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# FINANCE AND TECHNOLOGY: WHERE ARE WE HEADING?

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# Summary

- Finance produces a set of services we will always need
- Current system evolved over centuries to meet needs efficiently
- Technology reduces transactions & information costs, without changing activities
- New technologies create new threats to individuals and the real economy
- Require consumer & investor protection, crime prevention, mitigation systemic risk
- Need framework where same service, same risks, same regulation
- Principles: Identity verification, disclosure, reporting, registration, compliance
- Shift from entity-based to activity-based regulation

# Outline

- Introduction
- Role of finance
- Impact of technology
- A framework for regulation
- Crypto-currencies, Crypto-assets, and CBDC
- Where are we heading?

# Big Questions

- How is technology influencing financial structure?
- How are traditional intermediaries changing?
- How should regulators react?
- What should we do about crypto-currencies and crypto-assets?

# Finance and Technology over the centuries

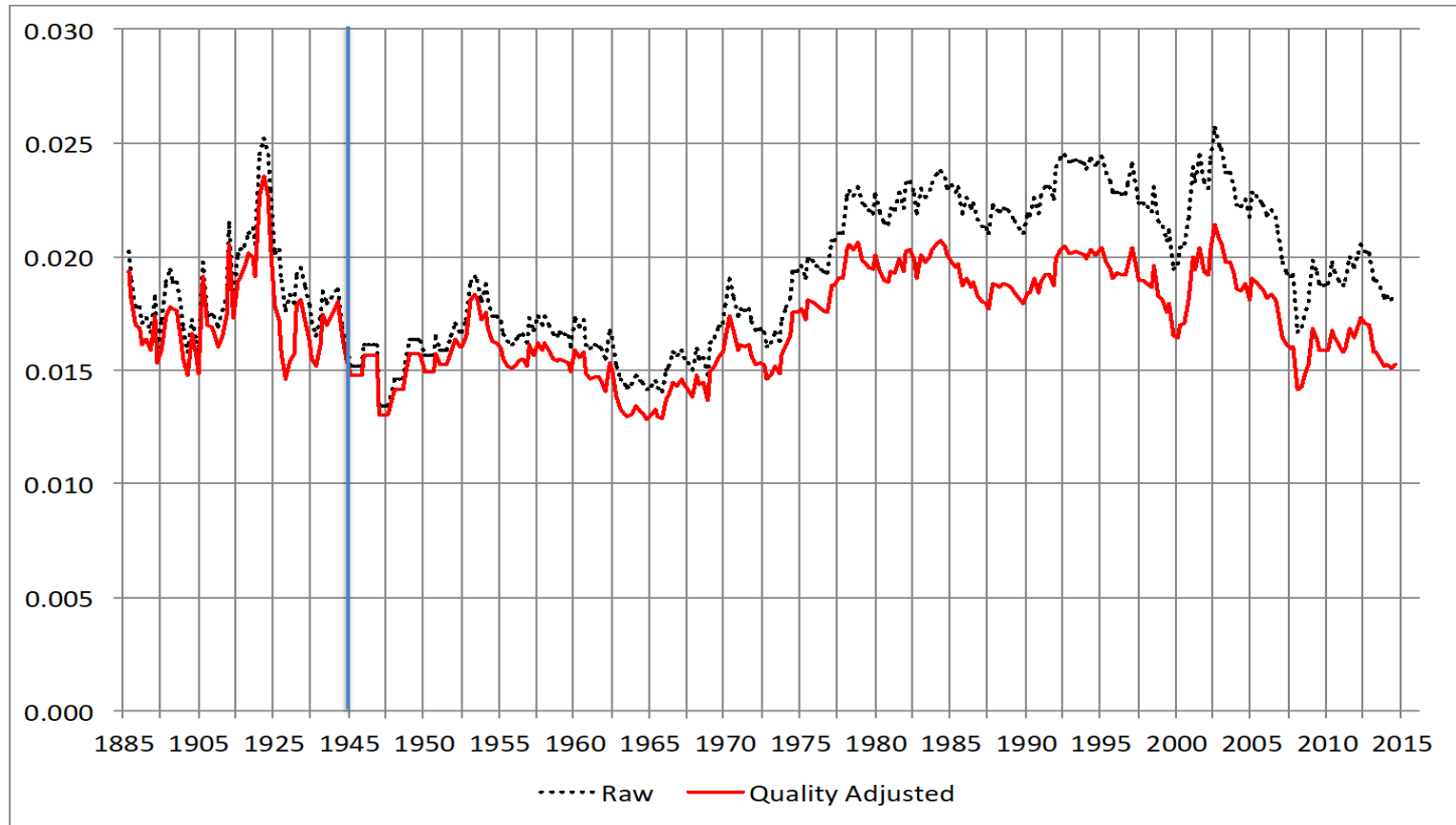
- Finance

- Sovereign bonds (12<sup>th</sup> c)
- Double-entry bookkeeping (13<sup>th</sup> c)
- Consols (16<sup>th</sup> c)
- Joint stock company (17<sup>th</sup> c)
- Limited liability companies (19<sup>th</sup> c)
- Options pricing (20<sup>th</sup> c)

- Technology

- Telegraph (1844)
- Transatlantic cable (1866)
- Telephone (1876)
- Computer (1943)
- Internet (1969)
- Mobile phone (1973)
- Personal computer (1977)

