

**14.462**  
**Spring, 2020**

**Design, Regulation, and Policy with  
respect to Payment Systems and  
Financial Infrastructure**

**Bitcoin and Fintech as Examples of Technological Innovation, with  
Implications for Money and Financial Intermediation, Begging Issues  
of What is Optimal**

**(Lecture 1)**

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# New Technology

## ❖ Bitcoin, blockchain and distributed ledgers

- Implications for central banks

## ❖ Fintech

- Implications for money and banking
- Implications for regulation

# Latest Technology: Bitcoin, Blockchain, Distributed Ledgers

❖ Importance of distributed ledgers to information and contracts:  
Iansiti and Lakhani (2017)

➤ “Contracts, transactions, and the records of them are among the defining structures in our economic, legal, and political systems.... And yet these critical tools and the bureaucracies formed to manage them have not kept up with the economy’s digital transformation. They’re like a rush-hour gridlock trapping a Formula 1 race car.... With blockchain, we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared databases, where they are protected from deletion, tampering, and revision.”

❖ Definition

➤ Distributed Ledger Technologies (DLT) refers to the processes and related technologies that enable nodes in a network (or arrangement) to securely propose, validate, and record state changes (or updates) to a synchronized ledger that is distributed across the network’s nodes. BIS (2017)

# Examples

## ❖ Distributed Ledgers

- Digital Asset – with Australian Stock Exchange
- Maersk - shipping logistics
- TReDS – accounts receivable platform in India
- Propy – title registries
- IBM: Walmart –food chain tracking to track contamination

## ❖ Digital currencies

- Ripple, Stellar
- Tether, DAE, StableCoin
- JPMorgan Coin
- Utility Settlement Coin (USC)
- CBDCs, central bank digital currency (Project Jasper and others)

## ❖ Digital assets

- Aspen coin
- Alt.Estate and Imbrex

# But DLT comes with Hype and Fraud

- ❖ Beware of the hype

- ❖ Digital Assets and DTCC

- Two hours every day to reconcile trades in repo, important for monetary policy
- Yet did not happen

- ❖ Libra

- May happen, or not

- ❖ Fraud

- DAO, Decentralized Autonomous Organization – 50 million high-jacked
- Tether, Stable Coin- not actually 100% backed by US\$

# Controversy, a comment on innovation

## ❖ Satoshi Nakamoto (2008)

- “What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party.”
- Obvious reaction
  - BIS (2018): Decentralized technology of crypto currencies, however sophisticated, is a poor substitute for the solid institutional backing of money

## ❖ Nothing new, hence not important?

- Innovation vs. invention, yes, make this distinction
- Adoption depends on context and other things, can happen well after invention

# Misleading Definitions

## ❖ “Decentralization”

- Mallet: The synchronization of so-called decentralized ledgers actually requires centralization or coordination across nodes-

## ❖ “Disintermediation”

- They mean disruption, as a good thing
- At best, eliminate oligopoly markups
- It is intermediation = mediation, as in the economics of financial platforms and money

# However, Central Banks Change Their Tune: Central Bank Digital Currency



# Rogoff (2016) *The Curse of Cash*

❖ <https://altexploit.files.wordpress.com/2017/01/kenneth-s-rogoff-the-curse-of-cash-princeton-university-press-2016.pdf>

There is little question that cash plays a starring role in a broad range of criminal activities, including drug trafficking, racketeering, extortion, corruption of public officials, human trafficking, and, of course, money laundering.

Cash also plays a central role in the illegal immigration problem that bedevils countries like the United States. It is incredible that some politicians talk seriously about building huge border fences, yet no one seems to realize that a far more humane and effective approach would be to make it difficult for US employers to use cash to pay ineligible workers off the books and often below the minimum wage.

Second, as I have argued for some time, phasing out paper currency is arguably the simplest and most elegant approach to clearing the path for central banks to invoke unfettered negative interest rate policies should they bump up against the “zero lower bound” on interest rates. Treasury bill rates cannot fall much below zero, precisely because people always have the option of holding paper currency, which at least pays zero interest.<sup>1</sup>

As trivial as the problem seems, the zero bound has essentially crippled monetary policy across the advanced world for much of the past 8 years since the financial crash of 2008.

# Survey Evidence in Rogoff (2016)

as of the end of 2015, \$1.34 trillion worth of US currency was being held outside banks, or \$4,200 floating around for every man, woman, and child in the United States.

vast bulk of this mass stash of cash is in high-denomination notes, the kind most of us don't carry in our purses and wallets, including the US \$100 bill, the 500-euro note (about \$570 at present), and the 1,000–Swiss franc note (a little over \$1,000).

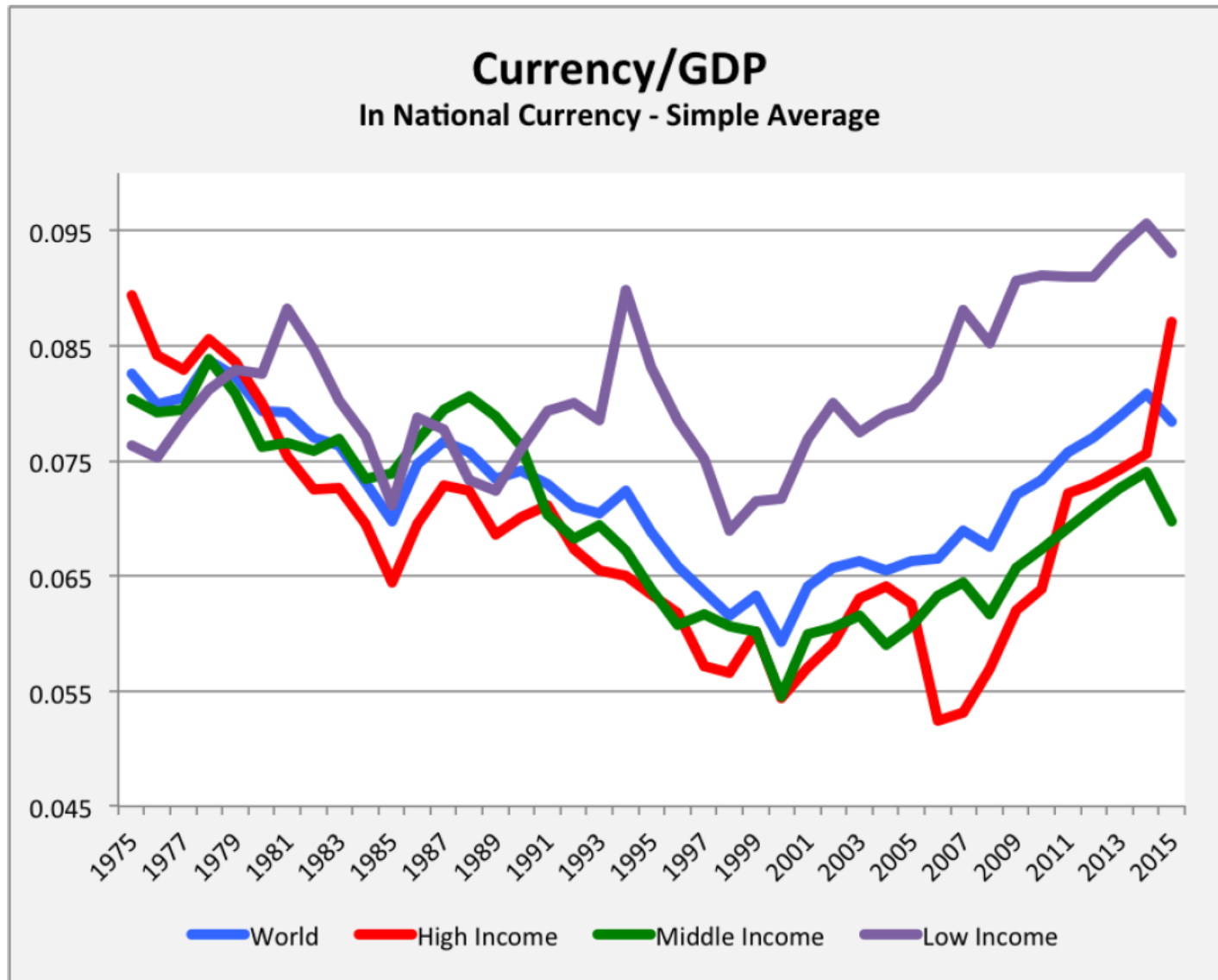
a four-person family would need to be holding \$13,600 just in \$100 bills, and that is not counting smaller bills.

