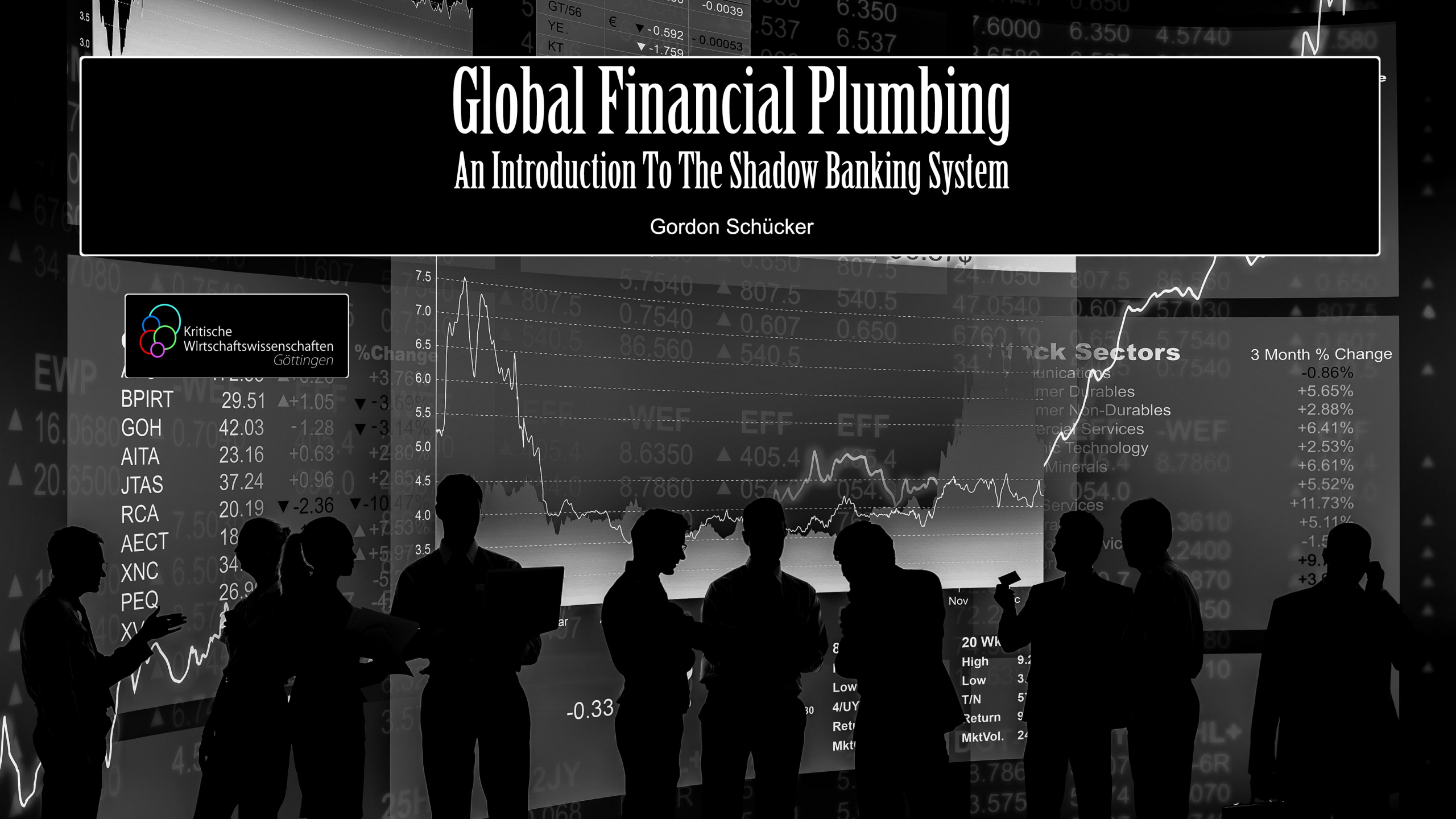
Global Financial Plumbing

An Introduction To The Shadow Banking System

Gordon Schücker



Realize that everything connects to everything else.

– Leonardo da Vinci

Introduction video

The Crisis of Credit Visualized by Jonathan Jarvis

What is money?

- “Traditional” measures of money supply
  - M0, M1, M2 (various measures combining currency in circulation, bank deposits and checking accounts).

