

# Blockchain & Money



**Class 10**

**October 11, 2018**

# Class 10 Overview

- Readings and Study Questions
- Finance & Financial Institutions
- Finance & Regulation
- Finance & Technology
- Credit & Capital Markets
- Financial Sector Risk Management and Crises
- Financial Sector => Opportunities
- Conclusions

# Class 10 (10/11): Study Questions

- What are the tradeoffs of centralized institutions and markets in the financial sector?
- Which challenges of the financial sector – periodic crises, concentrated risks, economic rents, legacy systems, processing risks, financial inclusion – might present opportunities for blockchain applications?
- How does blockchain technology fit within other trends – particularly with regard to technology - facing the financial sector in 2018?

# Class 10 (10/11): Readings

- *'Top financial services issues of 2018'* PwC Financial Services Institute
- *'Sheila Bair on What Hasn't Changed since the Great Recession'* New York Magazine
- *'The Rise of Market Concentration and Rent Seeking in Financial Sector'* Zhang

## *Optional*

- *'Ten Years after the Crash, We are Living in a World it Brutally Remade'* New York Magazine

# What is the Role of Finance?

Moving, Allocating & Pricing:



**Money**

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**&**



**Risk**

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# Financial Institutions

## Intermediaries of Financial Assets and Liabilities

- Functions
  - Investments (aka. Store of Value)
  - Credit (aka. Borrowing Value)
  - Risk Transformation
  - Advice regarding Financial Assets and Liabilities
- Sectors
  - Commercial Banks & Credit Unions
  - Investment Banks & Brokerage Firms
  - Insurance Companies & Underwriters
  - Collective Investment Vehicles, Mutual Funds, Pension Funds & Annuities
  - Asset Managers & Financial Advisors
  - Exchanges, Clearinghouses & Settlement Organizations

# Financial Markets

- Primary Markets
- Secondary Markets
  - Exchange Trading
  - Over the Counter
- Asset Management
- Market Infrastructure

# **Finance**

## **Ledgers**

**Records Economic Activity and Financial Relationships**

**Records Transactions and Accounts**

## **Payment & Settlement Systems**

**Method to Amend and Record Ledgers for Money & Financial Assets**

**Authorizing, Clearing and Recording Final Transfers of Value**



# **Finance and Regulation**

- **Finance has long been subject to**

**Public Policy Debates and Regulation**

# Public Policy Framework

- Financial Stability
- Protecting the Public
- Guarding Against Illicit Activity

# Finance and Technology

- Finance has long been in a

**Symbiotic Relationship with Technology of its Time**

# Money



Salt Bars - Ethiopia

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Tally Sticks - England

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Cowrie Shells - Nigeria

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Rai Stones - Yap

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# Metal Money



Bronze Aes Rude - Rome

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Bronze Spade - China

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Cooper Plate - Sweden

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Bronze Yuan - China

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Silver Dekadrachm - Greece

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Gold Aureus - Rome

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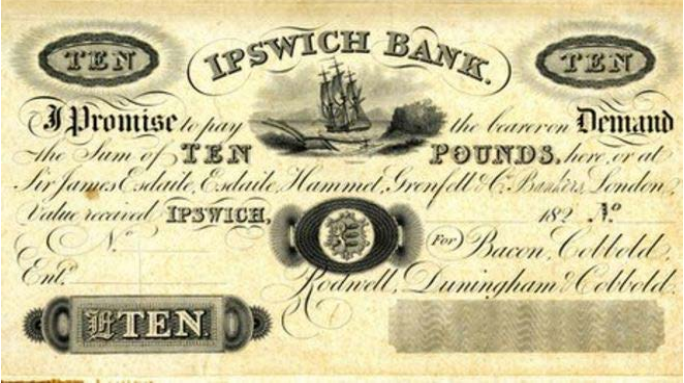
# Paper Money



Jiaozi Promissory Note - China



5 Pound Note - England



Private Bank Note – U.S.



Continental Note – U.S.



Private Bank Note - Canada

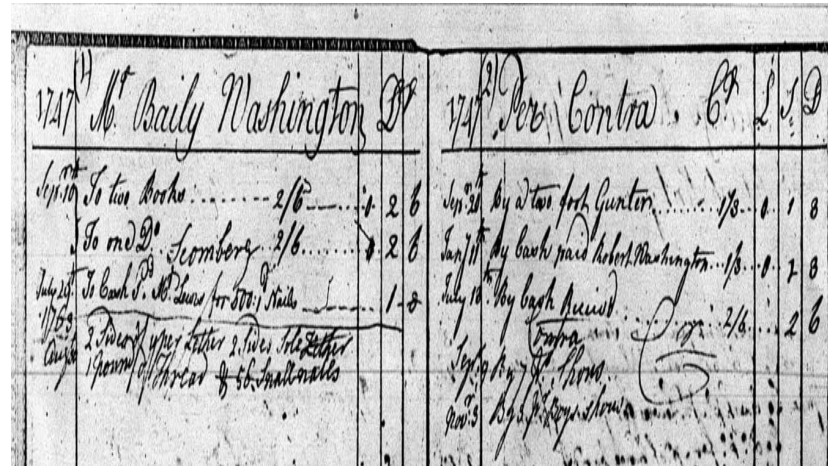
# Fiat Currency

- Represented by Central Bank Liabilities & Commercial Bank Deposits
- Accepted for Taxes
- Legal Tender for All Debts Public & Private
- Relies upon System of Ledgers