# Fernando Alvarez

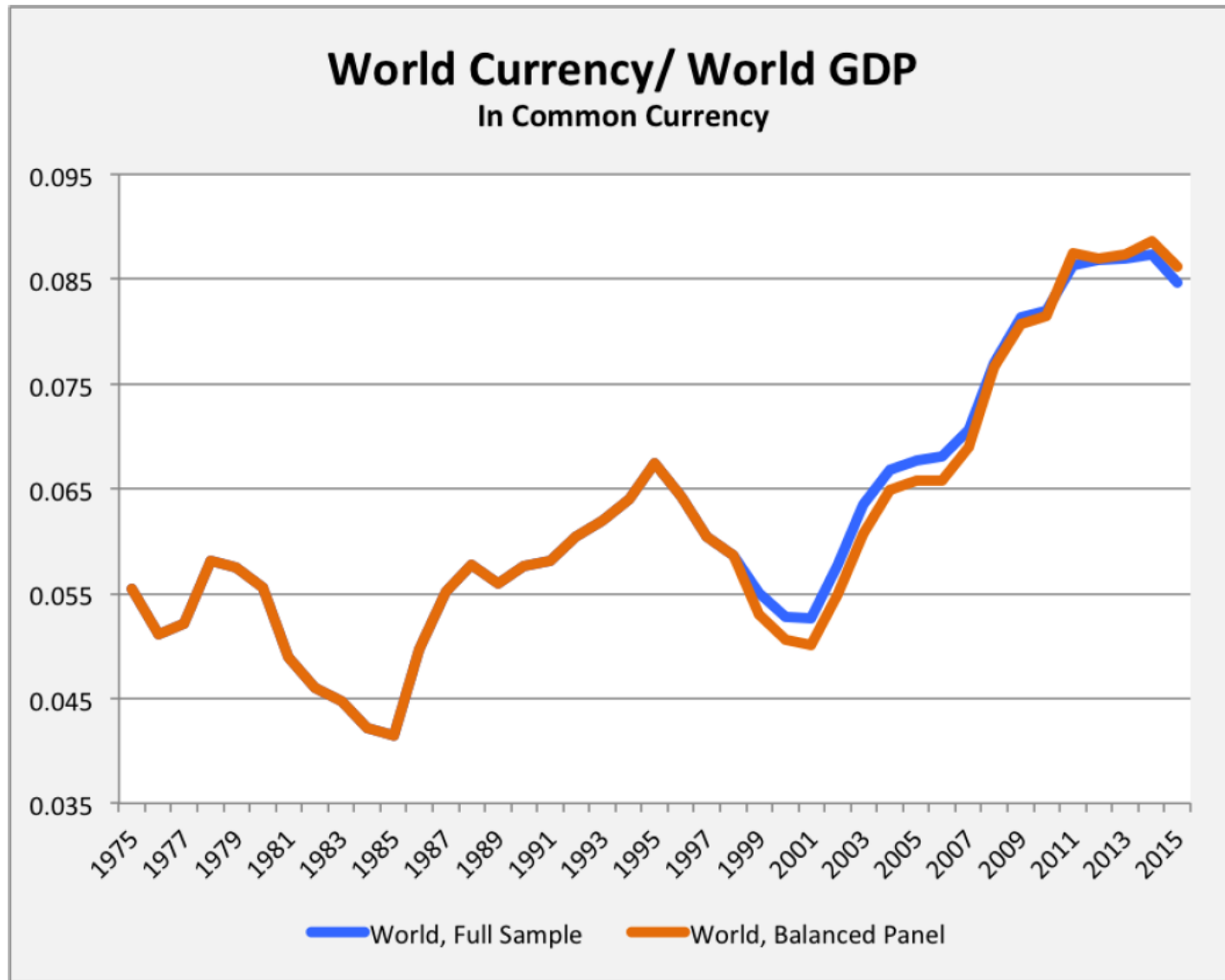


- Cash = bills and coins in circulation.
- We have argued that cash is NOT disappearing globally.
- If anything the world economy is becoming more cash intensive.  
(complement to argument of share of large denomination bills -Rogoff)
- Technology has worked (slowly) to decrease use of cash on transactions.
- Conjecture that cash is resilient mostly as store of value.
- Conclude that this is mostly a problem relative to ZLB issues.

# Common currency by group, all countries since 1975



# World currency common currency, 1975



# Two 40-year-old technologies

## Alternative Means of Payment

- Credit ( and charge) Cards (CC), birthdate  $\approx 1960$ 
  - Affects choice of means of payment.
  - Higher credit card ownership or acceptance, decreases need to carry cash.
  - Similarity with newer electronic means of payments.
- Automated Teller Machine (ATM), birthdate  $\approx 1970$ 
  - If cash is replenished often, decreases need to carry cash.
  - Higher density or lower cost of ATM access, decreases average cash balances.