# Unit cost of financial intermediation in the US

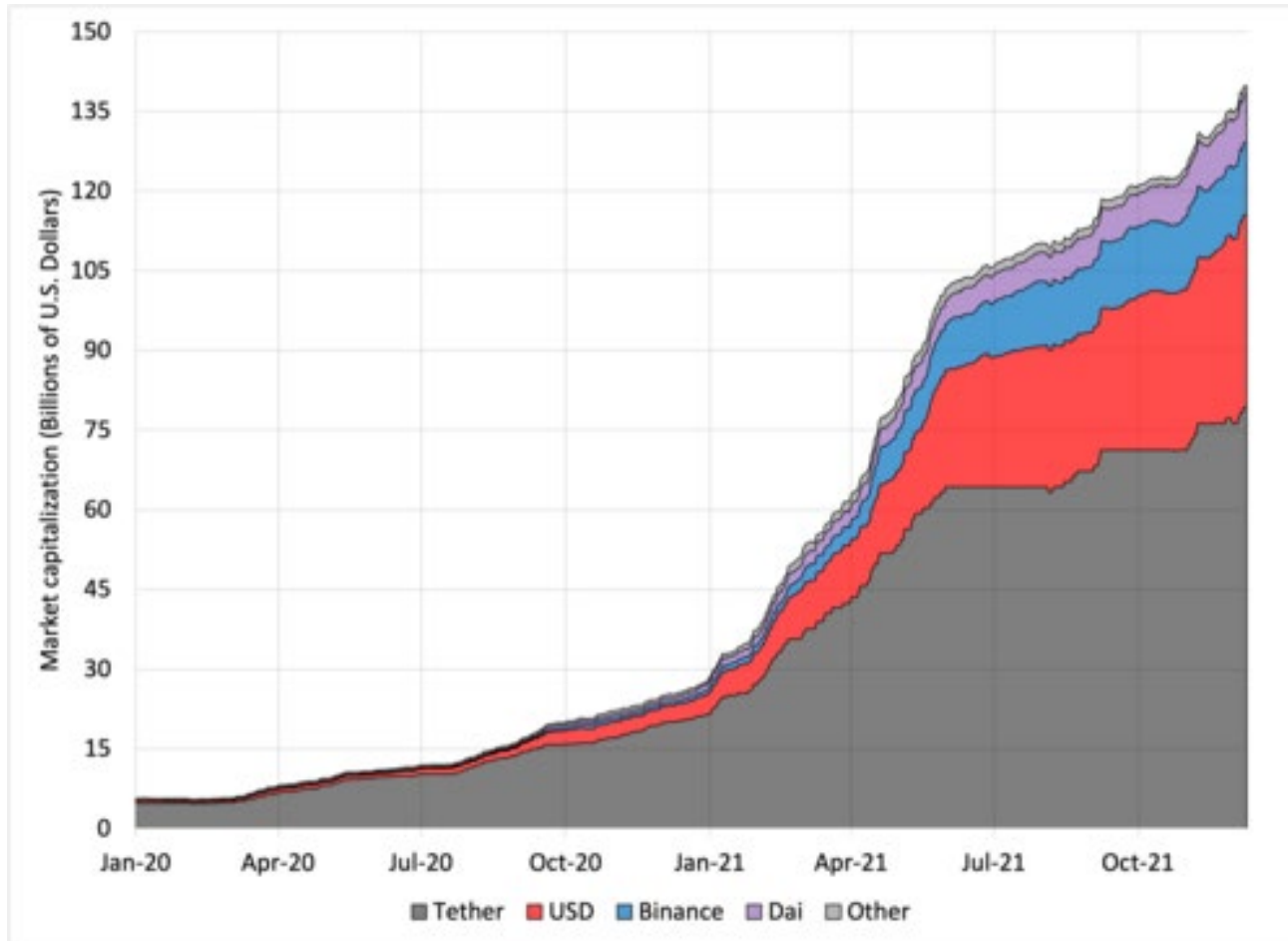


Costs stuck:  
1½% to 2% for 130 yrs

Will this finally come down?

Source: Figure 3 in Philippon (2016).

# Stablecoin



Volume is large and growing rapidly

Uses:

1. Transactions in other digital coins (such as Bitcoin or Ether)
2. High-frequency trading

Should we worry?

Source: [Coinmetrics](https://www.coinmetrics.com/). Note: According to [coingecko.com](https://www.coingecko.com/), as of 9 December 2021, Tether and USD Coin account for about 54 percent of total stablecoin capitalization of \$161.5 billion.



# Implications of experience

- Compliance is still costly (remittances)
- Screening & monitoring still necessary, but difficult (P2P)
- Private money issuance is always attractive



# Implications of experience

- Compliance is still costly (remittances)
- Screening & monitoring still necessary, but difficult (P2P)
- Private money issuance is always attractive

Will technology reduce costs of compliance,  
screening & monitoring?

If so, risk premia will fall and access to credit will increase.

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# Services the Financial System Provides

- Collect & process information
- Safekeeping and accounting