# Financial Ledgers



**Proto Cuneiform**  
**Uruk, ca 3000 B.C**



**Personal Ledger**  
**George Washington**  
**1747**

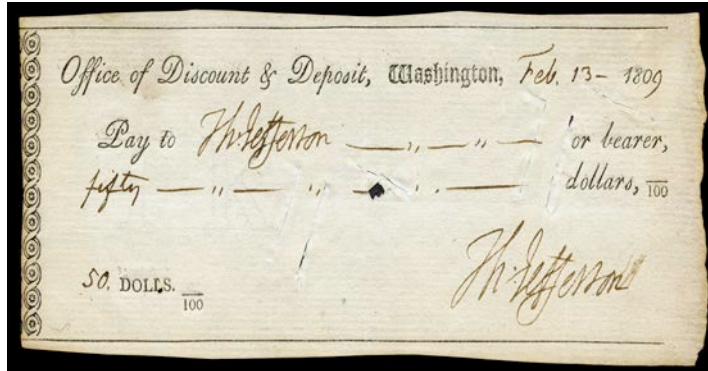


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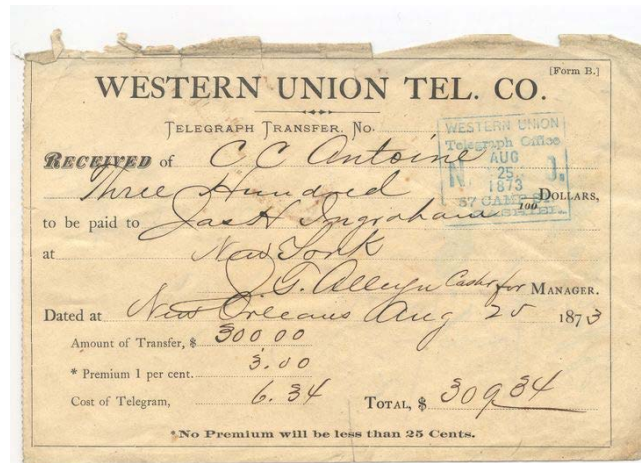
**IBM 360**  
**1961**



# Payment & Settlement Systems



**Personal Check**  
**Thomas Jefferson**  
**1809**



**Western Union**  
**Telegram**  
**1873**



**Telex**  
**1950s – 1970s**

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# Technologies of our Time Affecting Finance



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## AI & ML



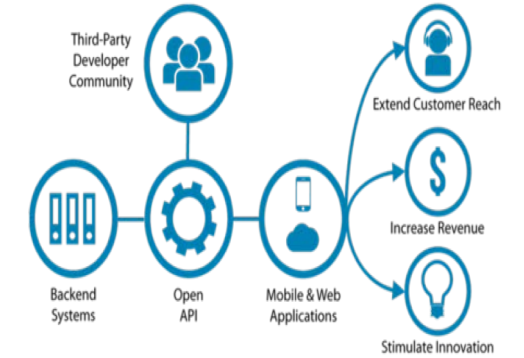
Image by Scott Robinson. CC BY.

## Blockchain



Image by Jacob Gube. CC BY.

## Cloud



Courtesy of RestCase. Used with permission.

## Open API



Image by NEC Corporation of America. CC BY

## Biometrics



Image by Mike Seyfang. CC BY.