Table 1: Salient Results

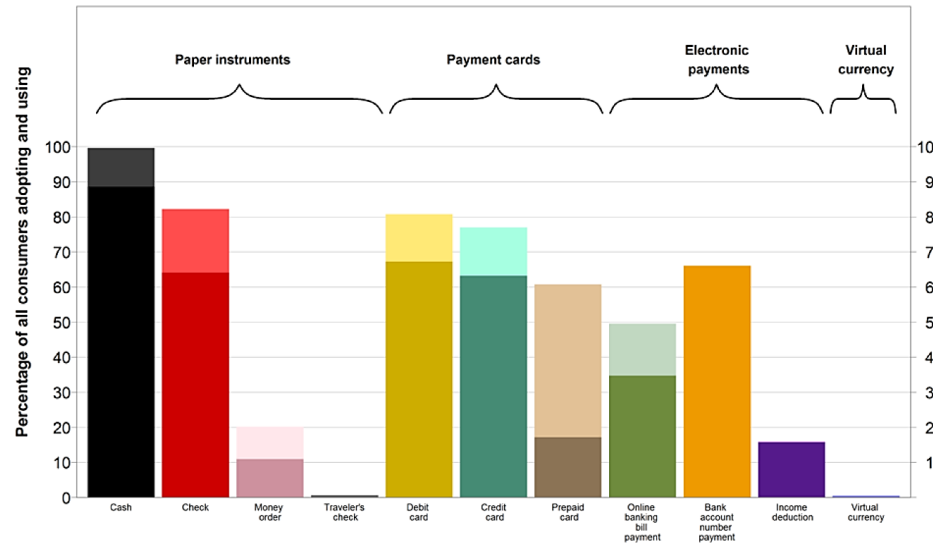
	AU	AT	CA	FR	DE	NL	US
<b>Payment share by volume</b>							
Cash	0.65	0.82	0.53	0.56	0.82	0.52	0.46
Debit	0.22	0.14	0.25	0.31	0.13	0.41	0.26
Credit	0.09	0.02	0.19	0.01	0.02	0.01	0.19
<i>Total</i>	0.96	0.98	0.97	0.88	0.97	0.95	0.91
<i>other most important payment instrument (share &gt; 5%)</i>	.	.	.	0.09 <sup>a</sup>	.	.	.
<b>Payment share by value</b>							
Cash	0.32	0.65	0.23	0.15	0.53	0.34	0.23
Debit	0.32	0.25	0.30	0.43	0.28	0.60	0.27
Credit	0.18	0.05	0.41	0.03	0.07	0.04	0.28
<i>Total</i>	0.82	0.95	0.94	0.60	0.89	0.97	0.78
<i>other most important payment instrument (share &gt; 5%)</i>	0.12 <sup>b</sup>	.	.	0.30 <sup>a</sup>	.	.	0.14 <sup>a</sup>
<b>Ownership of payment cards</b>							
Debit share	0.93	0.85	0.97	0.83	0.94	0.99	0.76
Credit share	0.47	0.24	0.81	0.36	0.33	0.62	0.67
<b>Average transaction values</b>							
Cash	15.2	24.7	12.9	10.9	25.0	17.4	17.8
Debit	43.3	55.6	37.6	56.6	75.7	39.1	37.3
Credit	60.0	85.9	64.7	92.5	160.5	95.6	56.4
<b>Acceptance of alternatives to cash<sup>c</sup></b>							
Share	.	0.63	0.73	.	0.57	.	.
<b>Average cash balances in wallet</b>							
mean	59	148	64	70	123	51	74
median	32	114	38	30	94	28	37



# Statistics for the US

❖ Greene, Schuh and Stavins (2017) “The 2015 Survey of Consumer Payment Choice: Summary Results”

➤ <https://www.bostonfed.org/publications/research-data-report/2017/the-2015-survey-of-consumer-payment-choice-summary-results.aspx>



Source: 2015 Survey of Consumer Payment Choice, Tables 8 and 23a. Note: Lighter bars show percentage of consumers who adopted the payment instrument. Dark bars show percentage of consumers who used the payment instrument at least once in the year ending October 30, 2015.

Figure 10: Percentage of consumers adopting and using payment instrument in the year ending October 30, 2015

Number of payment instruments	Cash	Check	Traveler's check	Money order	Credit card	Debit card	Prepaid card	OBBP	BANP	Percentage of consumers
7	x	x			x	x	x	x	x	16.8
6	x	x			x	x		x	x	8.3
6	x	x			x	x	x		x	8.3
5	x	x			x	x			x	6.0
6	x	x			x	x	x		x	3.9

Source: 2015 Survey of Consumer Payment Choice, authors' calculation.

Table 3: Five most common portfolios of payment instrument types adopted by U.S. consumers, 2015

# Impact of Taking Away the Currency: Chodorow-Reich et al (2019)

We analyze a unique episode in the history of monetary economics, the 2016 Indian "demonetization." This policy made 86% of cash in circulation illegal tender overnight, with new notes gradually introduced over the next several months.

We present both narrative and statistical evidence that variation in these demonetization shocks occurred essentially at random with respect to economic activity.

districts which experienced more severe demonetization shocks had much larger contractions in ATM withdrawals. The link between currency availability and cash withdrawals both validates the usefulness of our geographic shock measure

a new household survey of employment and satellite data on human-generated nightlight activity to measure demonetization's effects at the district level. Importantly, these variables capture both formal and informal sector economic activity. Both variables show economically sharp, statistically highly significant contractions in areas experiencing more severe demonetization shocks. The effects on real economic activity peak in the period immediately following the announcement and dissipate over the next few months as new currency arrives. In terms of magnitude, comparing districts at the 10th and 90th percentiles of the demonetization shock in the period immediately after the announcement, both variables map into a difference in output of roughly 4.5 percentage points.

We then provide empirical evidence of the effects of demonetization. National time series aggregates cannot answer this question because they have limited coverage of the informal, cash-intensive sector of the economy and because other economic shocks occurred during the period.

# Central Bank Digital Currency: Shift to Embracing New Technology

- ❖ Sweden
- ❖ China
- ❖ Singapore
- ❖ South Africa
- ❖ Why do it, interest rates and quantity of it, role of traditional infrastructure and reliance on banks for monetary policy, co-existence of CBDC and crypto currencies
- ❖ Suberg (2020) “Europe Central Bank Proposes ‘Unattractive’ Rates for Digital Currency” (<https://cointelegraph.com/news/europe-central-bank-proposes-unattractive-rates-for-digital-currency>)

The European Central Bank (ECB) remains open to the idea of a digital euro equivalent but would want to stop citizens holding too much of it.

That was the conclusion of a fresh [working paper](#) on so-called central bank digital currencies (CBDCs) by Ulrich Bindseil, the bank's Director General of Market Infrastructure and Payments, on Jan. 3.