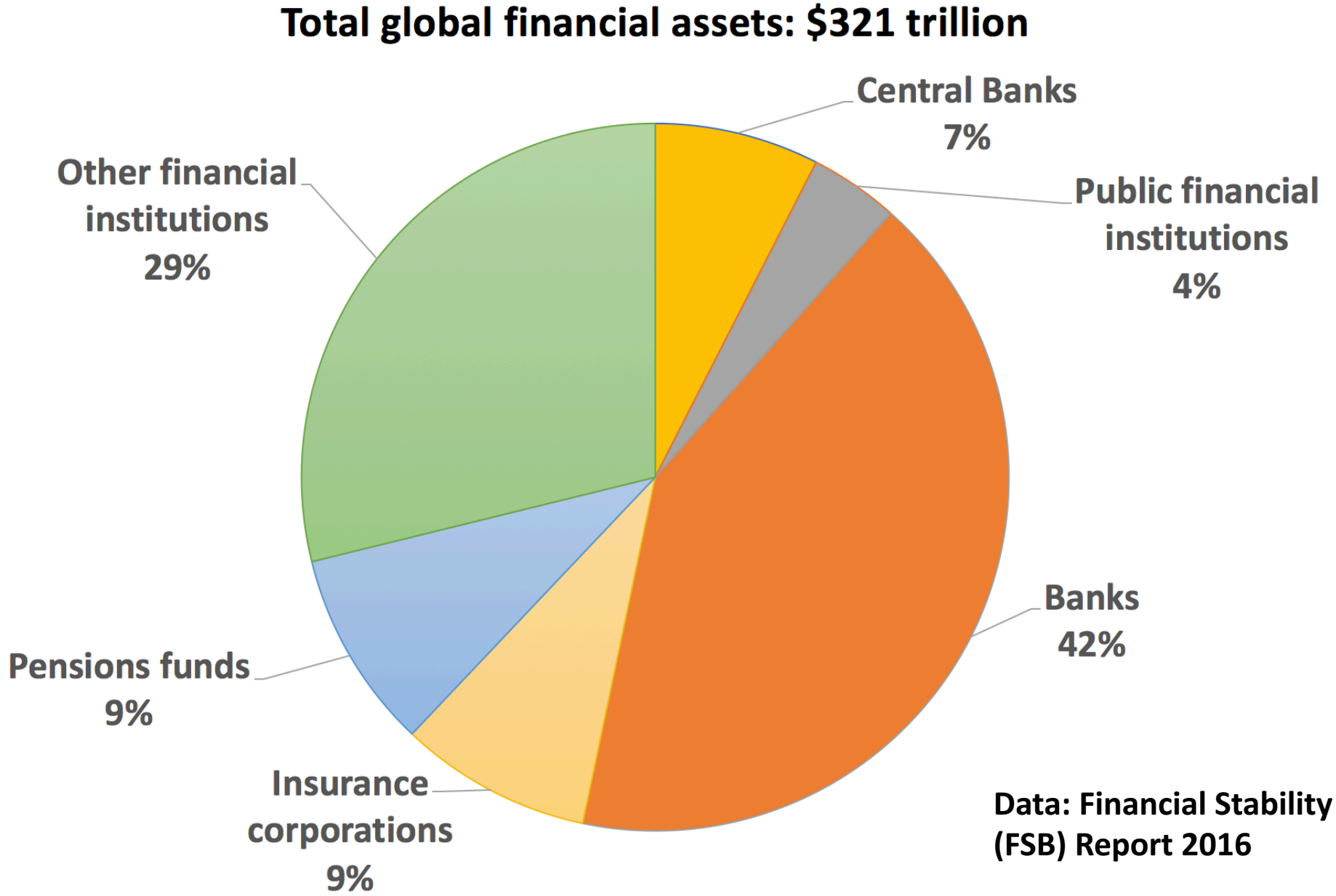
- How about a US government bond?
  - Highly “liquid” (= can be sold at any point in time on financial markets)
  - Satisfies the three main functions of money: medium of exchange, unit of account and store of value.

What is money? | View of the Federal Reserve

The problem is that we cannot extract from our statistical database what is true money conceptually*, either in the transactions mode or the store-of-value mode. One of the reasons, obviously, is that the proliferation of products has been so extraordinary that the true underlying mix of money in our money and near money data is continuously changing. As a consequence, while of necessity it must be the case at the end of the day that inflation has to be a monetary phenomenon,* ***a decision to base policy on measures of money presupposes that we can locate money.*** *And that has become an increasingly dubious position.*

– Alan Greenspan, FOMC Policy Meeting June 28, 2000, Federal Reserve

Mapping of the global financial system | FSB



Data: Financial Stability Board (FSB) Report 2016

Shadow banking definition

- Goal of this presentation: Explain the interactions happening on global financial markets.
- A possible broad **definition of shadow banking**:

  All bank-like activities and entities outside of the traditional banking system.
- Existence of many other definitions of shadow banking in the literature, e.g. International Monetary Fund, Shadow Banking (2014).
- Relatively “new” concept. Term introduced in 2007.

Shadow banking | Examples

- Instruments of shadow banking
  - **repurchasing agreements** (**repo**)
  - **asset-backed securities** (**ABS**), e.g. mortgage backed securities (MBS)
  - **derivatives** e.g. credit default swap (CDS), c.f. intro video
- Entities of shadow banking:
  - **broker-dealer**: entity that engages in the business of trading securities for its own account or on behalf of its customers, e.g. defunct Lehman Brothers Inc.
  - **hedge fund**: managed and pooled fund that uses different strategies to invest, including derivatives and leverage, e.g. defunct Long-Term Capital Management.
  - **money market fund**: entity that invests only in short-term debt securities such as US Treasury bills.

Funding mechanism on global financial markets

- **Definition of collateral**: something pledged as security for repayment of a loan, to be forfeited in the event of a default. E.g. a house in a mortgage.

- Manmohan Singh, Collateral and Financial Plumbing (2014):

  Collateral is one of the building blocks on which the financial markets are constructed. Used for a number of purposes - including trading with central counterparties (CCPs), secured funding with market counterparties and central banks, OTC derivatives margining and settlement - the role of effective collateral management in monetizing assets has never been more important.