- Diversification & risk pooling
- Advising
- Derivatives-based risk transfer
- Market access and market making
- Liquidity provision
- Issuance of deposits & payment instruments
- Equity & debt underwriting
- Payments system access

These are not changing.

# Who does what?

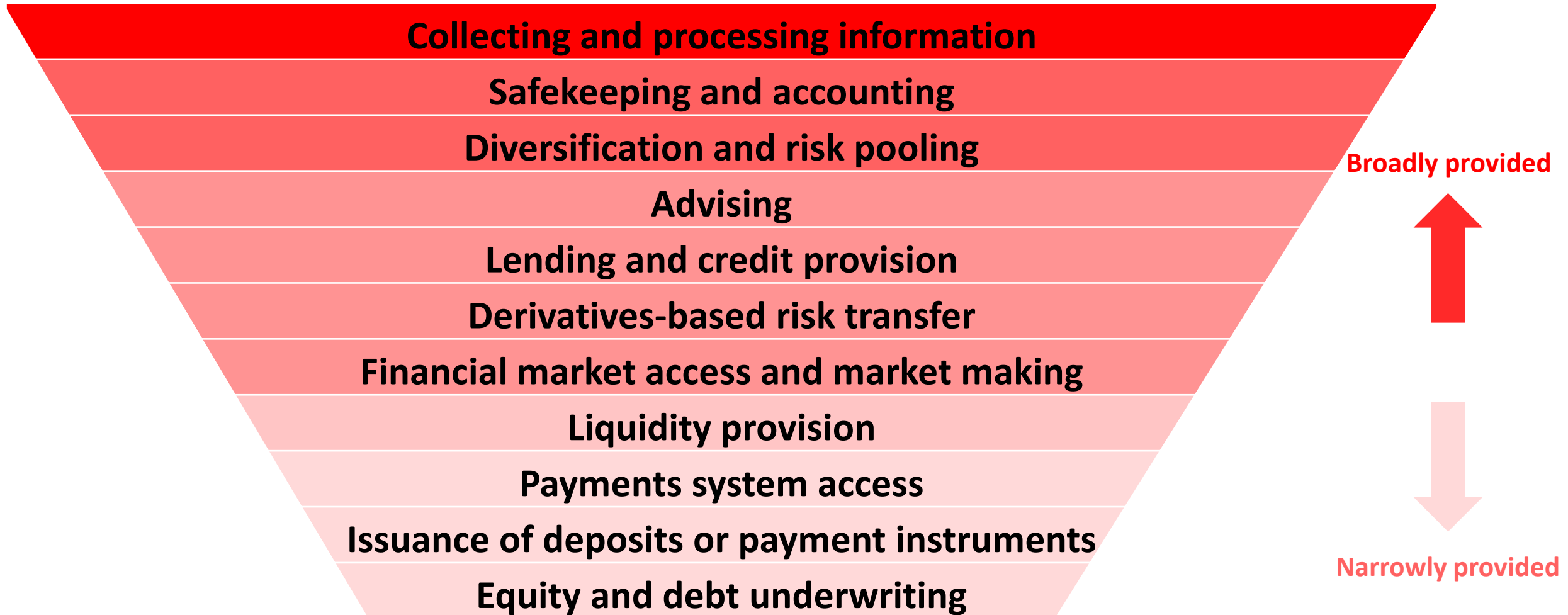
<b>Functions</b>	<b>Asset Managers*</b>	<b>Investment Banks**</b>	<b>Depository Banks</b>	<b>Life Insurers</b>	<b>Pension Funds</b>	<b>Private Equity &amp; Venture Capital</b>	<b>Money Transfer Services</b>	<b>Central Clearing Parties (CCPs)</b>	<b>Exchanges</b>	<b>Property and Casualty Insurers†</b>	<b>Custodians</b>	<b>Credit Rating and Scoring Agencies</b>
<b>Collecting and processing information</b>	X	X	X	X	X	X	X	X	X	X	X	X
<b>Safekeeping and accounting</b>	X	X	X	X	X	X	X				X	
<b>Diversification and risk pooling</b>	X	X	X	X	X	X				X		
<b>Advising</b>	X	X	X	X	X	X						
<b>Lending and credit provision</b>	X	X	X	X	X	X						
<b>Derivatives-based risk transfer</b>	X	X	X	X	X			X				
<b>Financial market access and market making</b>	X	X		X	X			X	X			
<b>Liquidity provision</b>	X	X	X	X								
<b>Payments system access</b>	X		X				X					
<b>Issuance of deposits or payment instruments</b>	X		X									
<b>Equity and debt underwriting</b>		X				X						

