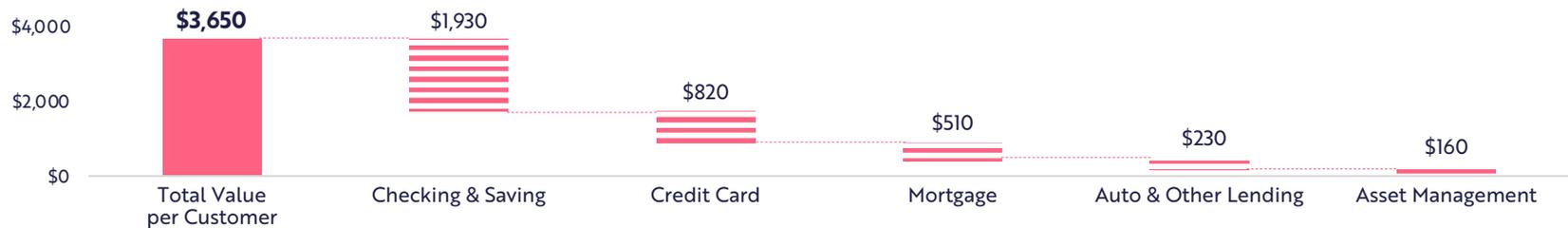
BIG IDEAS 2020

Public markets are valuing digital wallets, such as Square’s Cash App, at a significant discount per user to private fintech valuations. ARK believes that, at maturity, a digital wallet user should be valued at roughly \$3,650, similar to a retail bank customer.

Valuation Per Active User (USD): Private Fintech Startups vs. Public Digital Wallet Providers



Valuation Per Customer Across Revenue Segments (USD): Representative Retail Banks in the US



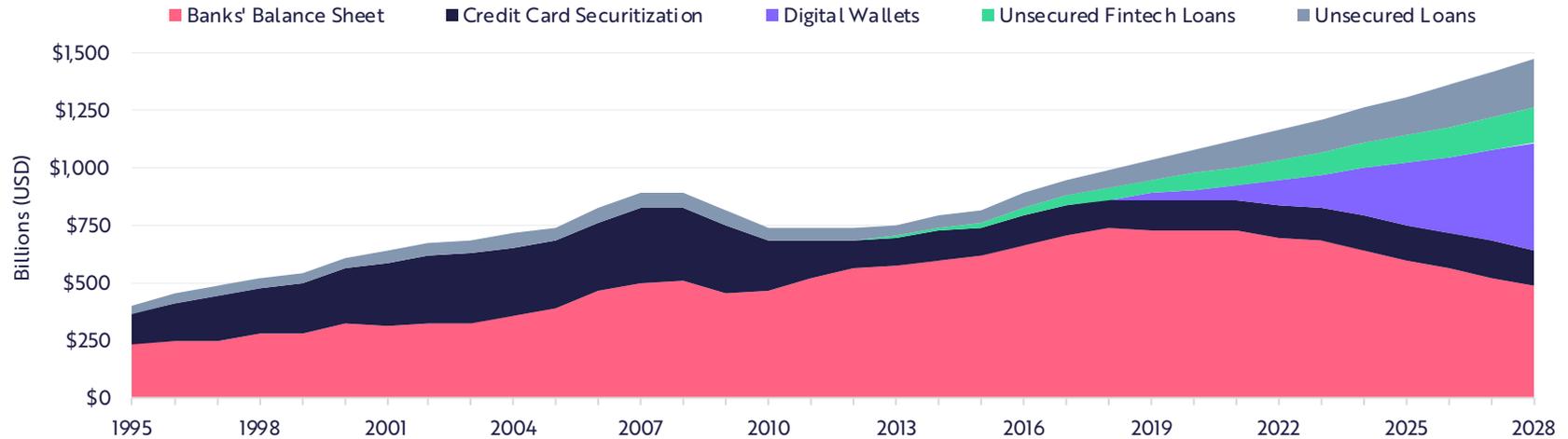
Source: ARK Investment Management LLC, 2019. Company Information, ARK Estimates. For Cash App and Venmo using Square’s and PayPal’s price-to-sales multiple applied to estimated Cash App and Venmo revenue and divided by ARK’s MAU (Monthly Active Users) estimate. For private Fintechs using last valuation divided by ARK’s MAU estimate. | Representative Retail Banks: ARK Estimates based on JP Morgan Chase, Wells Fargo, US Bank, PNC Bank, Bank of America 2018 Annual Reports. This is not a recommendation in relation to any named securities and no warranty or guarantee is provided. Any references to particular securities are for illustrative purposes only.