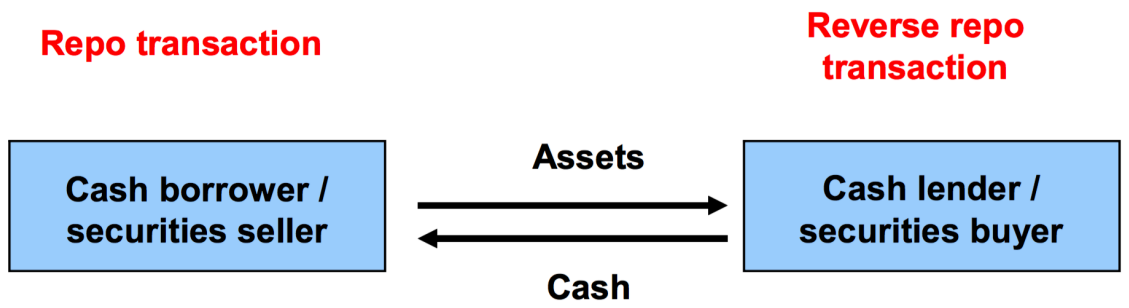
Asset backed securities (ABS) | Examples

- Mortgage backed securities (MBS): loans backed by mortgages
- Auto loan ABS: loans backed by car loans (subprime auto crisis for 2017 – 2018?)
- These ABS are used as building-block for securitization products such as **collateralized debt obligations** (CDOs), i.e. shuffling of various asset backed securities (ABS) and repackaging them into a new security. C.f. intro video.
- Chinese commodity financing deals (CCFD): Use commodities, for example copper, as collateral to secure Yuan (= Chinese currency) funding.

Repurchasing Agreement (repo)

- A **repurchasing agreement (repo)** is transaction that combines the selling of a security with the promise to buy it back at a later point in time at a fixed price.

Figure 6. Mechanics of a Cash Repo Transaction



Source: Citi.

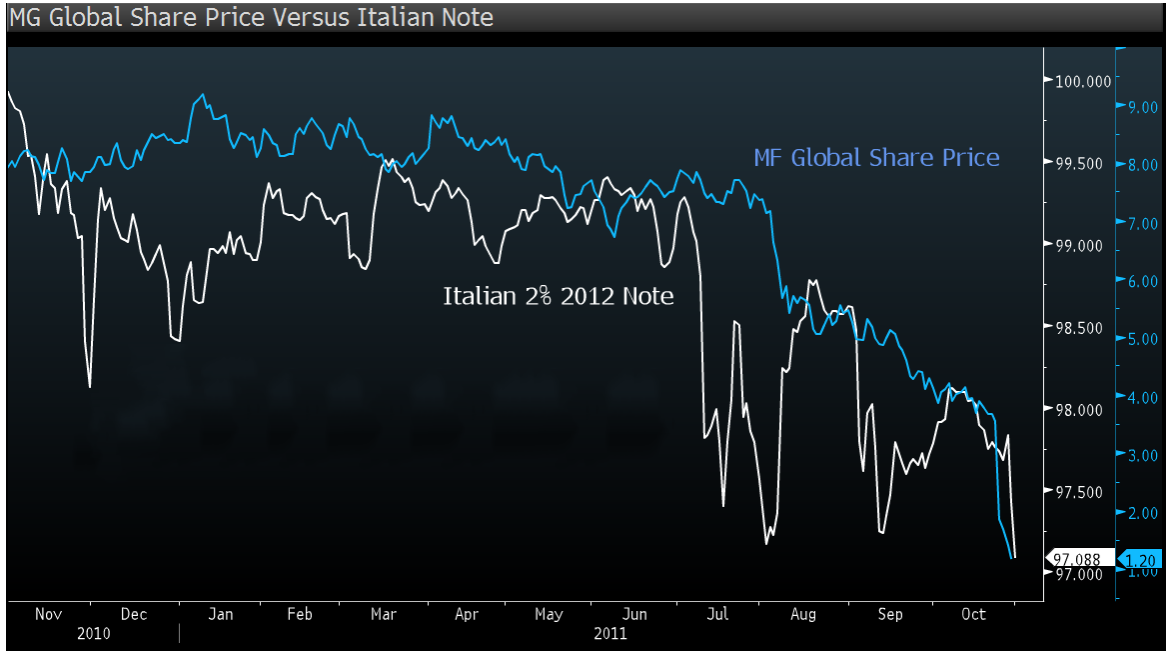
- Example: Bank A enters a repo transaction with Bank B. Bank A sells US government bonds for $100 million to Bank B with the promise to buy them back for $101 million in one year.
- **A repo is effectively a secured loan** with a 1% interest rate. The implied interest rate on a repo is called the **repo rate**.
- Note that the $100 million in US government bonds remain on the balance sheet of Bank A.

Repurchasing Agreement (repo)

- Repos are a major source of financing on Wall Street.
- From Gorton et al., Haircuts (2010):
  "**The average daily trading volume in the repo market was about $7.11 trillion in 2008**, compared with the New York Stock Exchange, where the average daily trading volume in 2008 was around $80 billion.

“Fractional repo banking” | Shadow money multiplier

- Purchase new assets from repo proceeds to increase leverage.
- Example:
  - Leg 1: buy US treasuries
  - Leg 2: repo these to secure funding
  - Leg 3: use proceeds to buy new US treasuries and repeat the cycle
- The (exemplified) MF Global trade that went wrong in 2011:
  - buy 2Y Italian bonds yielding 2%,
  - repo these to secure funding at a repo rate of 0.5%.
  - Repeat cycle to leverage up.
  - Idea: profit from the interest rate differential and bet that the Italian government will be rescued. Result $6 billion trade that blew up the company. (The Italian government was “bailed out”, but only 9 months later.)



“Fractional repo banking” | Rehypothecation

- Reuse of pledged collateral to secure third party funding
- Example:
  - Leg 1: Bank A secures funding from Bank B using $10 million in US treasuries in a repo transaction.
  - Leg 2: Bank B enters a repo trade with Bank C. Bank B used the $10 million in US treasuries it got from Bank A as collateral in the repo trade with Bank C.
- This creates so called **collateral chains**. Many actors have a claim on the same collateral.