\* Includes mutual funds, exchange traded funds, and hedge funds.

\*\* Investment banks include both brokerage and underwriting services.

† Property and casualty insurers engage in roughly 5% of the derivatives-based risk transfer of life insurers, so we ignore this. See NAIC (2015).

# Breadth of service provision in the traditional system



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# Impact of Technology on Finance

- Potential benefits

- Reduces transactions costs and expands delivery of services
- Reduces screening and monitoring costs for providers of funds
- Improves access for savers and borrowers
- Eliminates the zero lower bound constraint on policy rates

- Potential costs

- Can facilitate undesirable discrimination
- Can reduce competition, increase monopoly power, risking exploitation
- Creates a wasteful arms race (e.g. high-speed equity trading)



# Examples of Fintech Firms

Functions	Coinbase	Circle	Tether	Alipay	Lending Club	Betterment	Robinhood	Kickstarter	Bitcoin	Wise Transferwise	Traditional System
Collecting and processing information	X	X	X	X	X	X	X	X		X	100%
Safekeeping and accounting	X			X	X	X	X	X	X	X	67%
Diversification and risk pooling	X				X	X	X	X			58%
Advising				?	X	X	X	?			50%
Lending and credit provision	X			X	X	X	X				50%
Derivatives-based risk transfer							X				50%
Financial market access and market making	X					X	X				50%
Liquidity provision	X	X	X	X		X	X		X		33%
Payments system access	X	X	X	X		X	X		X	X	25%
Issuance of deposits or payment instruments	X	X	X	X					X		17%
Equity and debt underwriting								X			17%
Primary Business	Exchange, Wallet	Stablecoin	Stablecoin	Payments, Lender	P2P Lender	Broker, Roboadviser	Broker Dealer	Crowd funding	Crypto currency	Payments	(out of 12 types)

# The Case of India

## Aadhaar + PMJDY (Digital Identity + Government Subsidy)

- 442 million accounts
- ₹1.51 trillion

All since 2014!