## Chatbots



Image by Hakan Dahlstrom. CC BY

## Mobile

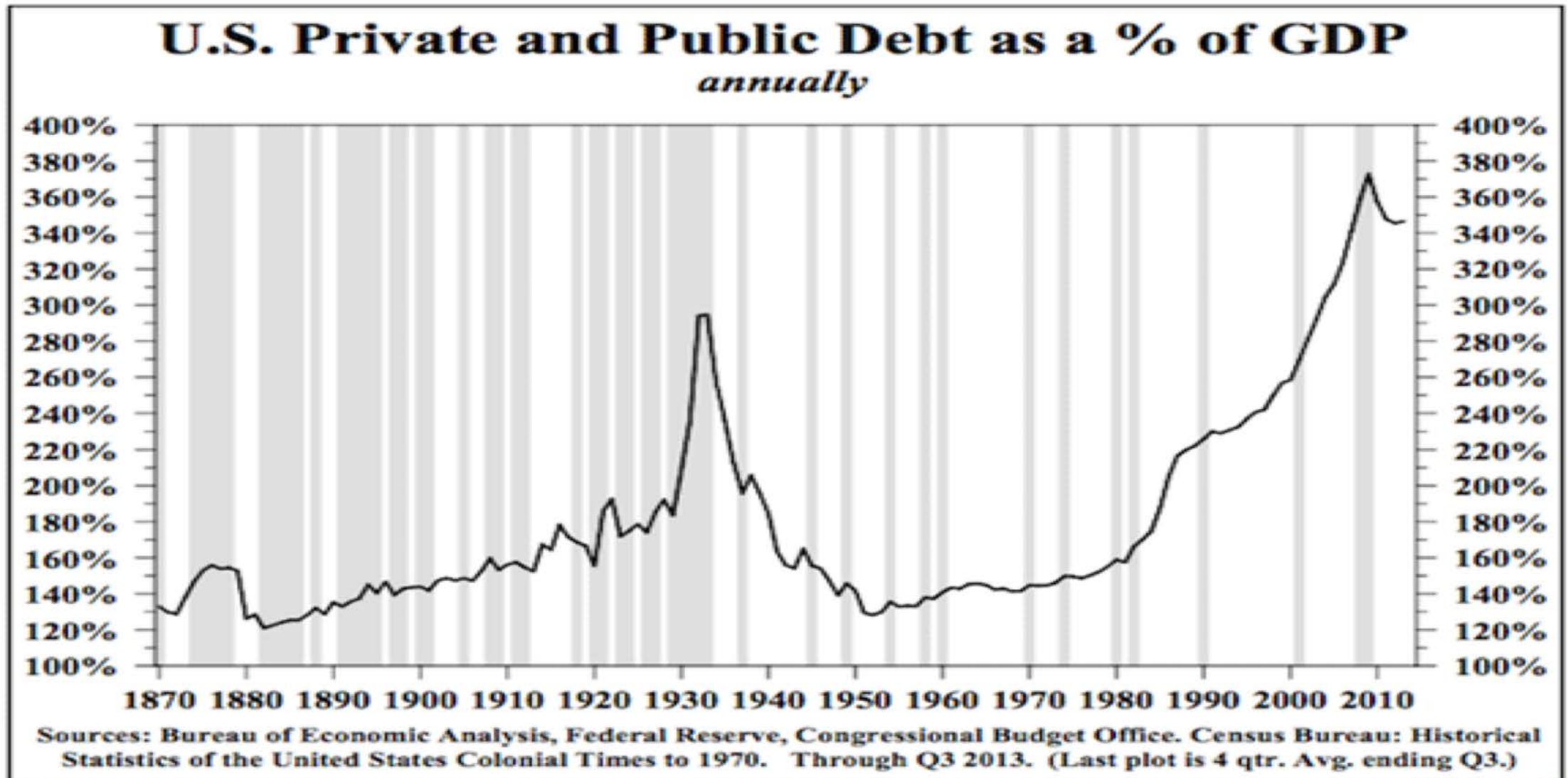


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## RPA

# Credit

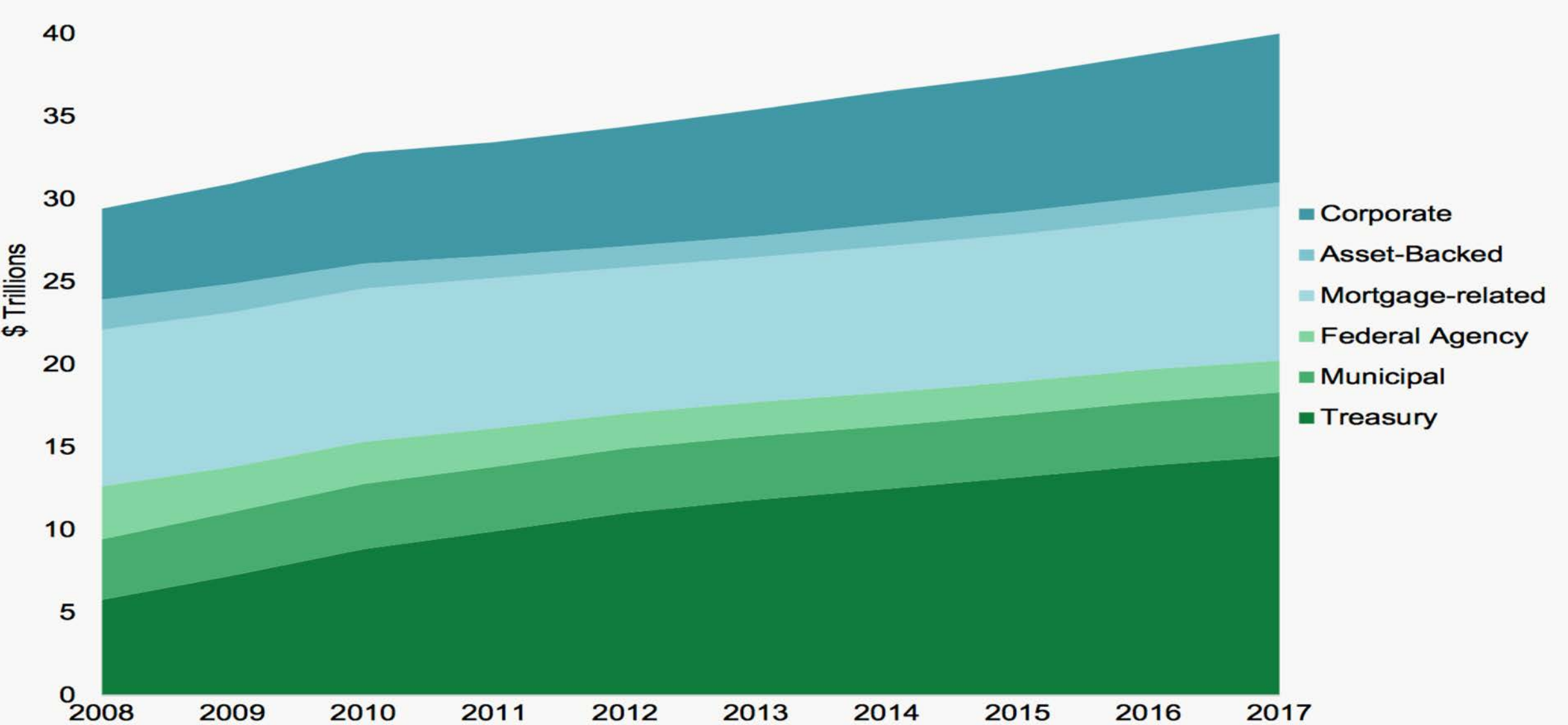
**Borrowing Money or Value with an Agreement to Repay in the Future**



# U.S. Total Credit Market - \$67 Trillion

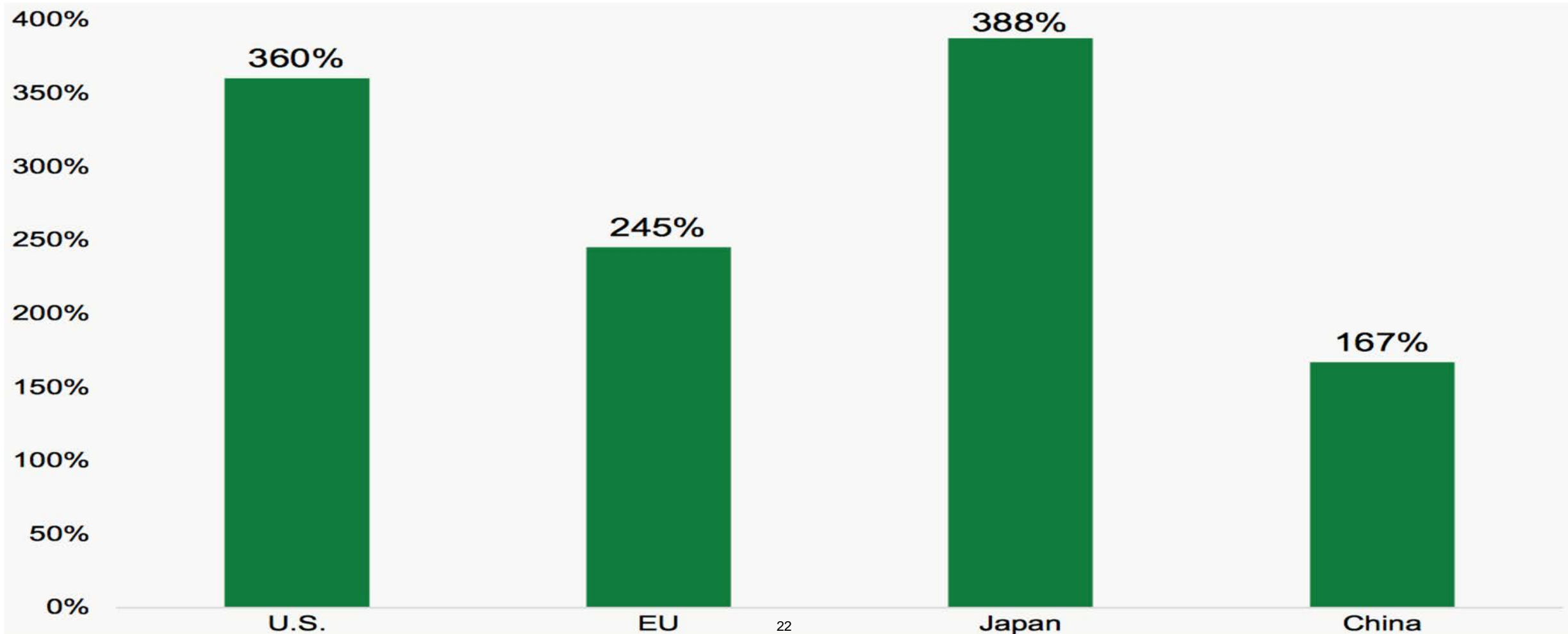
- Government
  - Federal \$17.5 Trillion
  - State & Local \$ 3.1
- Commercial \$14.8
- Financial \$16.1
- Household \$15.4
- Source: Federal Reserve 2018 Q2 'Financial Accounts<sub>20</sub> of the U.S.'