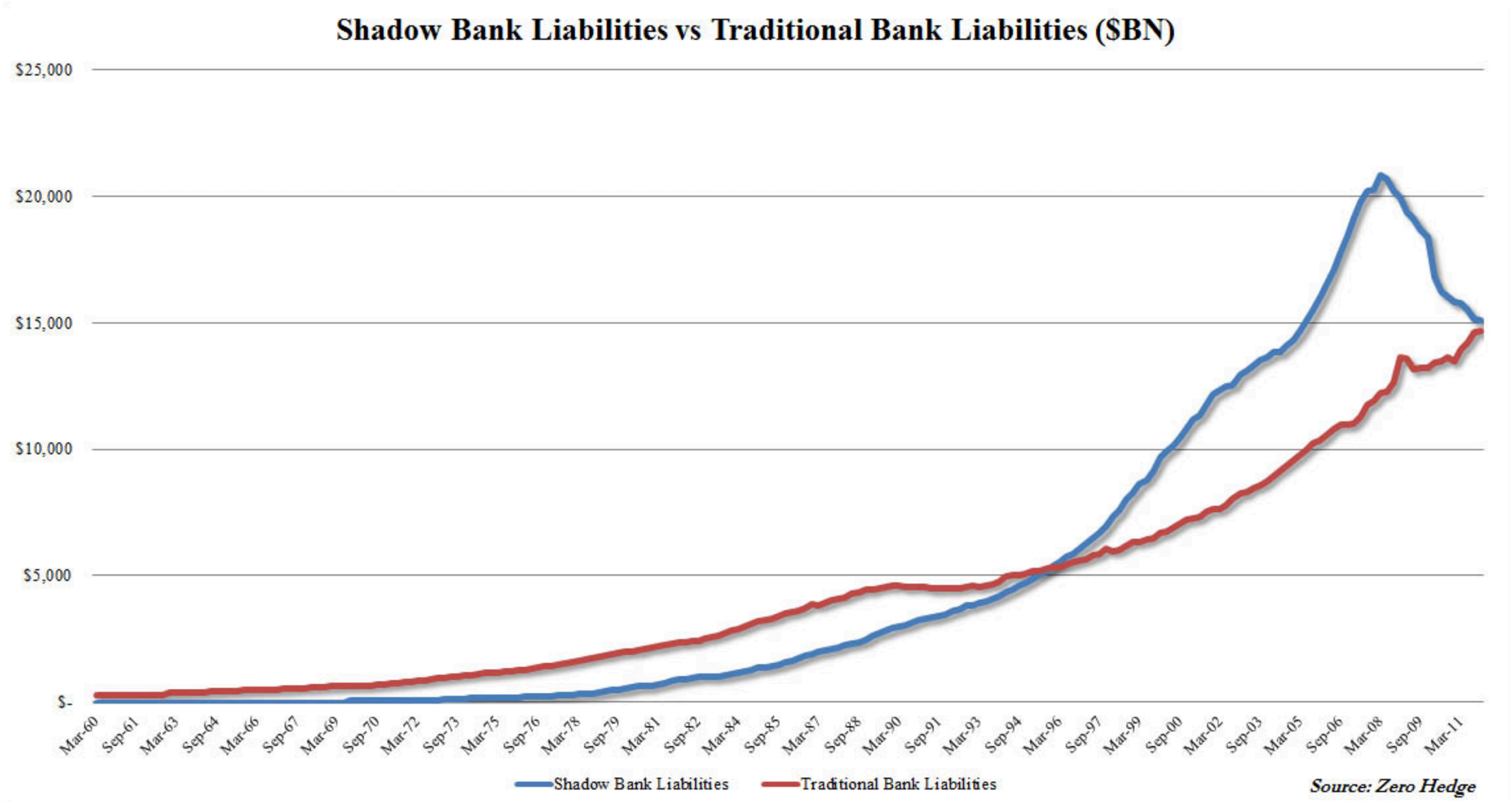
Repo | Accepted collateral

- Accepted collateral for repo transactions: often “high quality assets” such as government bonds and mortgage backed securities (MBS). But anything is possible
- Depending on the quality of the collateral, repo funding might not be 100% of the value of the collateral.
- For example $100 million in US government bonds might only secure $90 million dollar in cash. This reduces risk for the lender in case the collateral loses value.

Sources on repo:

- FSB, Global Shadow Banking Monitoring Report 2013
- Matt King, Are The Brokers Broken (2008)
- Gorton & Metrick, Haircuts (2010)
- US Treasury, Office of Debt Management - Fiscal Year 2013 Q2 Report

Shadow banking vs traditional banks in the US



Risks in the shadow banking system

- Some entities might not have access to central bank funding or government bailouts. (Especially not when located in a different jurisdiction.)
- Bank-like activities are subject to the same risks present with traditional banking.
- Example of bank-like activity: **maturity transformation**, i.e. borrowing on a short term basis while lending on a long term basis. Possibility of "a run on a shadow bank".
  - Lehman Brothers financed most of its operations via 7 days repos, when trust "evaporated", long term "investments" (such as subprime CDOs) had to be "fire sold" leading to its bankruptcy (and the near collapse of the entire global financial system).
- Moral hazard in a subprime CDO. Use of NINJA-mortgages (no income, no job, no asset) in '08. Issuer does not bear the consequences of his decisions as risk is sold to someone else.

