

Discussions

Bitcoin's Fatal Flaw: The Limited Adoption Problem

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and

Designing Central Bank Digital Currencies

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Financial System of the Future

Fed Atlanta, October 31, 2019

Baozhong Yang

Georgia State University

Challenges to the Banking and Monetary System

- Rise of FinTech firms in terms of payment, deposit, and other services
- Cryptocurrencies, especially stable coins, offer alternative ways of transactions and storage of value
- Central Bank Digital Currencies potentially will challenge cash and bank deposits

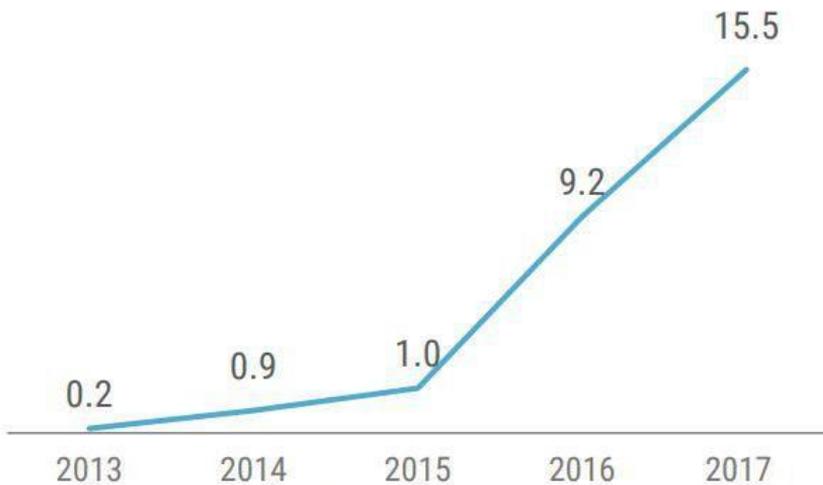
Fast Payment Systems

- WeChat Pay, AliPay in China
- PayPal, Venmo in US
- Banks are also responding
 - Target Instant Payment System (TIPS) in Europe
 - Swish app in Sweden
 - Zelle in US

Alipay and WeChat Pay are leading China's transition to a cashless economy

China's mobile payment volume continues to surge...