# Money and Banking

Fintech, Implications for Intermediation, Official Views of BIS  
and Central Banks, Regulation

# Outline

- ❖ Definitions of intermediation, go-between financial platforms, media of exchange
- ❖ And financial sector flow of funds
  - Patterns in the data over historical periods
  - Key ratios in advanced countries and emerging markets
- ❖ Central banks and financial access: view from the BIS
  - Fin tech, big tech, and IO
  - Fin tech in the US
  - Fin tech and regulation, a drag on growth , cross country evidenced
  - On the difficulty of getting it right

# Some Standard Definitions: A distinction without much of a difference

## ❖ Financial Intermediation

### ➤ From Wikipedia:

- A **financial intermediary** is an institution or individual that serves as a middleman among diverse parties in order to facilitate financial transactions. Common types include commercial banks, investment banks, stockbrokers, pooled investment funds, and stock exchange. Transformation of maturity, risk and denomination. ([https://en.wikipedia.org/wiki/Financial\\_intermediary](https://en.wikipedia.org/wiki/Financial_intermediary))

- Gorton and Winton (2002): The savings/investment process in capitalist economies is organized around financial intermediation, making them a central institution of economic growth. Financial intermediaries are firms that borrow from consumer/savers and lend to companies that need resources for investment. In contrast, in capital markets investors contract directly with firms, creating marketable securities.

## ❖ Mediation: intervention in a process or relationship; intercession or go-between.

- matchmaker – messenger – intercessor – intermediate – medium – interagent

## ❖ Financial Platforms

### ➤ From Investopedia

- P2P: lending websites connect borrowers directly to investors. The site sets the rates and the terms and enables the transaction. The process can be entirely automated or lenders and borrowers can choose to haggle. (<https://www.investopedia.com/terms/p/peer-to-peer-lending.asp>)

## ❖ Media of Exchange

### ➤ From Investopedia

- A medium of exchange is an intermediary instrument or system used to facilitate the sale, purchase or trade of goods between parties. (<https://www.investopedia.com/terms/m/mediumofexchange.asp>)

# Financial Sector Flows

- ❖ Measuring financial intermediation through national accounts
- ❖ Deepening over time in some but not other ratios
- ❖ With disparities across countries in cross-section
- ❖ Bottom line: Questions about efficiency remain

# Flow of Funds and Financial Sector

## ❖ Historical

- Flow of funds: calculated from financial accounts, balance sheets, and production accounts. The difference between savings on the LHS, then on the RHS distinguish real physical investment from acquisition of financial assets (or the reverse for deficits and sales)

## ❖ The rise of finance: 1850-2015 (Nikolaus Hildebrand)

- For twelve advanced economies since 1850
- Sample includes Australia, Canada, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. These countries make up for 55.3% of world gross domestic output in 1913 and 79.3% in 2000, and thus provide a representative cross-section of financial growth and structure in advanced economies over the past 150 years.
- The financial part
  - Currency and deposits (series on currency, current deposits, savings deposits and total deposits),
  - Securities (series on corporate bonds, public debt and bank securities),
  - Loans (series on bank loans and mortgages),
  - Equities (stock market capitalization)



# Some Stable Ratios

- ❖ The share of investment that is externally funded through the issuance of financial liabilities is the external financing ratio. It has hovered at around 30-35% since at least 1890.
- ❖ External financing ratios measure the importance of external finance for investment and are a proxy for financial frictions at the aggregate level. ...
  - Obstacles remain evidently
- ❖ The costs of intermediation are roughly constant at around 1.7%-2.3% of intermediated assets.
  - Costs are not coming down
- ❖ The structure of financial assets is stable with a debt share of roughly 60% throughout the past two centuries.
- ❖ Similarly, at the aggregate level, the issuance of liquid, safe assets compared to the issuance of risky assets by the financial sector is quite stable

# Other Ratios Grow or Explode

- ❖ Compared to national output, financial assets more than quintuple since 1860. They rise quickly from 90.5% of gross domestic product in 1860 to 239% in 1910, followed by stagnation throughout the 20th century. After 1980, financial asset-to-output ratios skyrocket, reaching 523% of gross domestic product in 2009 compared to just 223% thirty years earlier.
- ❖ The average income share of finance industry - a measure for both the total cost of finance and the size of the financial services industry - follows a similar pattern, growing from 1.42% of gross domestic product in 1860, to 2.95% in 1913, and reaching 6.36% in 2009.
- ❖ Related:
  - Piketty and Zucman (2014) “Capital Is Back: Wealth-income Ratios In Rich Countries 1700–2010”
    - “How do aggregate wealth-to-income ratios evolve in the long run .using 1970–2010 national balance sheets recently compiled in the top eight developed economies. For the United States, United Kingdom, Germany, and France, we are able to extend our analysis as far back as 1700. We find in every country a gradual rise‘ of wealth-income ratios in recent decades, from about 200–300% in 1970 to 400–600% in 2010. In effect, today’s ratios appear to be returning to the high values observed in Europe in the eighteenth and nineteenth centuries (600–700%).”

# Cross-Country: Advanced vs. Emerging Market

❖ Recent Cross Country Evidence from BIS (<https://www.bis.org/publ/cgfs62.pdf>)

❖ List of jurisdictions used in this study:

➤ Advanced economies (AEs):

- Australia (AU), Belgium (BE), Canada (CA), Denmark (DK), France (FR), Germany (DE), Italy (IT), Japan (JP), the Netherlands (NL), New Zealand (NZ), Norway (NO), Spain (ES), Sweden (SE), Switzerland (CH), the United Kingdom (GB) and the United States (US)

➤ Emerging market economies (EMEs):

- Argentina (AR), Brazil (BR), Chile (CL), China (CN), Colombia (CO), the Czech Republic (CZ), Hong Kong SAR (HK), Hungary (HU), India (IN), Indonesia (ID), Israel (IL), Korea (KR), Malaysia (MY), Mexico (MX), Peru (PE), the Philippines (PH), Poland (PL), Romania (RO), Russia (RU), Saudi Arabia (SA), Singapore (SG), South Africa (ZA), Thailand (TH) and Turkey (TR)

# Countries over Time and Across Space

- ❖ Developed and deep capital markets can play a key role in financing economic growth as well as influencing financial stability and the transmission of monetary policy.
- ❖ As economies develop and investment projects become larger and more complex, efficient resource allocation and risk-sharing are facilitated by the information aggregation activity and variety of financial claims provided by capital markets.
- ❖ There still remain significant differences in the size of capital markets across economies. Indicatively, the largest equity, government bond and corporate bond markets relative to GDP in advanced economies (AEs) are approximately twice the size of those at the 75th percentile, which in turn are twice the size of those at the 25th percentile. A similar pattern holds across markets in emerging market economies (EMEs).
- ❖ Fixed income markets have seen strong growth over the past two decades, bringing current amounts outstanding closer to equity market capitalisation. In terms of market functioning, market participants report the least concerns about government securities markets and the greatest concerns about markets for corporate bonds, with equities somewhere in between.