# U.S. Bond Market

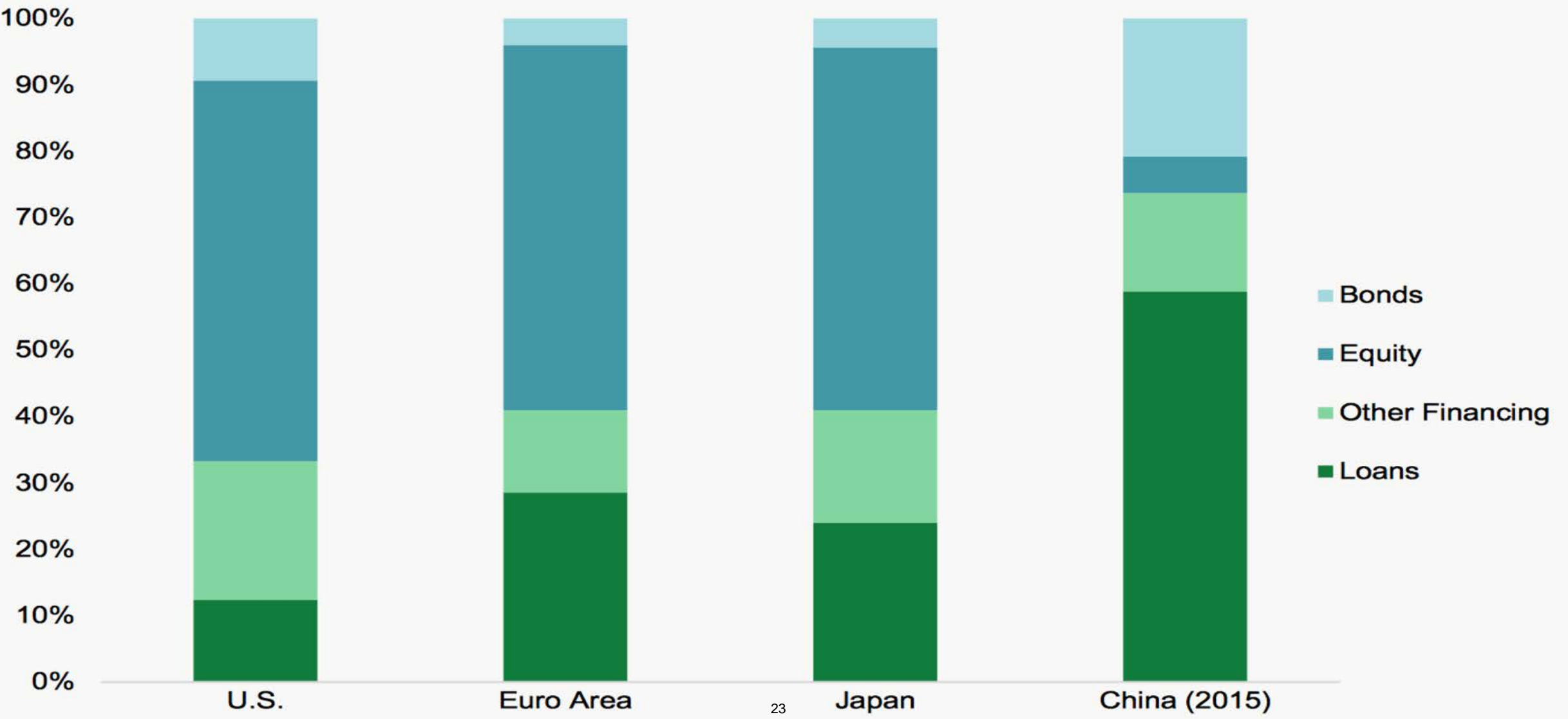


Source: Bloomberg, Thomson Reuters, US Treasury, US Agencies, Federal Reserve, SIFMA