A deeper dive into the derivative world

- exchange traded derivatives
  - e.g. futures and futures options on the Chicago Mercantile Exchange (CME)
  - All trades happen on a regulated exchange, i.e. if someone defaults on his promise to pay on a derivative trade, the exchange pays instead.
- over the counter (OTC) derivatives
  - e.g. credit default swaps (CDS)
  - Each trade happens between two individuals.
  - Less regulation and possibility of more leverage. Highly risky as defaults of one individual can lead to further defaults.

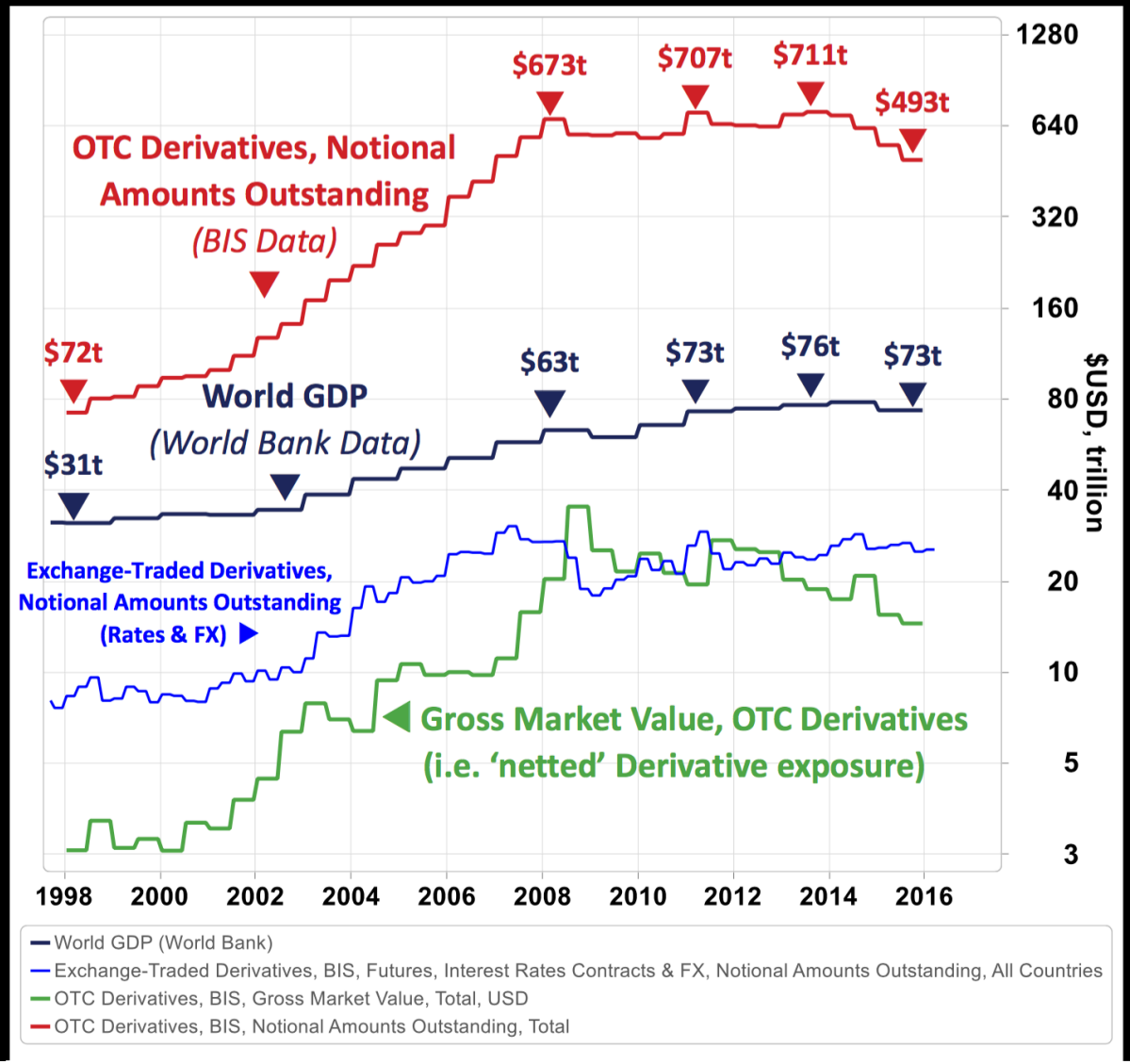
OTC derivative example | credit default swap (CDS)

- From the introductory video: AAA CDO tranche yielding 4%. Possibility to **insure it via CDS for a 1% fee**.
- Guaranteed 3% return, **but only if the CDS issuer does not fail**.
- CDS issuer (simplified) payouts: $1 profit if CDO tranche does not default. $103 loss if CDO tranche defaults. (I.e. also called “picking up nickels in front of steamrollers”.)
- Max possible derivative loss is called the **notional exposure** (i.e. in the CDS example the notional is $103).
- American International Group Financial Products (AIG-FP) had **$2.7 trillion** in notional CDS outstanding at the height of the subprime mortgage crisis.

OTC derivative example | Why notional matters

- Reconsider the same CDS example.
- AAA tranche CDO with 4% yield, CDS insurance for 1%
- Bank A buys a CDS on the above CDO from Bank B. Bank A sells a CDS on the same CDO to Bank C.
- **Netted exposure** of Bank A is **zero**. (Any profit or loss is transferred from Bank B to Bank C via Bank A).
- However, the **notional exposure** of Bank A is $103 as it might have to payout Bank B $103 if the CDO defaults while Bank C also defaults and is not able to pay Bank A.
- As soon as a someone defaults on his promise to pay, “netted” exposures become notional exposures quickly for everyone.

