FinTech:
Shaping the Financial World

April 15, 2020
Class 6: Overview

• Payment Systems
• Payment Trends
• Payment System ‘Pain Points’
• Real Time Gross Settlements
• Payment Companies Landscape
• Stable Coins, Crypto Projects & Tokenization
• Facebook Libra & China DCEP
Class 6: Readings

• 'The Digitalization of Payments and Currency: Some Issues for Consideration' Lael Brainard, Federal Reserve Board

• ‘The Payment Systems Space’ MIT Cryptocurrency Online Course

• '7 Key Payments Innovations in Fintech for 2020' Codete

• '9 Payment Trends That Will Shape 2020' Estelle Mense, BlueSnap
Class 6: Study Questions

• What are the challenges and opportunities in the current payment system architecture?

• What lessons can be drawn from Big Tech payment innovations such as Alipay, WeChat Pay, M-Pesa, Paytm, Kakao Pay, Amazon Pay, Apple Pay, & Google Wallet? What lessons from fintech disrupters such as Plaid, Square, Stripe, Toast, TransferWise, Venmo, etc.? What are incumbents such as the major banks as well as Visa, Mastercard and PayPal responding to the changing landscape?

• Do stable value coins and tokenized assets fill real gaps in payments and the financial markets? If so, will stable coins or tokenization take off or just be a passing fad?
Payment Systems

A Method to Amend and Record Entries on Ledgers for Money Authorizing, Clearing and Recording Final Settlement

Personal Check
Thomas Jefferson
1809

Western Union Telegram
1873

Telex
1950s – 1970s

Check and telegram are in the public domain. Telex image by ajmexico on flickr. CC BY.
Payment Systems

Image by Richard Gendal Brown. Used with permission.

Source: 'A Central Bank “Cryptocurrency”? An interesting Idea, but maybe not for the reason we think', Richard Gendal Brown, (3/5/15)
Modern Payment Systems

Digital wallets:
- Alipay
- Amazon Pay
- Android Pay
- Apple Pay
- GoPay
- Kakao Pay
- M-Pesa
- PayPal
- Paytm
- Samsung Pay
- Venmo
- WeChat Pay

Payment Instrument
- Checks
- Credit Card
- Debit Card
- Prepaid Card
- Payment Instruction
- Others

Networks & PSPs
- Visa/Mastercard/
  Union Pay/etc.
- First Data/Stripe/etc.
- ACH
- Other

Cryptocurrency (Bitcoin)

Access method
- Phone
- POS
- Web/e-commerce Gateway

Consumer 1

Issuing Bank

Merchant Bank

Acquirer

Merchant

Consumer 2
## Global Payment Trends

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2023*</th>
<th></th>
<th>2019</th>
<th>2023*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>eCom payment methods</strong></td>
<td></td>
<td></td>
<td><strong>POS payment methods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital/Mobile Wallet</td>
<td>41.8%</td>
<td>52.2%</td>
<td>Cash</td>
<td>30.2%</td>
<td>18.7%</td>
</tr>
<tr>
<td>Credit Card</td>
<td>24.2%</td>
<td>18.8%</td>
<td>Debit Card</td>
<td>24.3%</td>
<td>26.3%</td>
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<tr>
<td>Debit Card</td>
<td>10.6%</td>
<td>8.8%</td>
<td>Digital/Mobile Wallet</td>
<td>21.5%</td>
<td>29.6%</td>
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<tr>
<td>Bank Transfer</td>
<td>9.0%</td>
<td>9.3%</td>
<td>Credit Card</td>
<td>20.9%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Charge &amp; Deferred Debit Card</td>
<td>5.0%</td>
<td>3.0%</td>
<td>Charge Card</td>
<td>2.1%</td>
<td>2.1%</td>
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<tr>
<td>Cash on Delivery</td>
<td>4.5%</td>
<td>2.7%</td>
<td>Pre-Paid Card</td>
<td>1.0%</td>
<td>1.2%</td>
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<tr>
<td>Buy Now Pay Later</td>
<td>1.6%</td>
<td>2.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostPay</td>
<td>1.3%</td>
<td>0.9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Paid Card</td>
<td>1.0%</td>
<td>0.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PrePay</td>
<td>0.6%</td>
<td>0.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.6%</td>
<td>0.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Forecasted