Digital Wallets Are Taking Share in the Consumer Credit Market

Fintech companies like LendingClub and Sofi have captured 39% of the unsecured consumer loan market. According to ARK's research, digital wallets will reduce the amount of revolving credit card debt sitting on bank balance sheets from \$740 billion in 2018 to \$483 billion by 2028. As a result, interest income on banks' credit cards is likely to be cut in half during the next five to ten years.

Total Unsecured Consumer Debt in US



Forecasts are inherently limited and cannot be relied upon. | Source: ARK Investment Management LLC, 2019; "US ABS Issuance and Outstanding," Securities Industry and Financial Markets Association, 6 Dec. 2019, <https://arkinv.st/2sJ7gJf>; "Board of Governors of the Federal Reserve System," The Fed - Consumer Credit - G.19, <https://arkinv.st/2FrbOq6>.

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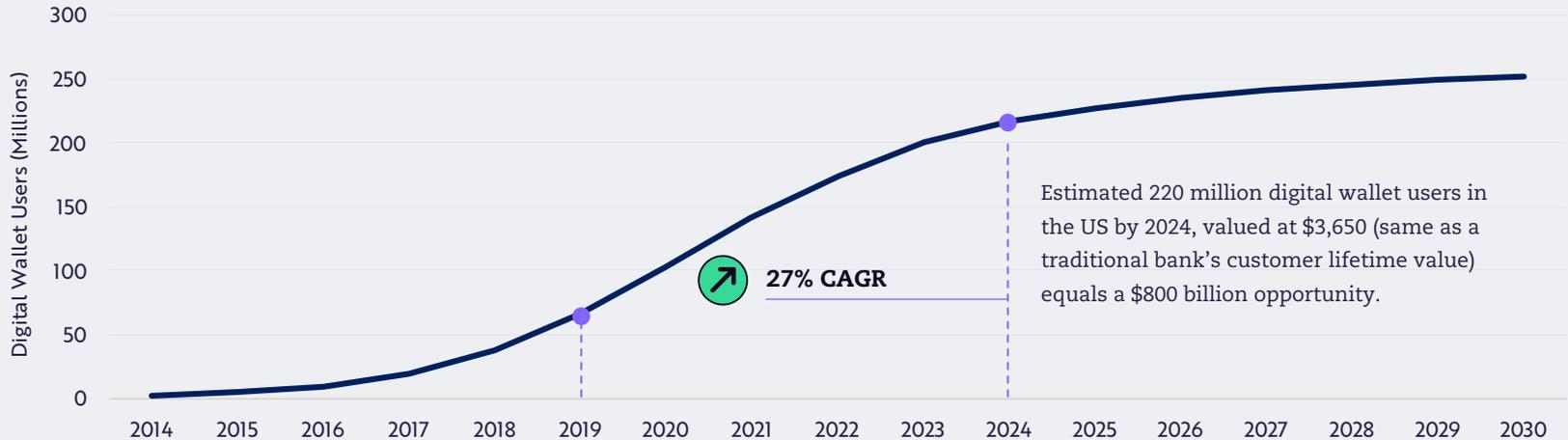


Sizing the Opportunity



In the US, digital wallets could be valued at **\$800 billion by 2024**, 27x the \$29.5 billion today.