# Emerging Markets

- ❖ EME capital markets are catching up, but a gap relative to AE markets remains.
- ❖ Overall, EME markets still appear less resilient to volatility than AE markets.
- ❖ In EME government securities markets, the instrument mix and liquidity have improved. At the same time, EME corporate securities markets have experienced a broad deepening. . . but still have less access to longer-maturity, local currency debt securities; and compared with AEs, fewer small firms access EME equity markets.
- ❖ Financial access as an explicit goal, the apparent need for financial deepening and policies to that bring us back to technology as mentioned at the outset
- ❖ G20- St. Petersburg, Japan meeting
- ❖ IMF, central banks and inequality
  - Featured at upcoming Spring meetings of IMF in DC
- ❖ Core functions of central banks in many countries now include financial access in addition to price and output stability, growth, financial stability
  - It is no longer just an afterthought

# Speech by Agustín Carstens, General Manager, Bank for International Settlements

## ❖ Traditional tools and views

- My main thesis is that central banks and financial authorities can support and promote financial inclusion, first and foremost, by pursuing their core objectives. By watching over price stability, they ensure that money keeps its value. By ensuring financial stability, they prevent financial institutions from failing, and taking people's savings with them. But most of all, central banks promote trust. By reinforcing trust in the financial system and its institutions, central banks bring ordinary people into the mainstream and help them reap its benefits. In this way, the central bank can help to catalyse a more inclusive and vibrant economy.

❖ Yet it is not sufficient.

❖ Other elements too are important.

# New Technology and Financial Access

- ❖ New technology can play a crucial role in breaking down barriers for both citizens and financial institutions.
- ❖ The first barrier is “lack of trust” in the financial system, and particularly in money and financial institutions. The second barrier is “high costs”. The third barrier is “lack of documentation”.
- ❖ Digital technology and big data, in particular, are key to overcoming the other barriers to financial inclusion
- ❖ When it comes to cutting costs, web and smartphone-based financial services have proved to be most effective. From M-Pesa in Kenya to Alipay in China and PayTM in India, technology has brought financial services literally to our fingertips. First, digital technology offers the cheapest delivery channel for financial services. Second, digital networks expand the circle of users, creating positive network effects. Third, mass smartphone ownership lets financial service providers reach a huge number of potential customers. Digital financial service platforms can thus be scaled up at virtually zero marginal cost. In China, for instance, digital payment platforms like AliPay let users seamlessly buy insurance or invest wallet balances in mutual funds. Cost reductions could also be realized in cross-border services such as remittances. The bank then uses transaction data to score and offer credit to the farmers, who typically lack the documentation

# Infrastructure, Innovation and Regulation: The Tension Once Again

- ❖ Yes, but what kind?
- ❖ The tension: existing regulation is based on traditional definitions, which are threatened
- ❖ To foster this process, central banks and financial authorities must provide the right infrastructure. This includes hard or physical infrastructure such as payment and settlement systems, as well as soft or “contextual” infrastructure such as rules and guidelines that let the full benefits of the technology be captured while protecting its users.



# The IO Issue: Big Tech

- ❖ Threats that new intermediations simply extract rent the way traditional intermediaries do
- ❖ Needless to say, there is a less benign side to new technology. One potential market failure is excessive market concentration.
- ❖ Entry: Once a large digital network is established, potential competitors have little scope to build rival networks. The fixed cost of setting up a new network would be excessive. Also, dominant platforms may seek to consolidate their position by raising the barriers to entry. When a network operator owns a smartphone-based payment system, for example, it can charge potential competitors, such as banks, a connection fee that will prevent new entrants from competing effectively. Once they have a captive user base, dominant platforms can then jack up the price of their financial services. So, although new technologies cut the cost barriers to financial inclusion, market concentration can work in the opposite direction.
- ❖ Data/Information: Second market failure arises from the control of customer data. When big tech firms – such as Ant Financial, Tencent or Mercado Libre – collect detailed information about their customers, they become – at least, to date – the sole owners of that data. This can be seen as a by-product of the services provided by big techs. Given that such data are free and non-rival – that is, usable by many without loss of content – it would be socially desirable to share it. But big tech firms have no incentive to do so. On the contrary, data give them an informational advantage over competitors. Using privileged data, for example, they can assess a potential borrower's creditworthiness, and even a person's reservation rate – the highest interest rate at which a borrower would be willing to take out a loan. Based on this, a big tech firm can charge higher lending rates, up to the individual reservation rates, extracting a larger share of the surplus from its customers. Proprietary control of data thus amplifies big techs' market power.

# Fintech in the US

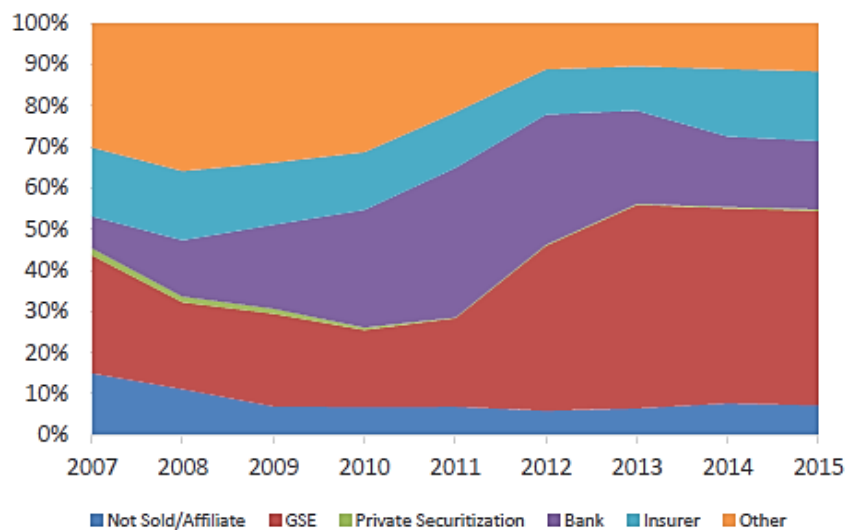
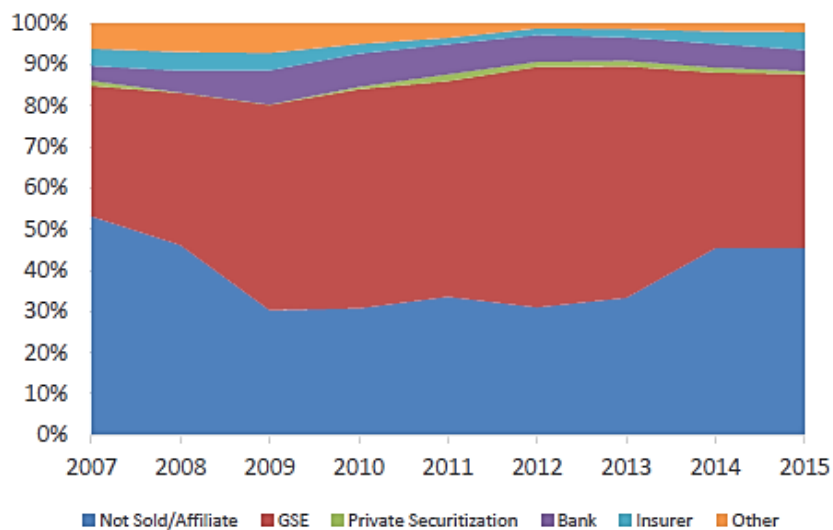
## ❖ Mortgages