# North America Payment Trends

## North America eCom payment methods

<table>
<thead>
<tr>
<th>Method</th>
<th>2019</th>
<th>2023*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Card</td>
<td>34.4%</td>
<td>26.8%</td>
</tr>
<tr>
<td>Digital/Mobile Wallet</td>
<td>23.7%</td>
<td>36.6%</td>
</tr>
<tr>
<td>Debit Card</td>
<td>17.6%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Charge &amp; Deferred Debit Card</td>
<td>10.5%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Bank Transfer</td>
<td>5.9%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Cash on Delivery</td>
<td>3.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td>PostPay</td>
<td>1.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Other</td>
<td>1.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Buy Now Pay Later</td>
<td>0.9%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Pre-Paid Card</td>
<td>0.9%</td>
<td>0.3%</td>
</tr>
<tr>
<td>PrePay</td>
<td>0.9%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

## North America POS payment methods

<table>
<thead>
<tr>
<th>Method</th>
<th>2019</th>
<th>2023*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Card</td>
<td>40.1%</td>
<td>41.6%</td>
</tr>
<tr>
<td>Debit Card</td>
<td>33.5%</td>
<td>31.5%</td>
</tr>
<tr>
<td>Cash</td>
<td>14.6%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Digital/Mobile Wallet</td>
<td>6.0%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Charge Card</td>
<td>3.9%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Pre-Paid Card</td>
<td>1.9%</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

*Forecasted

U.S. Payment Trends

U.S. Card Payment Trends

Note: Includes General Purposes Credit & Debit Cards

Source: ‘The 2019 Federal Reserve Payments Study’ (December 2019)
Payment System ‘Pain Points’

• Chargebacks
• Complexity
• Costs
• Cross Border Payments
• Data Privacy
• Delayed Settlement
• Financial Inclusion
• Fraud
• Public Policy Compliance
Credit Card Transaction Breakdown

In Typical $100 Purchase

|$97.25| $2.20| 23¢| 19¢| 13¢|
Goes to the merchant | Issuing bank | Payment processor | Acquiring bank | Card network

Payments Global Revenues - 2018

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1 Trade finance and cross-border payments services (B2B, B2C).
2 Net interest income on current accounts and overdrafts.
3 Fee revenue on domestic payments transactions and account maintenance (excluding credit cards).
4 Remittance services and C2B cross-border payments services.

Source: McKinsey Global Payments Map
Real Time Gross Settlements (RTGS)

- Early Large Value Models: Fed Wire (1970); UK CHAPS (1984); Eurozone TARGET (2002); China CNAPS HVPS
  - Operational Hours Limited

- SWIFT (Society for Worldwide Interbank Financial Telecommunications, founded 1973) Facilitates Interbank Payment Messaging

- Real Time Retail ‘Instant’ Payment Systems (24x7x365)
  - Australia NPP (2018); China IBPS (2010); Eurozone TIPS (2018); India NEFT (2019); Japan Zengin (2018); Mexico SPEI (2015); UK FPS (2011)

- U.S. Projects
  - Federal Reserve: FedNow Service (announced 2019, expected 2024)

Sources: ‘Economic impact of real-time payments’, Deloitte (July 2019) & for India – Reserve Bank of India Notification (12/6/19)
FinTech – Payments

Big Tech


Startup Unicorns

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Facebook - Payments

• Facebook Credit (2009):
  • Virtual Currency in 15 currencies,
  • Terminated 2013

• Facebook Messenger payments (2015):
  • P2P & Charitable Payments offered in US, UK, & France
  • Terminated P2P in UK & France 2019

• WhatsApp Pay (2018)
  • Pilot in India, to be Rolled Out Conditional on Data Standards
  • 1 Million Accounts Pending further Approvals

• Facebook Pay (2019)
  • Consolidated Ap for Facebook, Messenger, Instagram & WhatsApp
  • Announced 11/12/19
Payment Companies Landscape

• Commercial Banks & Bank Owned Payment Networks: 1,000s of Banks (1784 – now), The Clearing House (1853) 24 Large Banks; China UnionPay (2002) 85 founding Banks

• Card Companies: Visa (1958) $373B; Mastercard (1966) $268B; AmEx (1850) $76B; Discover (1985) $12B


Sources: Public Company Valuations from Bloomberg (4/10/20); Private Company Valuations from Forbes & Crunchbase based on latest funding or announced merger
Payment Company Recent Mergers