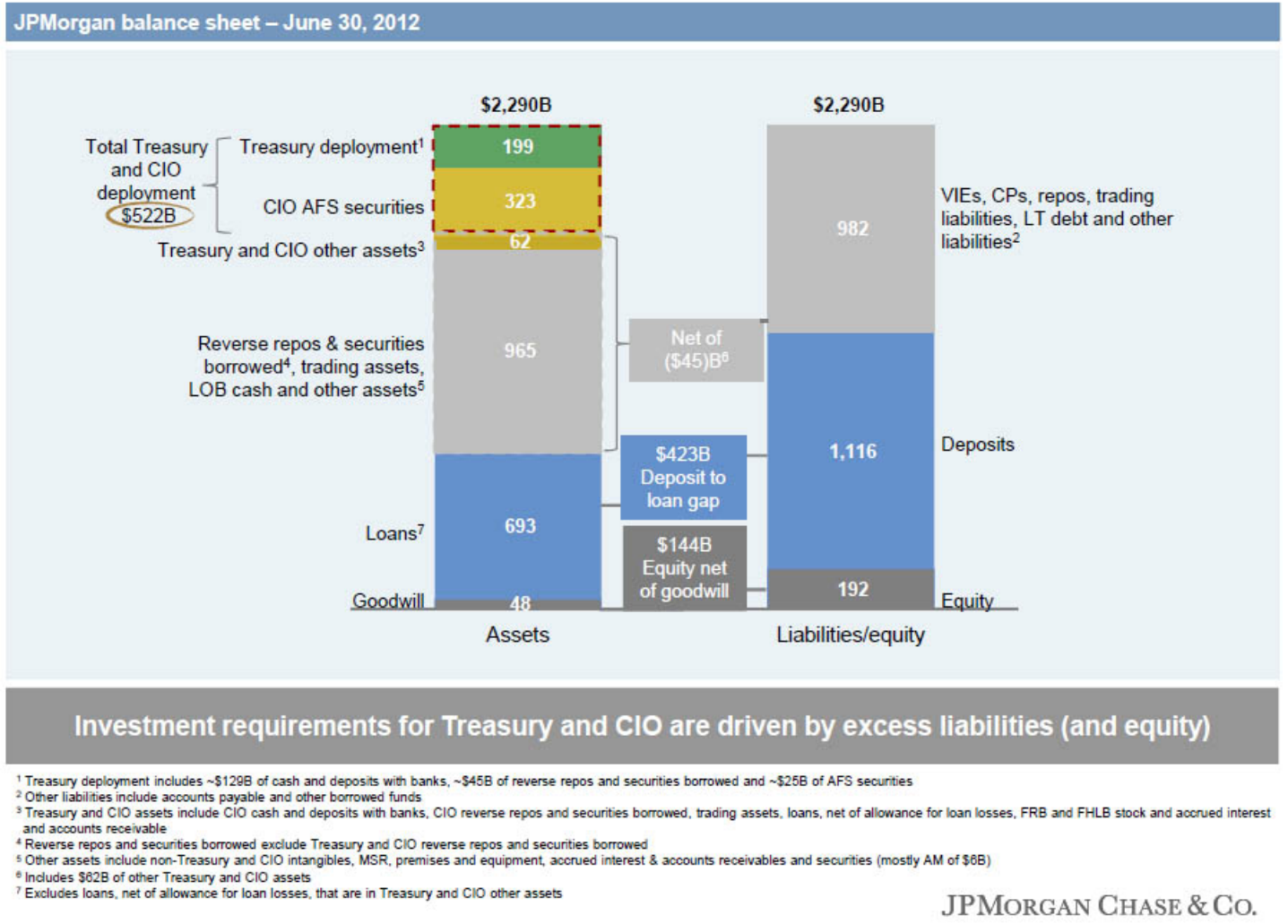
Outstanding OTC derivatives



Prerequisite CAPITAL MANAGEMENT

Interconnectedness traditional vs shadow banks

- Obvious high interconnectedness since both entity types interact with one another.
- Traditional banks also use shadow banking instruments such as repos and derivatives.
- Traditional banks use various loopholes to bypass regulation anyways. E.g. J.P. Morgan Chase lost $5 billion trading CDS in the summer of 2012, while supposedly “hedging” (= enter trades for insurance purposes only and not for generating profits).