## ❖ Buchak et al (2017) “Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks”

We study the rise of shadow banks in the largest consumer loan market in the US. The market share of shadow banks in originating residential mortgages nearly doubled from 2007-2015. Shadow banks gained a larger market share among less creditworthy borrowers, with a significant share of loans being originated-to-distribute to GSEs. Difference in difference tests suggest that traditional banks contracted origination activity in markets in which they faced more capital and regulatory constraints; these gaps were partly filled by shadow banks. Shadow banks with predominately online mortgage application process, “fintech” lenders, accounted for roughly a quarter of shadow bank loan originations by 2015. Relative to non-fintech shadow banks, fintech lenders serve more creditworthy borrowers and are more active in the refinancing market. They appear to use different information in setting interest rates, consistent with a big data component of technology, and charge a convenience premium of 14-16 basis points.

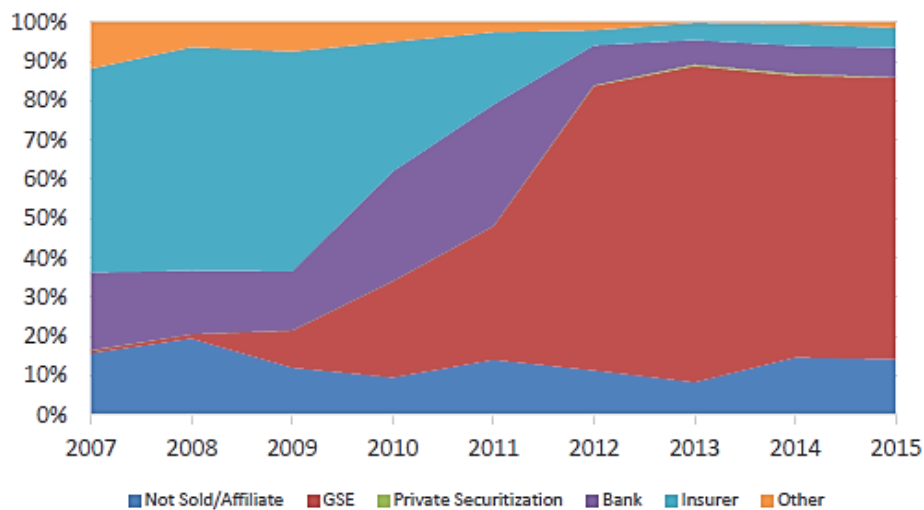
**Figure 4: Disposition of Loans among Traditional Banks, Shadow Banks, and Fintech Lenders**

Figure 4 shows the percentage of originated loans by originator type sold to various entities within the calendar year of origination (including loans not sold). Panel A shows the buyer composition of traditional bank originations; Panel B shows the buyer composition of all shadow bank originations; Panel C shows the buyer composition of fintech shadow bank originations. Loans categorized as “unsold” are not sold within the calendar year of origination, although they may be sold some time later. The GSE category pools Fannie Mae, Freddie Mac, Ginnie Mae, and Farmer Mac. Calculations are based on HMDA data.



(a) Traditional banks

(b) Shadow banks



(c) Fintech lenders

# Market Place Exchanges in the US: P2P Platforms for Intermediation

- ❖ Morrison Foerster: “Lending Basics: How It Works, Current Regulations and Considerations”
- ❖ Although the majority of P2P lending is for mortgages and credit card refinancing, some P2P lending platforms focus on particular segments of the consumer lending market, including small-business lending (OnDeck, Funding Circle, Kabbage), student loans (SoFi, Kiva), low income entrepreneurs (Kiva), and younger borrowers (Upstart).
- ❖ P2P lending platforms typically issue loans in amounts ranging from \$1,000 to \$35,000 with fixed interest rates and maturities of three to five years – used to be some bidding, for loans, not lately.
- ❖ Before a loan is posted on a platform’s website, a prospective borrower submits an application to the platform for consideration.
- ❖ The platform obtains a credit report on the applicant and uses this information, along with other data (e.g., loan characteristics) in proprietary models to assign a risk grade to the proposed loan and set an interest rate corresponding to the assigned risk grade.
- ❖ If accepted, a loan request is posted on the platform’s website, where investors can review all loans or search for specific loans that meet their desired risk/return characteristics.

# U.S. Regulatory View, a Bit of a Mess

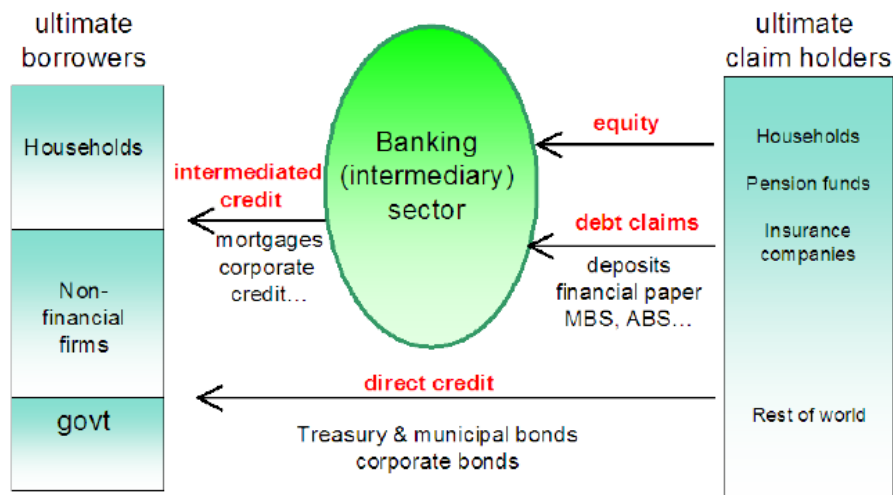
- ❖ Consumer credit, whether bank-originated or otherwise, is subject to an extensive web of federal and state laws, and participants in consumer credit markets are subject to the authority of numerous federal and state regulators.
  - Truth in Lending Act – Equal Credit Opportunity Act – Fair Credit Reporting Act – Gramm-Leach-Bliley Act – Electronic Fund Transfer Act – Bank Secrecy Act – Fair Debt Collection Practices Act
- ❖ In addition to consumer credit regulations, the funding side of P2P lending platforms is subject to SEC regulation. In Nov. 2008, the SEC issued a “cease and desist” order to P2P lending platform Prosper Marketplace, indicating that notes issued by Prosper were unregistered securities.
- ❖ Official acknowledgement of the confusing overlapping jurisdiction of multiple regulatory agencies, including SEC, state securities regulators, state banking regulators, FDIC and CFPB, with respect to P2P lending.
- ❖ GAO report outlined two approaches to the future regulation of P2P lending on the federal level: a SEC-centered approach vs. a Consumer Financial Protection Bureau, CFPB approach. the GAO did not make any firm recommendations
- ❖ Recent OCC (Office of the Comptroller of the Currency) proposal to be regulator
- ❖ **Bottom line issue to be considered**
  - Issues: diverse financial landscape, diverse products, scattered regulation: starting from a “mess”, are we stuck or should we think more deeply