Increase in bank account access  $\Rightarrow$  reduces the cost of remittances

Digital identity  $\Rightarrow$  reduces the cost of providing credit

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# Regulating Fintech

*“When banks and fintech firms vie for the same customers with similar services and by taking similar risks, they should be similarly regulated: ‘same risk, same regulation’.”*

[Agustín Carstens, General Manager of the BIS, 30 January 2018.](#)

# Regulatory Objectives

- **Consumer and Investor Protection:**  
Data ownership, Anti-fraud, Anti-discrimination, Conflict of interest, Suitability, Continuity of access (run risk, operational risk)
- **Market Efficiency and Integrity:**  
Price transparency, Competition, Resilience
- **Systemic Stability:**  
Run risk, Common Exposure, Procyclicality, Operational Risk
- **Crime Prevention:**  
Anti-money laundering (AML), Know your customer (KYC)

# Regulatory Objectives

Function	Consumer Protection	Investor Protection	Market Efficiency and Integrity	Prevent Illicit Activity	Systemic Stability
<b>Collecting and processing information</b>	Data ownership	Anti-fraud	Transparency, Competition Anti-fraud	KYC/AML	Op risk
<b>Safekeeping and accounting</b>	Anti-fraud Op risk	Anti-fraud Op risk		KYC/AML	Op risk
<b>Diversification and risk pooling</b>	Anti-fraud	Anti-fraud			Common Exposure
<b>Advising</b>	Suitability	Suitability			
<b>Lending and credit provision</b>	Suitability Anti-discrimination	Suitability Anti-fraud	Transparency, Competition Anti-fraud	KYC/AML	Fire sales Runs
<b>Derivatives-based risk transfer</b>	Suitability	Suitability		KYC/AML	Common Exposure
<b>Financial market access and market making</b>	Continuity of access	Price Transparency	Transparency, Competition Anti-fraud	KYC/AML	Fire sales Runs
<b>Liquidity provision</b>	Runs	Runs	Resilience	KYC/AML	Fire sales Runs
<b>Payments system access</b>	Anti-fraud Op risk	Anti-fraud Op risk	Transparency, Competition Anti-fraud	KYC/AML	Runs Op risk
<b>Issuance of deposits or payment instruments</b>	Stable value Property rights	Stable value Property rights	Resilience	KYC/AML	Fire sales Runs
<b>Equity and debt underwriting</b>		Transparency Conflict of Interest	Transparency, Competition Anti-fraud	KYC/AML	
<b>Current Regulator (by institutional form)</b>	<b>Conduct, Pension, Insurance, Competition</b>	<b>Securities, Derivatives, Competition</b>	<b>Securities, Derivatives, Competition</b>	<b>Financial Crimes Enforcers</b>	<b>Macroprudential Authorities</b>

# Regulatory Objectives

Function	Consumer Protection	Investor Protection	Market Efficiency and Integrity	Prevent Illicit Activity	Systemic Stability	Regulate by function
<b>Collecting and processing information</b>	Data ownership	Anti-fraud	Transparency, Competition Anti-fraud	KYC/AML	Op risk	<b>These are the regulatory authorities we need!</b>
<b>Safekeeping and accounting</b>	Anti-fraud Op risk	Anti-fraud Op risk		KYC/AML	Op risk	
<b>Diversification and risk pooling</b>	Anti-fraud	Anti-fraud			Common Exposure	
<b>Advising</b>	Suitability	Suitability				
<b>Lending and credit provision</b>	Suitability Anti-discrimination	Suitability Anti-fraud	Transparency, Competition Anti-fraud	KYC/AML	Fire sales Runs	
<b>Derivatives-based risk transfer</b>	Suitability	Suitability		KYC/AML	Common Exposure	
<b>Financial market access and market making</b>	Continuity of access	Price Transparency	Transparency, Competition Anti-fraud	KYC/AML	Fire sales Runs	
<b>Liquidity provision</b>	Runs	Runs	Resilience	KYC/AML	Fire sales Runs	
<b>Payments system access</b>	Anti-fraud Op risk	Anti-fraud Op risk	Transparency, Competition Anti-fraud	KYC/AML	Runs Op risk	
<b>Issuance of deposits or payment instruments</b>	Stable value Property rights	Stable value Property rights	Resilience	KYC/AML	Fire sales Runs	
<b>Equity and debt underwriting</b>		Transparency Conflict of Interest	Transparency, Competition Anti-fraud	KYC/AML		
<b>Current Regulator (by institutional form)</b>	<b>Conduct, Pension, Insurance, Competition</b>	<b>Securities, Derivatives, Competition</b>	<b>Securities, Derivatives, Competition</b>	<b>Financial Crimes Enforcers</b>	<b>Macroprudential Authorities</b>	