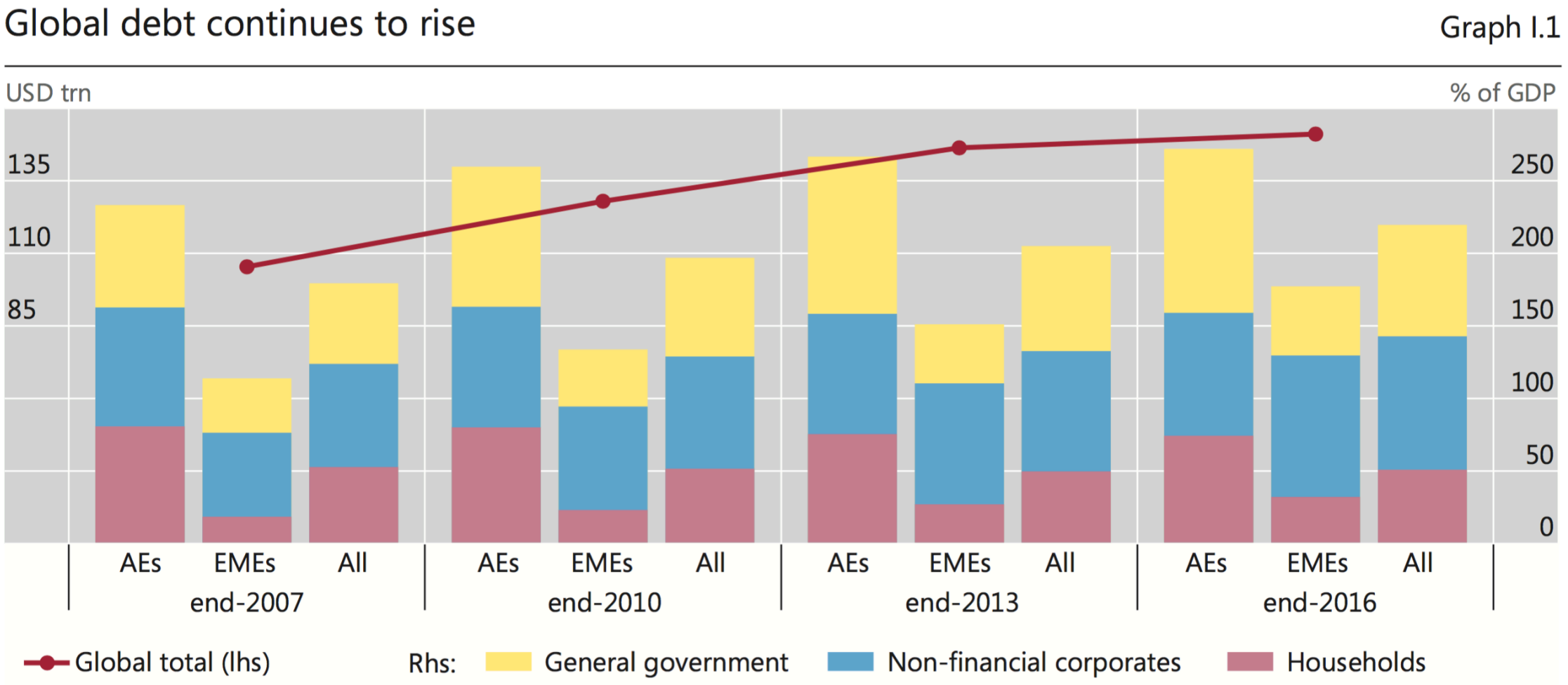


CIO = Chief Investment Office = JPM internal "hedge fund”

Government shadow banks

- **Government sponsored enterprises** (GSE) is a financial service corporation created by the United States Congress.
  - Two most known are mortgage lenders Fannie Mae and Freddie Mac.
- Pozsar et al., Shadow Banking (2010):
  "***All GSE debt and guarantees are off balance sheet to the federal government***."
- Similar in other jurisdictions.
- Unfunded pension liabilities is another topic. (Depending on estimates, up to several hundred trillion dollars globally. C.f. looming pension fund crisis.)

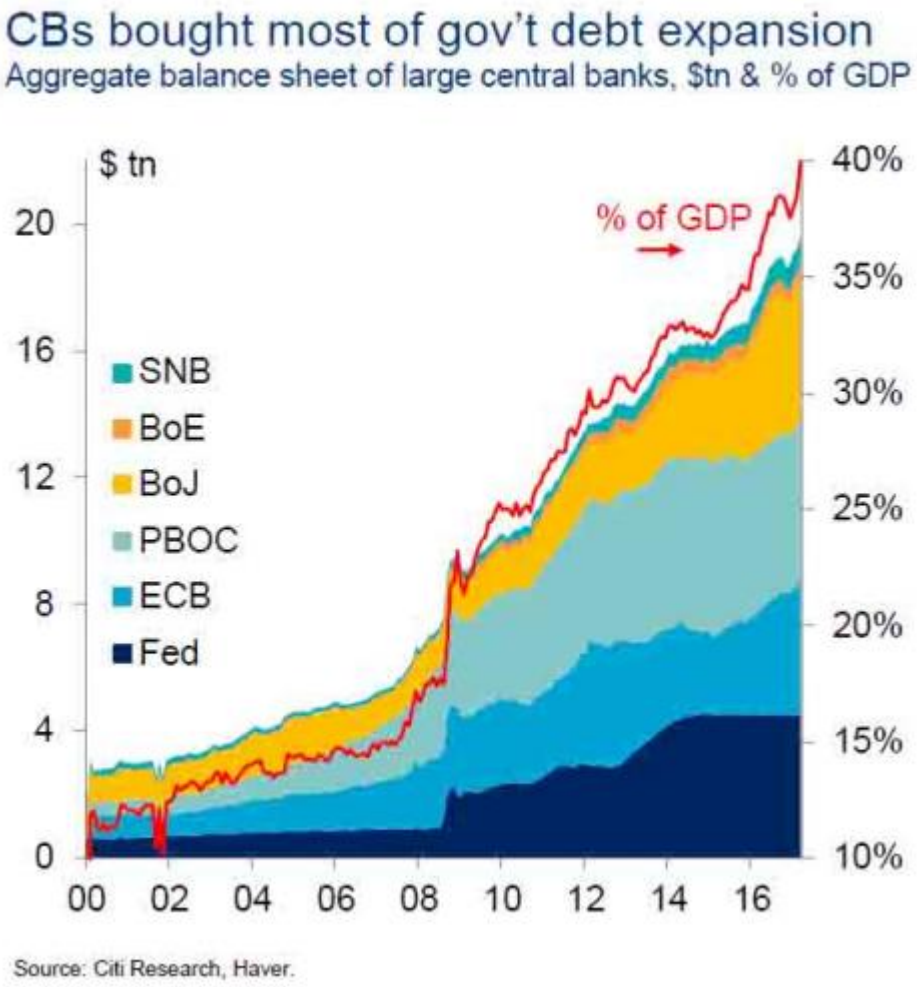
The bigger picture | Global debt never decreased



Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook*; national data; BIS; BIS calculations.