‘Incumbent’ Payment Service Provider 2019 / 2020 Megadeals:
• Fidelity National Information Services - Worldpay: $34B (+ $9B Debt)
• Fiserv - First Data: $22B (+ $17B Debt)
• Global Payments – Total Systems Services: $21.5B
• Worldline – Ingenico: $8.6B

API / Data Aggregator 2020 Deals:
• Visa – Plaid: $5.3B
• Sofi – Galileo: $1.2B

Sources: Individual public announcements by Acquiring Companies
Stablecoins & Messaging App Crypto Projects

• Retail Stable Value Tokens:
  • Tether, USD Coin, Paxos Standard, TrueUSD, DAI, Binance USD

• Wholesale Stable Value Token Projects: *
  • Fnality (aka Utility Settlement Coin), JPM Coin (JP Morgan), Wells Fargo (Wells Fargo Digital Cash), IBM Blockchain World Wire

• Messaging App Token Projects:
  • Facebook Libra, Telegram GRAM, LINE (Japan) Link

* Mizuho Financial Group’s J-Coin digital money offering has similarities but does not use token technology
Payment Cryptocurrency Tokens

• Bitcoin (2009) - $128B market value

• XRP (2013) - $8.5B - for Ripple’s xRapid cross-border application
• Bitcoin Cash (2017) - $4.4B - hard fork off Bitcoin, 32MB block size
• Bitcoin SV (2018) - $3.5B – hard fork off Bitcoin Cash, 128MB block size
• Litecoin (2013) - $2.8B – Bitcoin fork, 2.5 minute block times, ASIC resistance
• Stellar (2014) - $1B - Stellar Consensus Protocol with ledger chains
• IOTA (2017) - $455M – designed for micropayments on IoT

• Privacy Coins - $2.3B total - Monero (2014), Dash (2014), Zcash (2016), etc.

Source: Market Values from CoinMarketCap.com (4.12.20)
Tokenization Goals

**Broadened Access, Enhanced Liquidity & Efficiency through:**
- Extending Settlement to 24 hours by 7 days per week
- Real time Instant Settlement with Finality of Transfer
- Borderless Permissionless Censorship Resistant Exchange
- Peer to Peer and possible related Disintermediation
- Broader Investor Base
- Smart Contracts and Automation
- Fractionalization

**For:**
- Payments
- Payments vs. Payments (PvP)
- Payment +/- or Security side of Delivery vs. Payment (DvP)
- Atomic Swaps of Value
Facebook Libra Design Decisions

• Promote **Libra** as Global Digital Currency & Payment Solution
  • “The goal of the Libra Blockchain is to serve as a solid foundation for financial services, including a new global currency, which could meet the daily financial needs of billions of people.”

• Create Multicurrency **Libra Reserve** to back Libra
  • Government Securities & Bank Deposits - US, Euro, UK, & Japan

• Pay No interest on **Libra**

• Use ETF mechanisms for Libra Issuance and Redemptions

• Issue **Libra Investment Token** (LIT) earning Interest on Libra Reserve & to Promote Customer Adoption
Facebook Libra Design Decisions

• Use **Libra Blockchain** for a permissioned distributed ledger
• Develop **Move** language so apps can run on top of network
• Set up **Libra Association** as Swiss non-profit to Manage Libra Reserve and Libra Network
• Recruit 100 Large Organizations as **Libra Association** members
• Set up subsidiary **Calibra** offering services & custody tokens
• Offer digital custodial **Calibra Wallet** for Libra tokens
# Libra vs. China DCEP

<table>
<thead>
<tr>
<th>Name of currency</th>
<th>Libra</th>
<th>Digital Currency Electronic Payment (DCEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuer</td>
<td>Libra Association led by Facebook</td>
<td>People’s Bank of China (PBoC)</td>
</tr>
<tr>
<td>Blockchain Type</td>
<td>Permissioned blockchain (accessible to association members only)</td>
<td>Centralized private network controlled by PBoC</td>
</tr>
<tr>
<td>Peg</td>
<td>Basket of currencies including USD, EUR, JPY, GBP and SGD</td>
<td>Renminbi (RMB)</td>
</tr>
<tr>
<td>Status</td>
<td>Release Date TBC</td>
<td>Release Date TBC</td>
</tr>
</tbody>
</table>

Source: ‘The Digital Currency Race’, Tabul8tor (12/4/19)