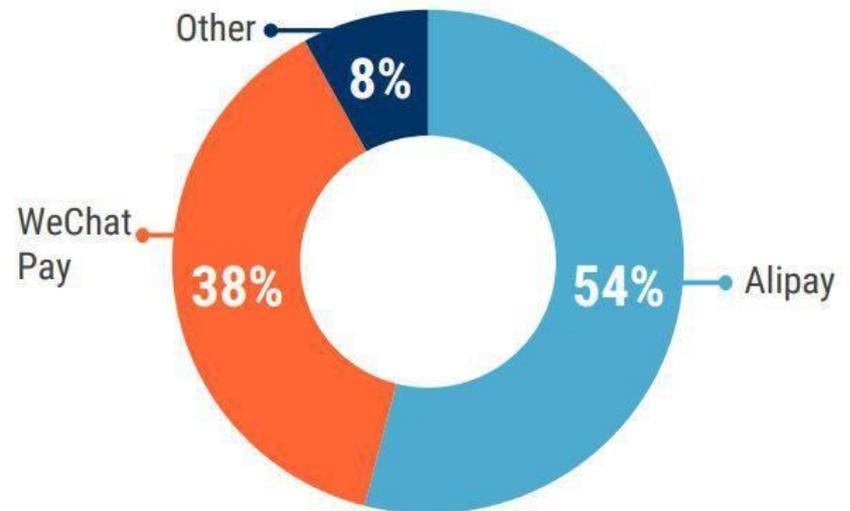
All values shown in USD Trillion



Sources: iResearch, Analysys, CB Insights analysis

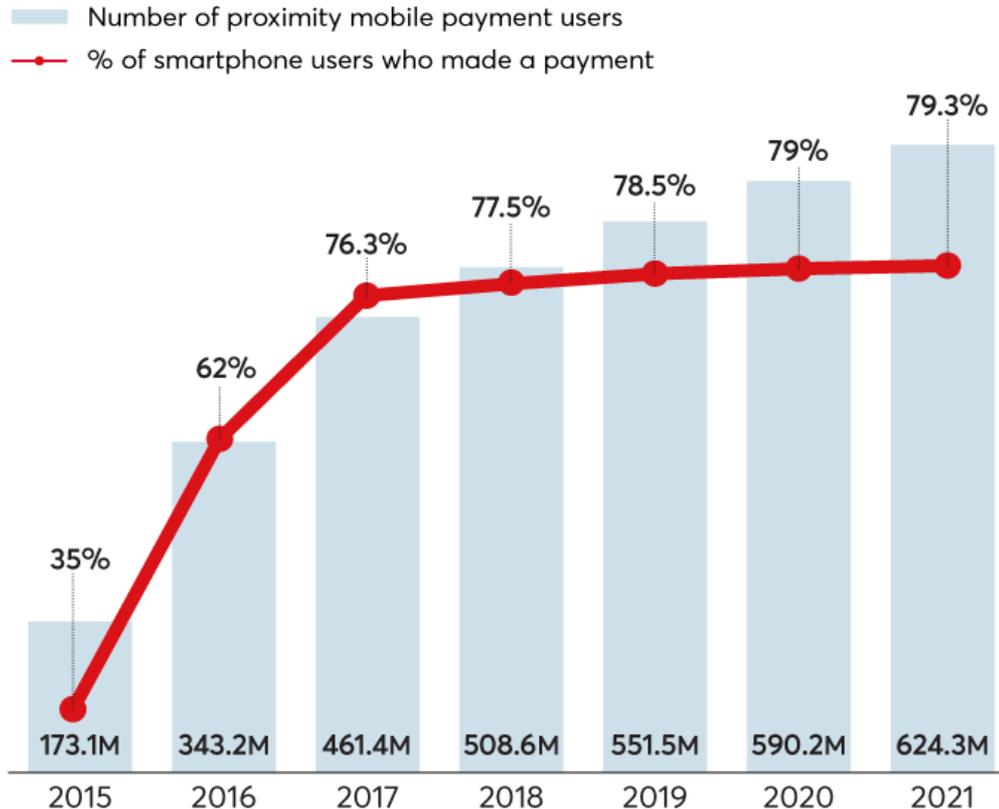
...as Alipay and WeChat Pay dominate market share

China mobile payment TPV market share in Q3'17



The swift pace of mobile payments adoption in China

By 2021, eMarketer projects that 79.3% of smartphone users in China will be tapping, scanning and swiping at the point of sale. By comparison, it will be 30.8% of users in the U.S. and 22% in Germany.

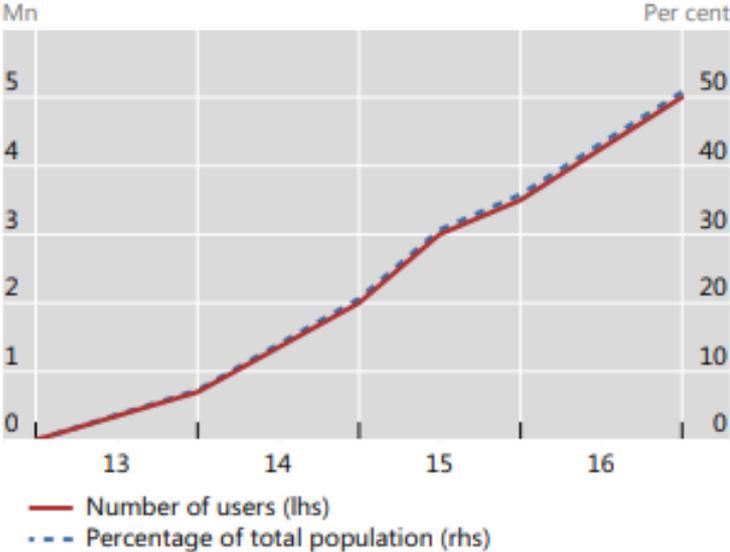


Note: Ages 14+; mobile phone users who have made at least one proximity mobile payment transaction in the past six months; includes point-of-sale transactions made by using mobile devices as a payment method; excludes transactions made via tablet; excludes Hong Kong. Data as of Nov. 2017

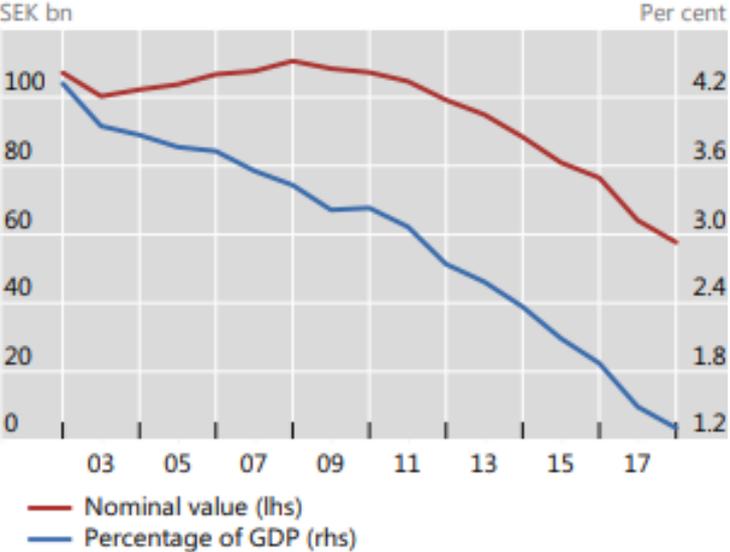
Source: eMarketer

Sweden: Soon to be Cashless?