# Challenges of Current Regulatory Framework

- Enforce the principle of **same service, same risk, same regulation**
- Shift from regulating by institutional form to regulating by function
- Allow innovation while safeguarding safety and resilience

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# Crypto-currencies and Crypto-assets

*“History is filled with attempts to invent money. People want to make a quick buck, literally.”*

[Agustín Carstens, General Manager of the BIS, 17 April 2018.](#)

*“Cryptocurrencies are ... a bubble, a Ponzi scheme and an environmental disaster.”*

[Agustín Carstens, General Manager of the BIS, 25 June 2018.](#)

# Crypto-currencies and Crypto-assets

- Concerns:
  - Consumer and investor protection: Property rights, stable value
  - Market efficiency and integrity: Resilience
  - Crime prevention: anti-money laundering (AML) and know your customer (KYC)
  - Systemic stability: runs, common exposures, and procyclicality
- Regulatory reaction:
  - Require that they meet the same requirements as current instruments and issuers
    - Stablecoins: payment instrument issuers should meet bank regulatory requirements
    - Crypto-currencies: meet disclosure, reporting, and AML/KYC requirements
  - Central bank digital currency (CBDC):
    - Does the threat from private digital monies warrant the issuance of CBDC?
    - Is CBDC a solution in search of a problem?

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# Where are we heading?

- Two possibilities:

1. Big tech takes over finance
2. Big banks continue to dominate



Build or purchase  
successful fintechs

- Considerations

- Banks are technology companies already
- Government authorities will play a critical role

# Where are we heading?

- Improved information will improve access and reduce costs of compliance, screening and monitoring
- Most crypto-currencies will disappear due to network externalities
- Crypto-assets (especially stablecoins) will be regulated based on their function
- Central bank digital currencies will appear in some jurisdictions, but perhaps not in large market-based economies