Digital Wallet Users in the US



Forecasts are inherently limited and cannot be relied upon.
Source: ARK Investment Management LLC, 2019



Bitcoin

Because of bitcoin, we are witnessing a global battle among monetary systems, both sovereign and non-sovereign. As an open, neutral, and permissionless global monetary system with no reliance on the State, bitcoin is in a good position to win this battle.

If it does, ARK believes the result will be measured in trillions, more than an order of magnitude higher than its \$150 billion network value* today.

*As of publication 01/14/2020

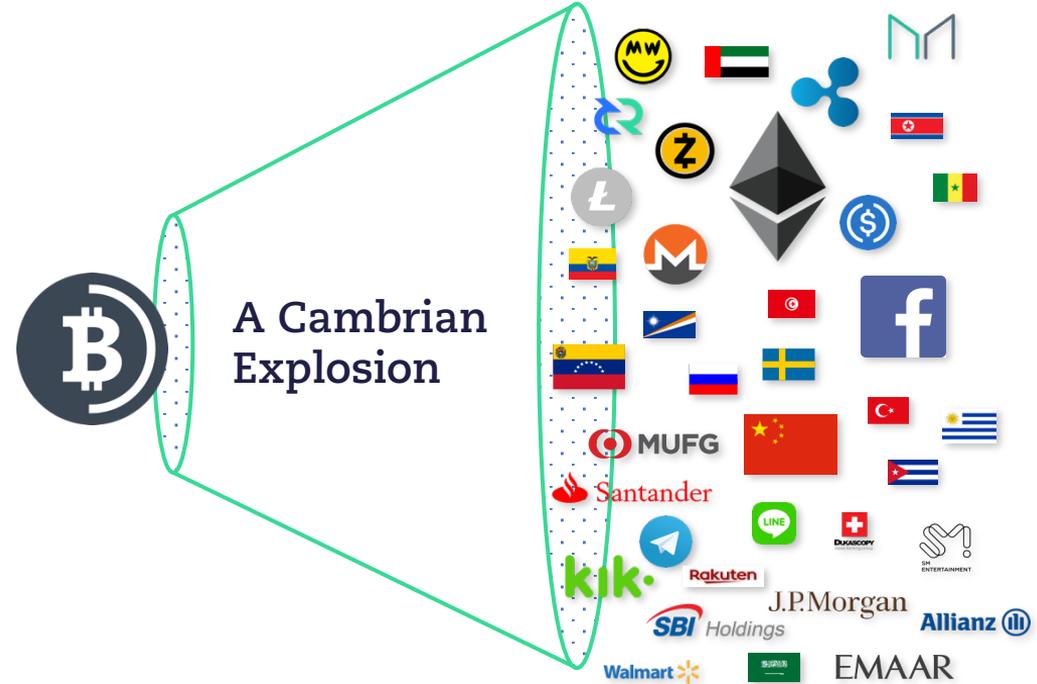




We Are Witnessing a “Cambrian Explosion” of Monetary Systems

Before the creation of bitcoin, a non-government backed monetary system seemed neither feasible nor imaginable.

| Pre-Bitcoin | Post-Bitcoin |
|--|---|
| An inextricable link between money issuance and the State. | The introduction of money as a private initiative. |
| The absence of a free market in money. | The rise of digitally native non-sovereign monetary systems. |
| State exploitation of the physical limitations of non-sovereign money like gold. | Viable forms of self-custody and sovereign wealth ownership enabled by public-key cryptography. |

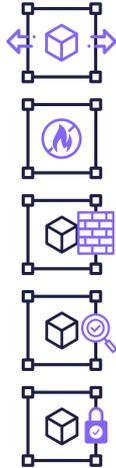


Source: ARK Investment Management LLC, 2019
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Today, a Global Battle Among Monetary Systems, Both Sovereign and Non-sovereign, Is Underway

In the long run, ARK expects that the winning monetary systems will ensure:



1. Money will be transferred and stored seamlessly.
2. Money will not be diluted arbitrarily.
3. Money will not be frozen or seized.
4. Money supply will be auditable, and transactions will not be censored.
5. Record of transactions will be secure and immutable.