# High Valued Financial Markets in the US: Shadow Banks

Adrian-Shin (2010) "The Changing Nature of Financial Intermediation and the Financial Crisis of 2007-09"

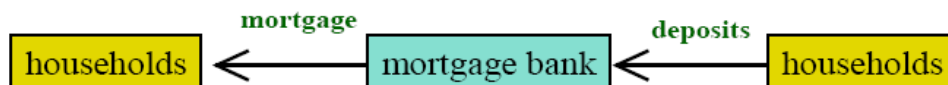
- ❖ Figure 1 is a stylized depiction of the financial system that channels funds from ultimate lenders to ultimate borrowers. For the household sector, borrowing is almost always intermediated through the banking system, broadly defined. At the end of 2008, U.S. household sector mortgage liabilities amounted to approximately \$10.6 trillion, and consumer debt accounts amounted 1

Figure 1. Stylized Financial System



- In the traditional model of financial intermediation, a bank takes in retail deposits from household savers and lends out the proceeds to borrowers such as firms or other households. **Figure 2** (see color insert) depicts the archetypal intermediation function performed by a bank; in this case, the bank channels household deposits to younger households who need to borrow to buy a house. Indeed, until recently, the financial intermediation depicted in **Figure 2** was the norm, and the bulk of home mortgage lending in the United States was conducted in this way.

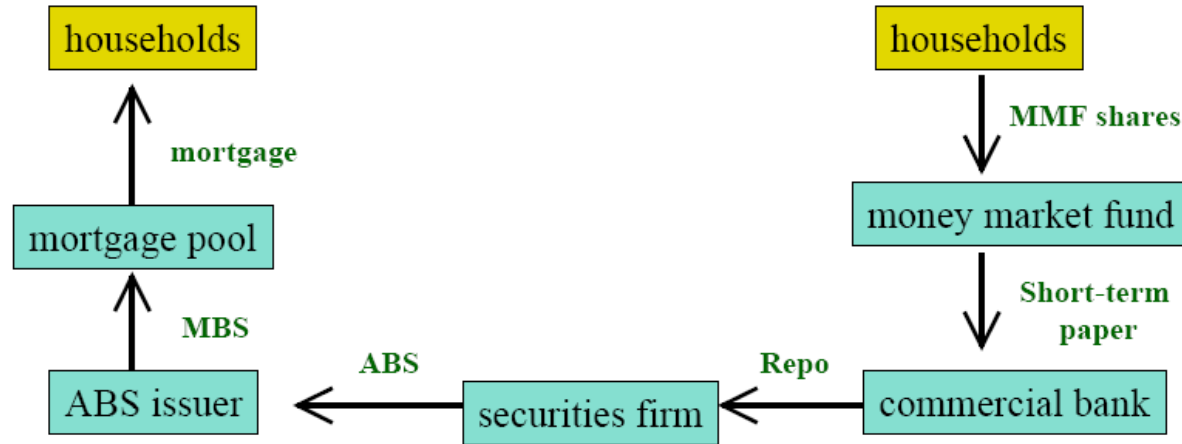
Figure 2. Short Intermediation Chain



# High Value Financial Markets (cont.)

- ❖ **Figure 6** illustrates one possible chain of lending relationships in a market-based financial system, whereby credit flows from the ultimate creditors (household savers) to the ultimate debtors (households who obtain a mortgage to buy a house).

Figure 6. Long Intermediation Chain



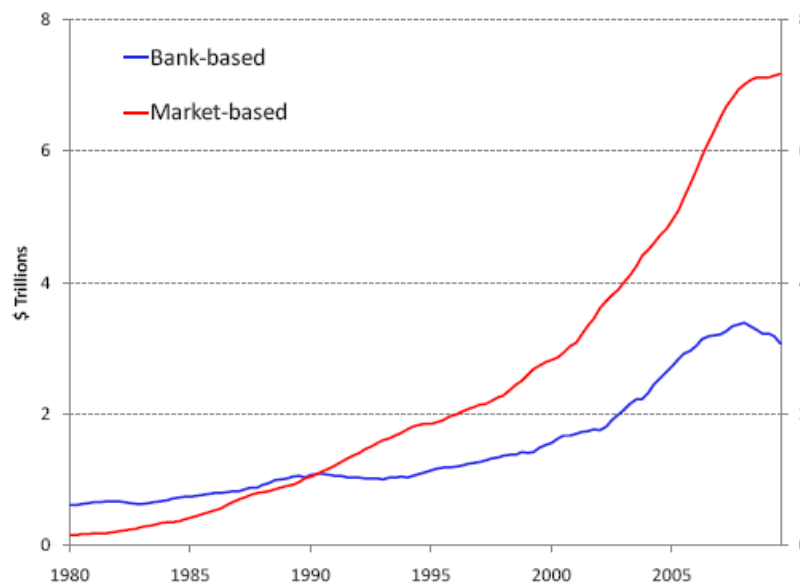
- In this illustration, mortgages are originated by financial institutions such as banks that sell individual mortgages into a mortgage pool such as a conduit. The mortgage pool is a passive firm (sometimes called a warehouse) whose only role is to hold mortgage assets. The mortgage is then packaged into another pool of mortgages to form MBSs, which are liabilities issued against the mortgage assets. The MBSs might then be owned by an asset-backed security (ABS) issuer who pools and tranches them into another layer of claims, such as collateralized debt obligations. A securities firm (e.g., a Wall Street investment bank) might hold collateralized debt obligations on its own books for their yield but will finance such assets by collateralized borrowing through repurchase agreements (i.e., repos) with a larger commercial bank. In turn, the commercial bank would fund its lending to the securities firm by issuing short-term liabilities, such as financial commercial paper. Money market mutual funds would be natural buyers of such short-term paper, and, ultimately, the money market fund would complete the circle as household savers would own shares of these funds.

**Figure 6** illustrates that those institutions involved in the intermediation chain were precisely those that were at the sharp end of the financial crisis that erupted in 2007.

# High Value Financial Markets (cont.)

- ❖ In **Figure 4** (see color insert), bank-based holdings comprise the holdings of commercial banks, savings institutions, and credit unions. Market-based holdings are the remainder—i.e., the GSE mortgage pools, private-label mortgage pools, and the GSE holdings themselves. Market-based holdings now constitute two-thirds of the \$11 trillion total of home mortgages.