# Bond & Equity Markets as % of GDP



# Financing of Non-Financial Corporations

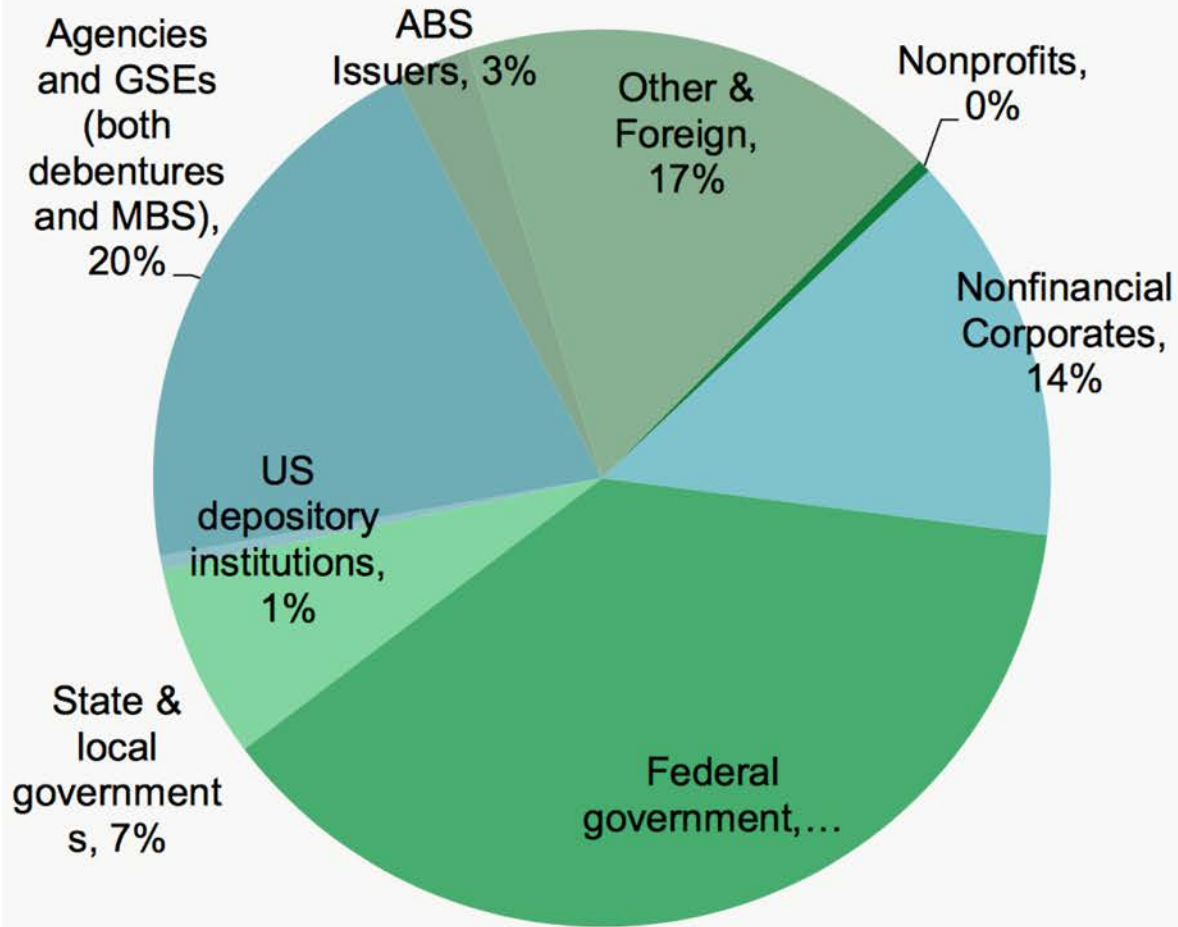


Source: SIFMA September 2018 Research

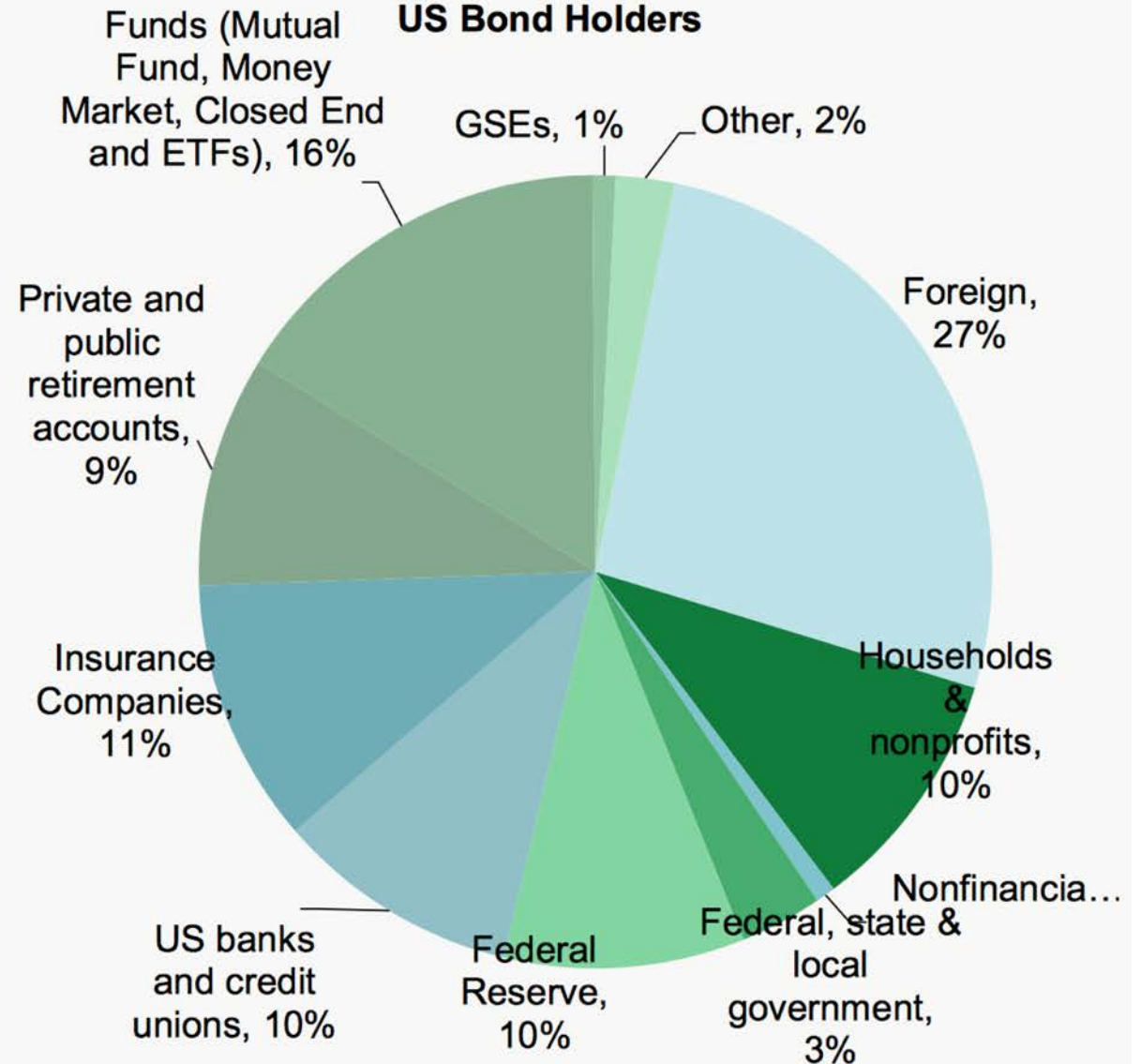
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# U.S. Bond Market