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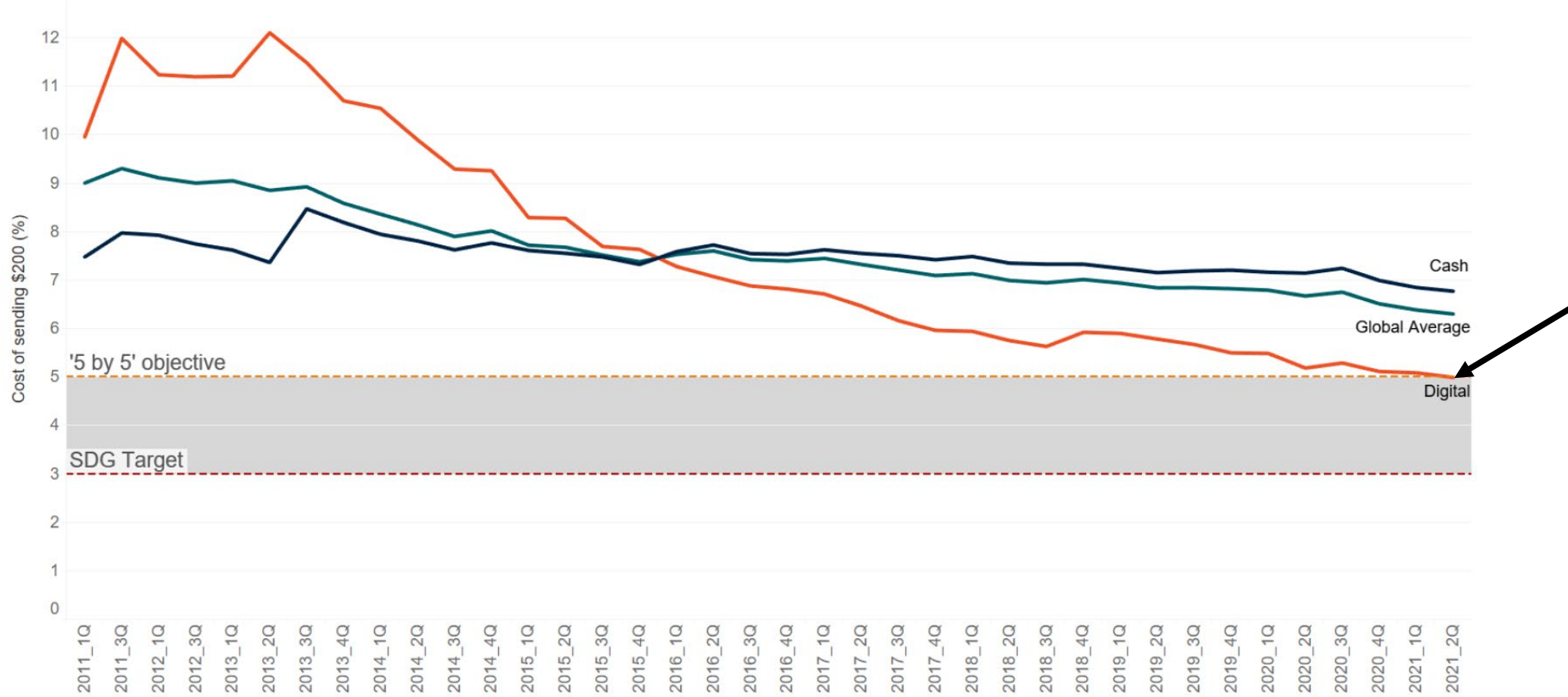
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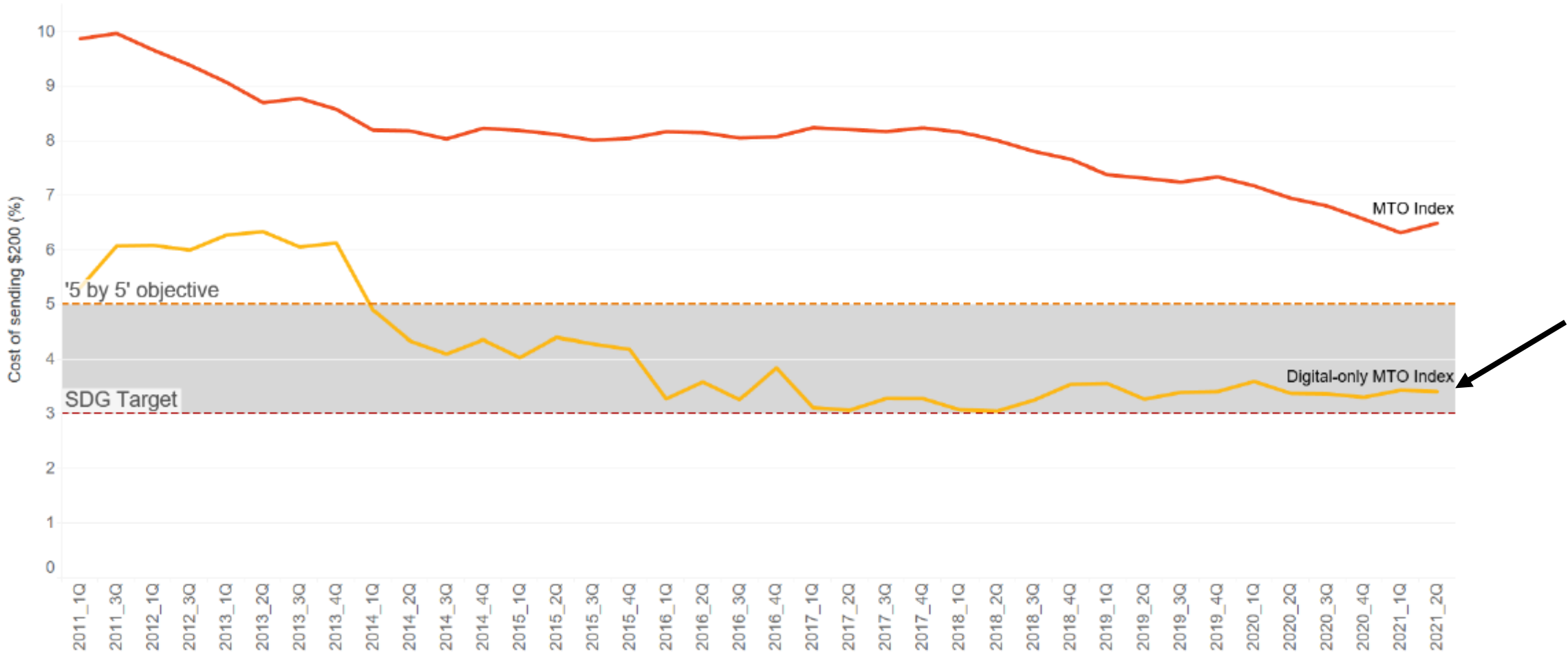
**Figure 1** Trends in the global cost of sending \$200 in remittances<sup>3</sup>