Swish downloads



Cash in circulation¹



Source: Bech and Garratt, Bank of International Settlements

Instant Payment in Europe

PRESS RELEASE

ECB goes live with pan-European instant payments

30 November 2018

- › TARGET instant payment settlement (TIPS) now operational
- › TIPS means consumers can make retail payments across Europe instantly, 24/7/365
- › ECB's service offered to banks at attractive price

The European Central Bank (ECB) has launched an innovative pan-European service for settling electronic payments instantly. TARGET instant payment settlement (TIPS) uses central bank money to settle payments individually in less than 10 seconds.

Issues facing cryptocurrencies

- Blockchain Trilemma
 - Scalability
 - Decentralization
 - Security
- Volatility of prices
- Compliance with regulation
 - AML (Anti-Money Laundering)
 - KYC (Know Your Customer)

Private Stable coins

- Stable coin: coin with value pegged to fiat currencies
 - Tether, TrueUSD
 - JPM Coin
 - Libra
 - Samsung Coin
 - Basis: algorithm-based stable coin
- Resolves the price volatility of cryptocurrencies
- Issues
 - Collateral
 - Security
 - Regulation

Basis: Shutdown

Unfortunately, having to apply US securities regulation to the system had a serious negative impact on our ability to launch Basis.

- As regulatory guidance started to trickle out over time, our lawyers came to a consensus that there would be no way to avoid securities status for bond and share tokens (though Basis would likely be free of this characterization).
- Due to their status as unregistered securities, bond and share tokens would be subject to transfer restrictions, with Intangible Labs responsible for limiting token ownership to accredited investors in the US for the first year after issuance and for performing eligibility checks on international users.
- Enforcing transfer restrictions would require a centralized whitelist, meaning our system would not only lose its censorship resistance, but also that on-chain auctions would have significantly less liquidity.

We considered many alternative paths to launch to try and comply with the regulatory constraints while keeping our product compelling and competitive, including launching offshore, and starting off with a centralized stability mechanism. Ultimately, however, we don't think any of the paths we considered are compelling enough for our users or our investors, or consistent enough with our vision to justify moving forward.

As such, I am sad to share the news that we have decided to return capital to our investors. This also means, unfortunately, that the Basis project will be shutting down.

Central Bank Digital Currencies

- Several major countries are seriously considering it
 - China
 - Sweden
- Major concern: disruption of the existing banking system

FT ADVISER

Currencies January 4, 2018

Bank halts crypto-currency plans over stability fears

HJS: Bitcoin's Fatal Flaw: The Limited Adoption Problem

- PoW network has limited adoption
 - **Intuition:** more users -> more fees -> more validators -> network congestion -> longer delay -> lower adoption rate
 - In equilibrium, the adoption rate decreases with number of users
- Permissioned network can solve this problem
 - Majority voting consensus
 - Two equilibria: one with all honest validators, one with all malicious validators
 - Coordination issue: when all are malicious, no validator is marginal
 - Stake-based consensus: only the honest equilibrium

Permissioned blockchains

- Used for some cryptocurrencies: Ripple, Libra, HashGraph
- Applications far beyond payment systems
- Enterprise applications
 - IBM: Hyperledger
 - R3: Corda
 - JP Morgan: Quorum
 - Digital Assets: DAML
 - Libra: allows smart contracts in addition to stablecoin
 - E&Y, ING, UBS, Banco Santander, etc.
- Auditing: Cao, Cong, and Yang (2018)
- Supply chain: Chod, Trichakis, Tsoukalas, Aspegren, and Weber
- (2018)
- Healthcare

Comments on HJS

- Nice model and solutions
- Clear intuitions and results with implications
- PoW network
 - Abstraction away from block awards - Reasonable
 - What will happen after Bitcoin retires block rewards and only rely on transaction fees after 2140? It may become harder to maintain the network
- In the model, price is stable
 - Price volatility will make Bitcoin even less attractive than the model implies
- Permissioned blockchains
 - External incentives of participants in maintaining the blockchain, e.g., external benefits or reputational concern

AAD: Designing Central Bank Digital Currencies

- Heterogeneous household preferences in $[0, 1]$
 - 0: security/deposits
 - 1: anonymity/cash
 - $0 < \theta < 1$: CBDC with hybrid features
 - The currencies compete for consumers with aligned preferences
- Network effects
 - Low adoption of a currency leads to disutility of households
- There can be equilibria where
 - All three currencies coexist
 - Cash ceases to exist
 - No equilibrium where deposits disappear
- Interest-bearing CBDC reduces the likelihood of cashless equilibrium
 - It competes more directly with deposits

Comments on AAD

- Nice, parsimonious model
- Other benefits/costs of CBDC
 - Current model only considers anonymity and security
 - Speed of transaction, lower costs
 - Payment data can be potentially very useful for the central bank but can create privacy issues
 - In a serious banking crisis, there could be a flight to the CBDC, as a safe haven from the deposits of weaker banks
- Assumption: CBDC pools with bank deposits in terms of network effects
 - Not necessarily the case if FinTech or Big Tech companies can enter this market and offer CBDC-based payments
 - In that case, CBDC can directly compete with traditional bank deposits
 - Entry costs really low given the technology
 - Banks may find it hard to compete for deposits and stay profitable