**US Bond Issuers**



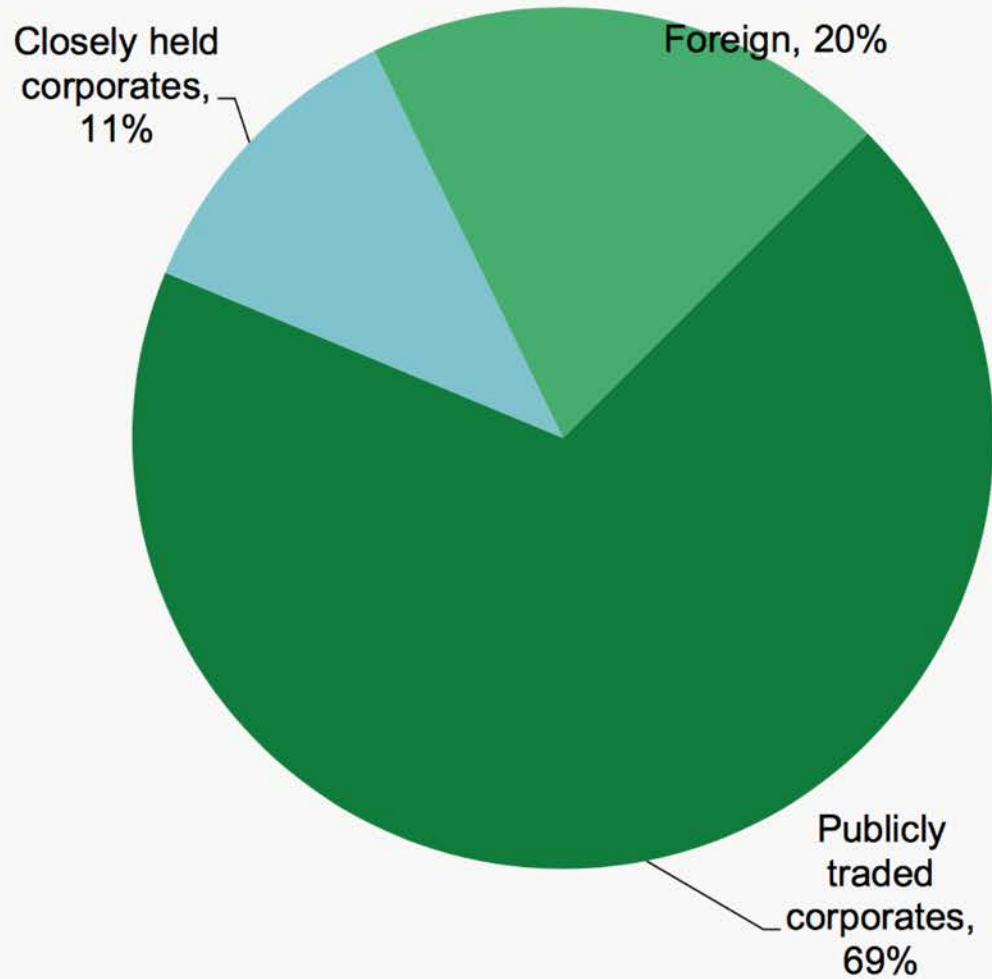
**US Bond Holders**





# U.S. Equity Market

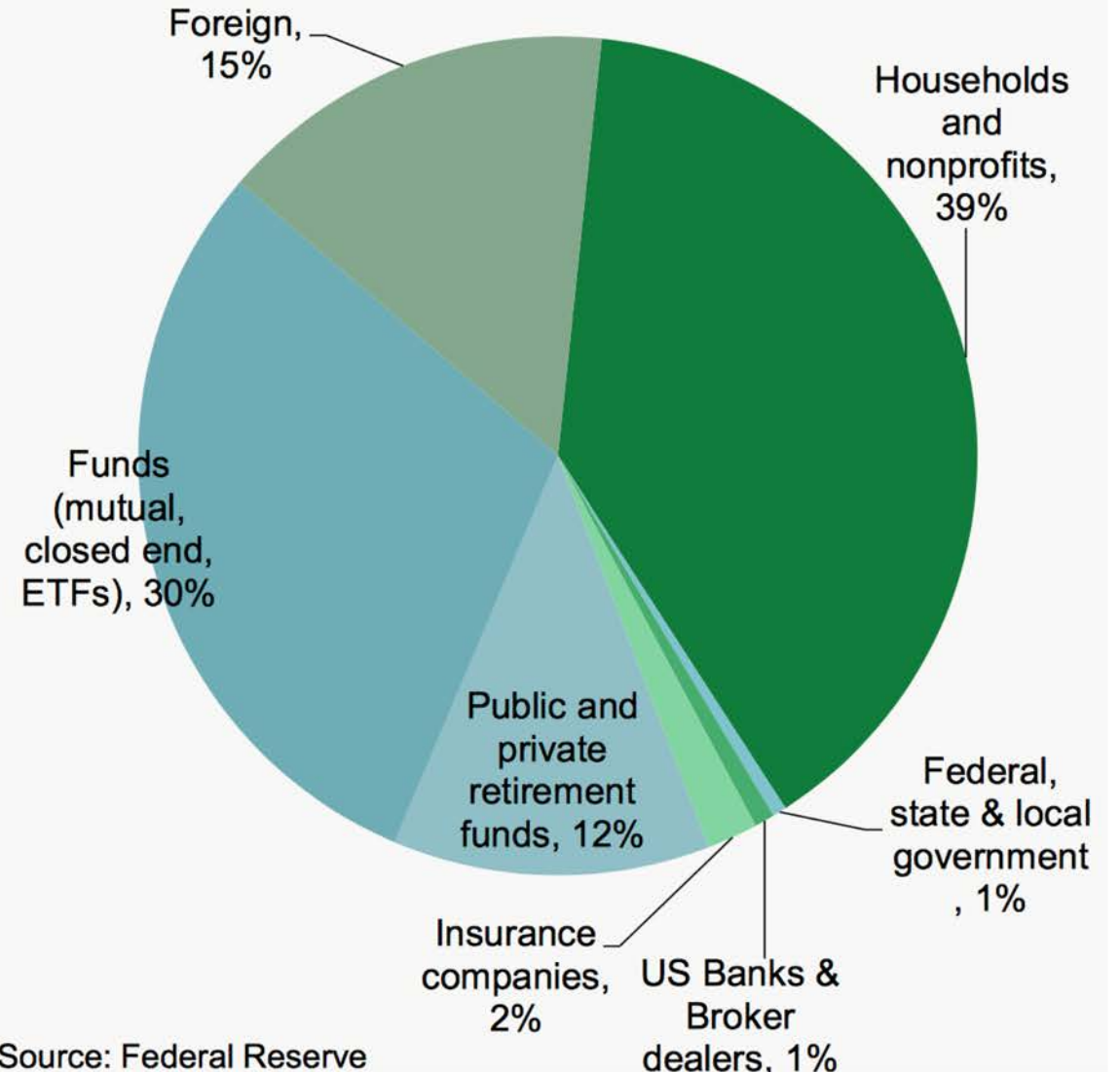
## US Equity Issuers



Source: Federal Reserve

Source: SIFMA September 2018 Research

## US Equity Holders

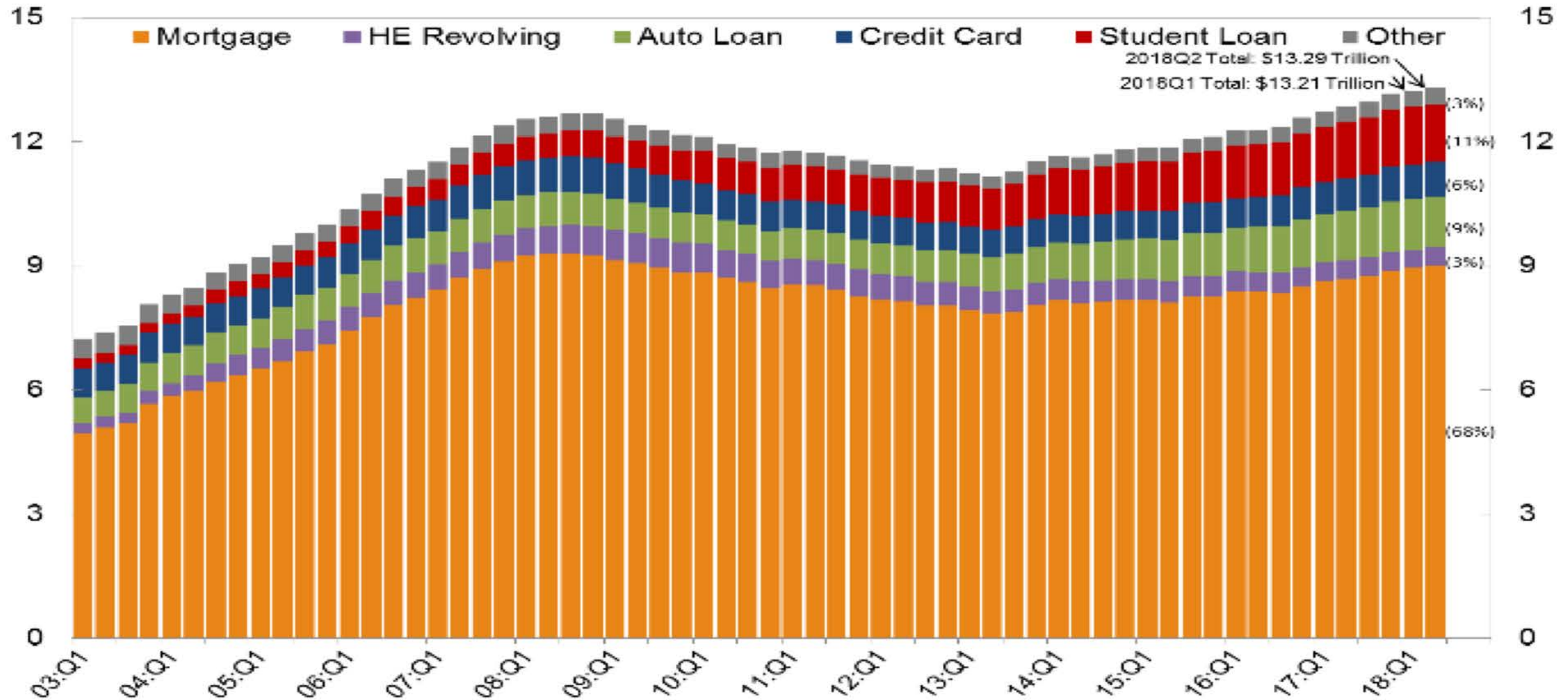


Source: Federal Reserve

# Total Debt Balance and its Composition

Trillions of Dollars

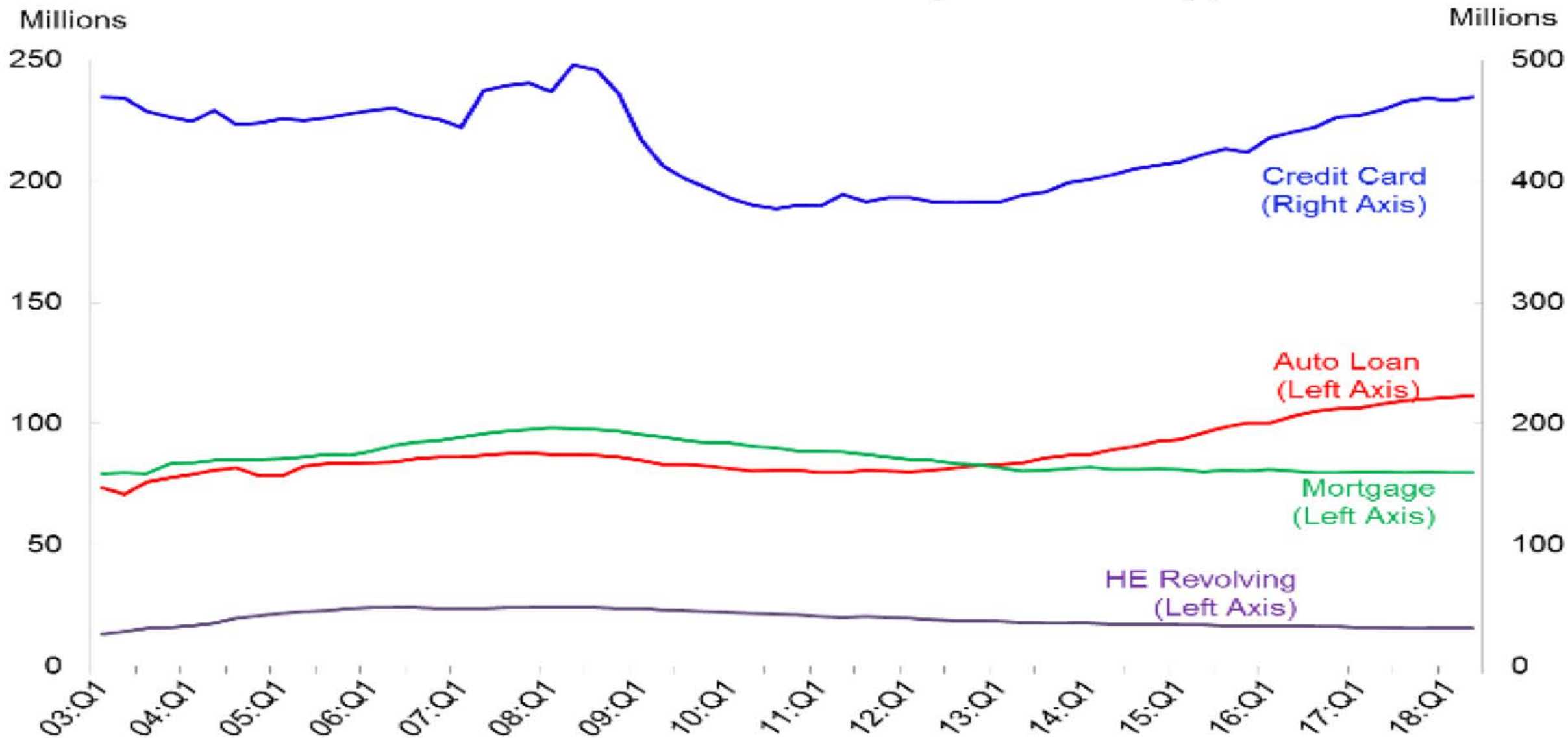
Trillions of Dollars



Source: New York Fed Consumer Credit Panel/Equifax

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# Number of Accounts by Loan Type



Source: New York Fed Consumer Credit Panel/Equifax

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# Financial Sector Risk Management

- Market - Price, Rate, Spread, Basis, Volatility
- Credit
- Underwriting
- Liquidity
- Funding
- Settlement
- Model - Correlation
- Operational & Cyber
- Legal & Compliance
- Reputational
- Systemic

# Financial Sector Crises

- Latin American Debt Crisis – late 1970s
- Continental Illinois - 1984
- Black Monday – 1987
- Savings & Loan Crisis – 1986 – 1995
- Asian & Russian Debt Crisis – 1997 – 1998
- Subprime Mortgage Crisis – 2008
- European Debt Crisis – 2009 -

# 2008 Financial Crisis

- Weak Underwriting & Predatory Lending =>  
Subprime Mortgage Crisis & Housing Bubble
- Easy Credit & Financial Derivatives =>  
Increased Leverage & Interconnectedness
- Poor Risk Management & Incentive Structures =>  