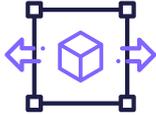


As open, neutral, and permissionless global monetary systems with no reliance on the State, cryptocurrencies appear to be best equipped to win this battle.



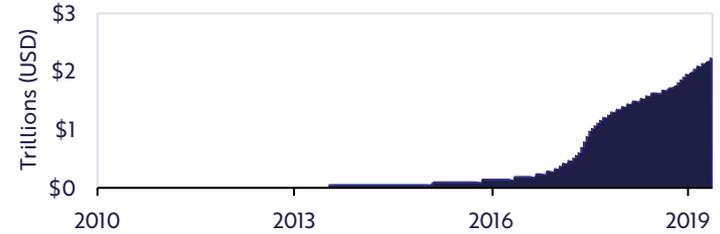
Among Cryptocurrencies, Bitcoin Is Well Positioned to Satisfy These Assurances

Assurance 1: Money will be transferred and stored seamlessly.



The Bitcoin network has transferred securely more than \$2 trillion of value. The barriers to transacting on Bitcoin are low, the only requirement being possession of a private key.

Adjusted Cumulative Bitcoin Transactions Volume

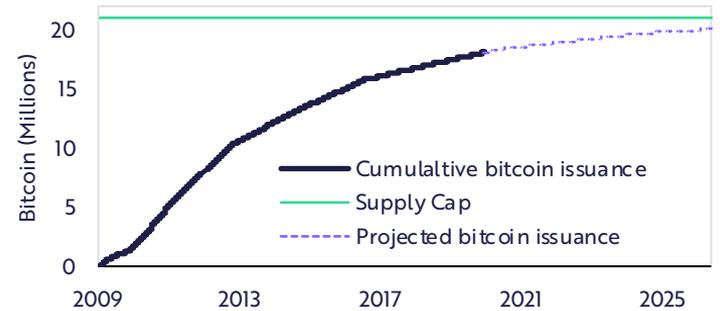


Assurance 2: Money will not be diluted arbitrarily.



All units of bitcoin have been created according to a mathematically metered, predictable, and predefined schedule. The supply of bitcoin is scarce, capped at 21 million units. Approximately 18 million units have been created with the current issuance growth rate set to halve in May 2020.

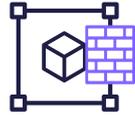
Bitcoin's Monetary Policy





Among Cryptocurrencies, Bitcoin Is Well Positioned to Satisfy These Assurances | CONT.

Assurance 3: Money will not be frozen or seized.



Bitcoin combines elliptic curve cryptography and secure custody to enable the strongest form of jurisdiction-agnostic property rights.

Assurance 4: Money supply will be auditable.



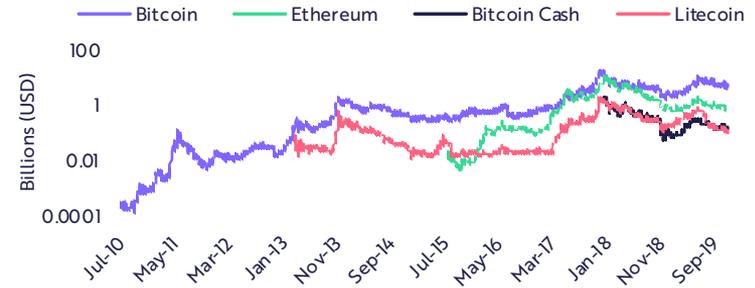
By running a full node, users are free to validate transactions and audit supply. Decision-making in Bitcoin is not subject to a centralized authority: anyone can make a bitcoin transaction permissionlessly.