**Figure 4. Market Based and Bank Based Holding of Home Mortgages**  
(Source: US Flow of Funds, Federal Reserve, 1980-2009)



- Although residential mortgages have been the most important element in the evolution of securitization, the growing importance of market-based financial intermediaries is a more general phenomenon that extends to other forms of lending



# Role of Central Bank as Financial Intermediary? A Direct Effect? Good or Bad?

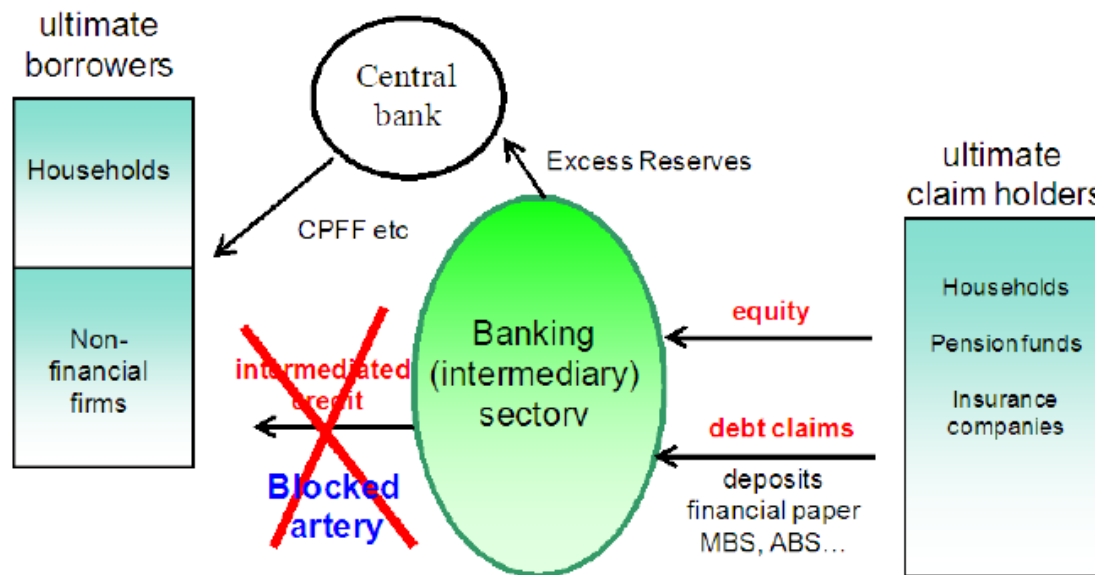
## ❖ Market-based Financial Intermediaries

- The increased importance of the market-based banking system has been mirrored by the growth (and subsequent collapse) of the broker-dealer sector of the economy, the sector that includes the securities firms. Broker-dealers are at the heart of the market-based financial system, as they make markets for tradable assets, they originate new securities, and they produce derivatives.

## ❖ Policy Response

- To the extent that the credit crunch resulted from a collapse of balance-sheet capacity in the financial intermediary sector, the Federal Reserve's policy response has been to counter the collapse through direct interventions to replace the lost balance-sheet capacity. Figure 24 (see color insert) is an illustration.

Figure 24. Making Up the Lost Balance Sheet Capacity



# Downside of Macro-Prudential Regulation and Policies Toward Fintechs: Indirect Effects

- ❖ Regulation can be constraining
- ❖ The fintech opportunity, lower costs, greater efficiency
- ❖ But will we meet the challenge, regulatory frameworks not changing
- ❖ Credit growth and macroprudential policies: preliminary evidence on the firm level
- ❖ “Credit growth and macroprudential policies: preliminary evidence on the firm level” Ayyagari, Beck and Peria (2017)  
(<https://www.Bis.Org/publ/bppdf/bispap91a.Pdf>)
  - Combining data on 1.3 million firms from 2002 to 2011 operating in 59 countries with changes in macroprudential regulations over this period, we find some evidence that macroprudential policies are associated with lower credit growth, especially for small firms with limited non-bank financing. We also find an impact of macroprudential policies on young firms in emerging markets.
  - Tradeoffs: Our results point to an important tradeoff in financial stability and financial deepening.

# Philippon (2016) “The FinTech Opportunity”

❖ (<https://www.nber.org/papers/w22476>)

This paper assesses the potential impact of FinTech on the finance industry, focusing on financial stability and access to services. I document first that financial services remain surprisingly expensive, which explains the emergence of new entrants. I then argue that the current regulatory approach is subject to significant political economy and coordination costs, and therefore unlikely to deliver much structural change. FinTech, on the other hand, can bring deep changes but is likely to create significant regulatory challenges.

- ❖ And in this context, the latest wave, a revolution at hand, again?
- ❖ Do we have correct framework for regulation and policy?

# Course Overview

- ❖ Lecture 1: Design, Regulation, and Policy with respect to Payment Systems and Financial Infrastructure: Bitcoin and FinTech as examples of Technological Innovation, with Implications for Money and Financial Intermediation, begging issues of What is Optimal
- ❖ Lecture 2: Ledgers and Data Base Management, Integrated Financial Statements, and an Application to Distributional and Regional Accounts
- ❖ Lecture 3: E-money, Infrastructure and Liquidity Shortages, Financial and Trader Centrality, and Optimized Liquidity Injections as Monetary Policy
- ❖ Lecture 4: Encryption and Validation Protocols for E-messages Versus Smart Contracts and Mechanism Design
- ❖ Lecture 5: Vision for Optimized Design of Financial Infrastructure using Distributed Ledger Technology: Scrambling of Information and Partitioned Ledgers, Delegation to the Contract, Limiting Access to the Outside Market, Single and Multiple-Colored Tokens as Decentralized Partitioned Ledgers, Commitment to Optimized Sequential Service to Mitigate Runs
- ❖ Lecture 6: Needed Financial Infrastructure: Innovations in Emerging Markets and Guidelines from Theory for Optimal Infrastructure Design
- ❖ Lecture 7: Dealing with Externalities of Payments Systems and Fire Sales: Designs for Optimized Competition among Crypto Currencies and Market Structure to Remove Pecuniary Externalities
- ❖ Lecture 8: Payment Systems: Problems and Issues to be Considered in Alternative Designs
- ❖ Lecture 9: The Information Problem of Decentralized Monetary Exchange and of Equilibria with High-Velocity Circulating Private Debt: Regulation using Distributed Ledger Technology
- ❖ Lecture 10: Money, Crypto Currency, and Public Debt as Bubbles: Implications for Indeterminacy, Fiscal Policy, Liquidity Pricing and the Interest Rate
- ❖ Lecture 11: Optimal Crypto Currency Policy and Optimal Monetary Policy: Observing Transactions Patterns, Heterogeneity and Wealth Effects, and the Implications of Micro-Market Frictions