Many Vulnerable Financial Institutions
- Multiple Failures => Systemic Loss of Funding & Liquidity =>  
Contagion & Near Collapse in Highly Interconnected System

# Financial Sector => Opportunities

- Legacy Customer Interface, Data, & Processing Systems
- Economic Rents
- Concentrated Risks
- Infrastructure Systems' Costs & Counterparty Risks
- Periodic Crises and Instability
- Financial Inclusion
  
- Wide Acceptance and Adoption of New Tech
- Rapidly Expanding Customer Data
  
- Financial sector costs: 7 ½ % of U.S. GDP
- Payment system costs: ½ - 1 % of Global GDP

# Financial Sector Potential Use Cases

- **Payment Systems** - Cross border, Large interbank, & Retail
- **Central Bank Digital Currency & Private Sector Stable Value Tokens**
- **Secondary Market Trading** – Crypto-exchanges & custody
- **Venture Capital** - Crowdfunding through Initial Coin Offerings
- **Clearing, Settlement and Processing** – Securities & Derivatives
- **Trade Finance & Supply Chain** - Digitizing paper-based processes
- **Digital IDs and Data Reporting**



# Class 11 (10/16): Study Questions

- How do decentralized blockchain applications affect the cost of verification and the cost of networking? How do blockchain applications affect market power?
- What might the economics and organization of the Internet - with its protocol layers and applications - tell us about the future of blockchain technology?