Assurance 5: Record of transactions will be secure and immutable.



Bitcoin's annual miner revenue, or ledger costliness*, is the highest of any cryptonetwork, surpassing \$5 billion in 2019 and making up roughly 80% of total miner revenue in 2019, as shown on the right. Bitcoin recipients can have high confidence that, once embedded in a few blocks, a transaction is unlikely to be reversed.

Annualized Miner Revenue Across Cryptocurrencies



*The term "ledger costliness" refers to the amount of compensation miners receive per unit of time. Source: ARK Investment Management LLC, 2019; Based on data sourced from: "Network Data Charts." Coin Metrics, <https://arkinvt/37tGsej>; Carter, Nic. Medium, 22 July 2019, <https://arkinvt/36OUw2x>.



Bitcoin Is Gaining Credibility In the Financial Community

| Entity | Market Validation |
|---|---|
|  | Portfolio Allocation: Cambridge Associates recommends that institutional investors begin exploring cryptoassets, citing a likely rise in institutional investor exposure. |
|  | Custody: Institutional appetite has fueled the demand for regulated custodial services, with institutions like Fidelity seeking to meet that demand. |
|  | Price Discovery and Market Infrastructure: Bakkt's physically delivered futures contract now serves as a benchmark determined by a trusted price discovery process upon which institutional investors can rely. |
|  | Support for Open Source Development: Square launched the first open source Bitcoin initiative, potentially a precursor of open source development from other institutions. |

Source: ARK Investment Management LLC, 2019; "Latest Research & Perspectives." Cambridge Associates, Feb. 2019, <https://arkinv.st/359leRH>; Fidelity Digital. "Custody in the Age of Digital Assets." Medium, Medium, 31 Jan. 2019, <https://arkinv.st/36bzk6p>; Bakkt. "We Have Liftoff: a Milestone for the Industry." Medium, Bakkt Blog, 25 Sept. 2019, <https://arkinv.st/2tdbmZY>; De, Nikhilesh. "Square Is Hiring New Crypto Engineers - And It Wants to Pay Them in Bitcoin." CoinDesk, 20 Mar. 2019, <https://arkinv.st/36bie8t>.

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Sizing the Opportunity



Currency Demonetization:

Bitcoin as a potential medium of exchange and catalyst for currency demonetization could evolve quickly in emerging markets.

Digital Gold:

Bitcoin improves upon gold's limitations as a store of value: it is highly portable, strictly scarce, and publicly auditable.

Protection Utility:

A sensible allocation to bitcoin as protection against asset seizure should approximate the probability of an asset seizure during an individual's lifetime.

Estimated Future Network Value*

\$40 trillion x 5%

Sum of M2**
Outside of
Top 4 Countries Market Share

\$9 trillion x 15%

Gold P (Bitcoin
Market Cap. replacing Gold)

\$46 trillion x 5%

Global Wealth P (Asset Seizure
of HNWI*** over 50 years)

\$1.1 Trillion

\$800 Billion

\$1.3 Trillion

*Assumes a five-year takeover time, 10% required return, and 9% dilution. Dilution is defined as Bitcoin's inflation rate over the next 5 years consistent with its predetermined supply schedule.
**M2 is a measure of the money supply that includes cash, checking deposits, and easily convertible near money. M2 is a broader measure of the money supply than M1, which just include cash and checking deposits.
***HNWI (High Net Worth Individual) is defined as a person with investable assets in excess of \$1 million USD.
Forecasts are inherently limited and cannot be relied upon. | Source: ARK Investment Management LLC, 2019; "This Time Is Different-Data." Harvard University, 2009, <https://arkinv.st/36de9Rd>.



Disclosure



For more research on disruptive innovation visit www.ark-invest.com

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ARK Investment Management LLC
3 E 28th Street, 7th Floor, New York, NY 10016
ark@ark-invest.com