Note: A digital remittance must be sent via a payment instrument in an online or self-assisted manner, and received into a transaction account, i.e., bank account, transaction account maintained at a non-bank deposit taking institution (say a post office), mobile money or e-money account.

Source: World Bank, [Remittance Prices Worldwide Quarterly](#), issue 38, June 2021.

**Figure 2 Trends in International MTO Index & Digital-only MTO Index**



Note: MTOs are Western Union and MoneyGram. Digital-only MTOs are Transferwise (Wise), Remitly, WorldRemit, InstaReM and Xoom.

Source: World Bank, [Remittance Prices Worldwide Quarterly](#), issue 38, June 2021

# Private Digital Currencies

- **Objectives:**

- Increase speed: current systems are fast
- Reduce costs: current systems are cheap
- Foster inclusion: requires government support

- **Challenges:**

- Need to meet AML/KYC standards – identity verification.
- Ensure countries do not lose seignorage
- Allow countries to retain control of monetary and payments system
- Mitigate the runs that could lead to huge capital flows

# Central Bank Digital Currencies (CBDC)

## • Potential Benefits

- Reduces costs of and improves access to domestic & cross-border payments
- Broadens access to financial system
- Facilitates distribution of government benefits
- Relaxes zero lower bound on interest rates
- Substitute for undesirable cryptocurrencies and risky stablecoins
- Counter tax evasion and criminal use of currency
- Reduce cost of deposit insurance

## • Possible Costs

- Disintermediation of depositories
- Risks creation of massive state bank
- Currency substitution from less trustworthy jurisdictions
- Loss of privacy
- Compliance with AML and KYC
- Diminishes competition and discourages entry of private providers



# Central Bank Digital Currencies (CBDC)

Can we achieve the benefits without incurring the costs?

- Are there ways to improve the payment system?
- Are there ways to improve access?
- How can we improve distribution of government benefits?
- Are there means to enhance the effectiveness of money policy?
- How can we make cryptocurrencies and stablecoins safe?
- What is the best way to counter tax evasion and criminal uses of money?

# Characterizing the traditional system

<b>Collecting and processing information</b>	<b>12</b>
<b>Safekeeping and accounting</b>	<b>8</b>
<b>Diversification and risk pooling</b>	<b>7</b>
<b>Advising</b>	<b>6</b>
<b>Lending and credit provision</b>	<b>6</b>
<b>Derivatives-based risk transfer</b>	<b>6</b>
<b>Financial market access and market making</b>	<b>6</b>
<b>Liquidity provision</b>	<b>4</b>
<b>Payments system access</b>	<b>3</b>
<b>Issuance of deposits or payment instruments</b>	<b>2</b>
<b>Equity and debt underwriting</b>	<b>2</b>

**Broadly provided**



**Narrowly provided**



# Examples of Fintech Firms

Functions	Coinbase	Circle	Tether	Venmo	Alipay	Lending Club	Betterment	Robinhood	Kickstarter	Bitcoin	Wise Transferwise
Collecting and processing information	X	X	X	X	X	X	X	X	X		X
Safekeeping and accounting	X				X	X	X	X	X	X	X
Diversification and risk pooling	X					X	X	X	X		
Advising					?	X	X	X	?		
Lending and credit provision	X				X	X	X	X			
Derivatives-based risk transfer								X			
Financial market access and market making	X						X	X			
Liquidity provision	X	X	X		X		X	X		X	
Payments system access	X	X	X	X	X		X	X		X	X
Issuance of deposits or payment instruments	X	X	X	X	X					X	
Equity and debt underwriting									X		
Primary Business	Exchange, Wallet provider	Stablecoin issuer	Stablecoin issuer	Payments provider	Payments provider, Lender	P2P Lender	Broker, Roboadviser	Broker Dealer	Crowd funding platform	Crypto currency	Payments provider