- What lessons should be drawn from crypto skeptics – Krugman, Stiglitz, Roubini, Gates, Buffett, Dimon, & others - about the economic potential for blockchain technology? What is an answer to the oft stated query: ‘what problem do cryptocurrencies solve?’

# Class 11 (10/16): Readings

- *'Why Bitcoin is and isn't the Internet'* Ito
- *'Some Simple Economics of the Blockchain'* Catalini and Glans
- *'Transaction Costs and Tethers: Why I'm a Crypto Sceptic'* Krugman
- *'Billionaire Bill Gates once got bitcoin for a birthday gift – Here's what he did with it'* CNBC
- *'Dr. Doom' Economist Nouriel Roubini Bearish on Everything Crypto'* Forbes

## Additional

- *'Exploring the Cryptocurrency and Blockchain Ecosystem'* Roubini

## Optional

- *'The Economic Limits of Bitcoin and the Blockchain'* Budish
- *'Valuing Bitcoin and Ethereum with Metcalf's Law'* Clearblocks
- *'The Meaning of Decentralization'* Buterin <sup>34</sup>

# Conclusions

- Finance Serves helps Allocate & Price Money & Risk in the Economy
- Ledgers & Settlement Systems undergird the Financial System
- Finance has long lived Symbiotically with Regulation & Technology
- Credit & Capital Markets are Essential parts of Modern Economies
- Finance Manages but also Concentrates Risk Leading to Periodic Crises
- Finance's Role, Ledgers & Challenges Present Opportunities for Blockchain Technology to be a Catalyst for Change



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