AE = advanced economies, EME = emerging economies

The bigger picture | Central Bank are buying a lot



CB = central bank, SNB = Swiss National Bank, BoE = Bank of England, BoJ = Bank of Japan,
PBOC = People's Bank of China, ECB = European Central Bank, Fed = Federal Reserve Bank

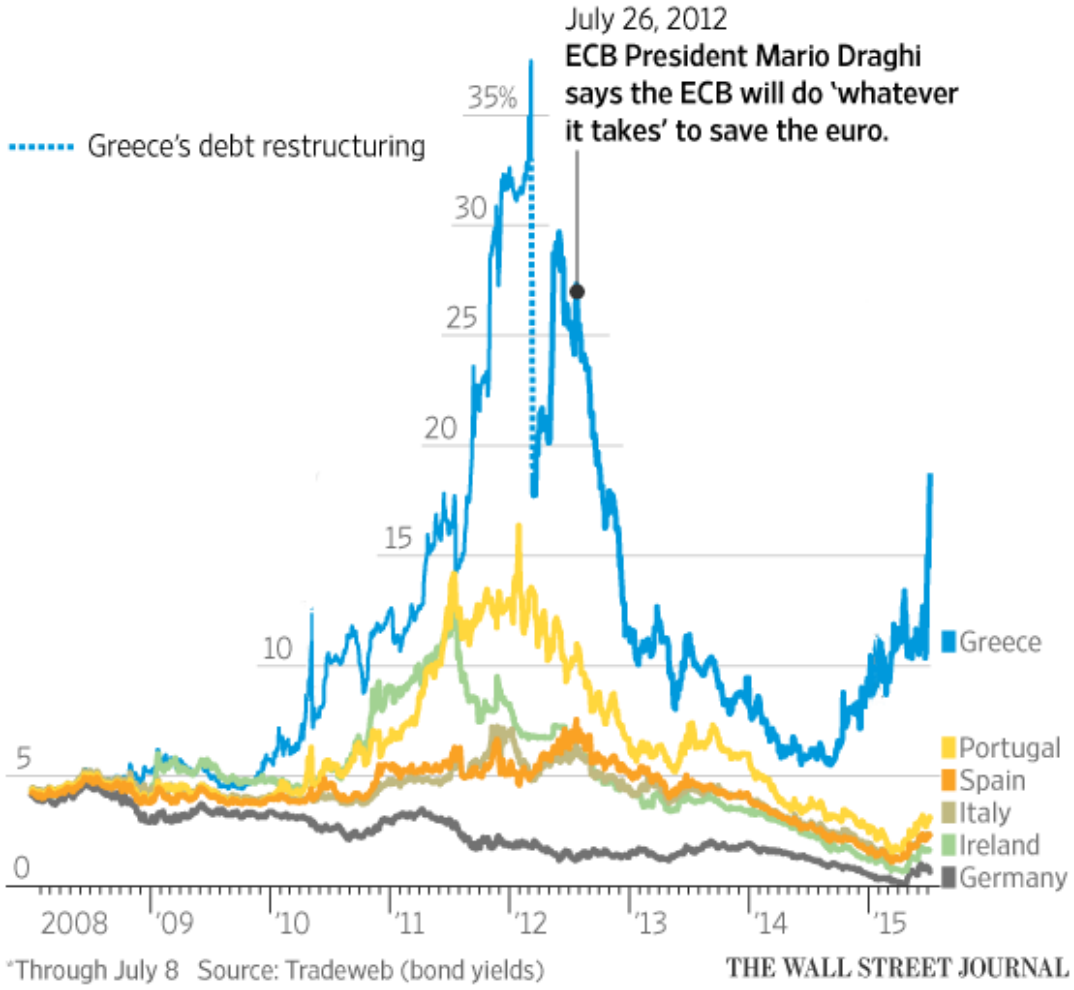
A small detour | Bond pricing (or also pricing of a loan)

- Suppose you buy a bond today at a price of $99 that will pay out $100 in one year, then the implied interest rate on that bond is (about) 1%.
- Suppose you can buy that same bond for $90 dollars today. Now the implied interest rate is about 11.1% (i.e. $100/$90-1).
- If you pay $100 for the bond today, then the implied interest rate is 0%.
- If you pay $101 for the bond, then the implied interest rate is -1%.
- **Interest rate and bond prices are inverse to one another.** I.e. an increasing interest rate reduces the price of the bond and vis versa.

The bigger picture | Central bank's implicit bailouts

- ``Whatever it takes'' by Mario Draghi: ECB promises to buy up to unlimited amounts of EU government bonds (**except Greek bonds**) in order to "stabilize" bond prices.
- Federal Reserve buys large amount of US government bonds and mortgages (program called **quantitative easing** (QE)).
- Stock buying by the Bank of Japan and the Swiss National Bank.

Interest rates on EU government bonds



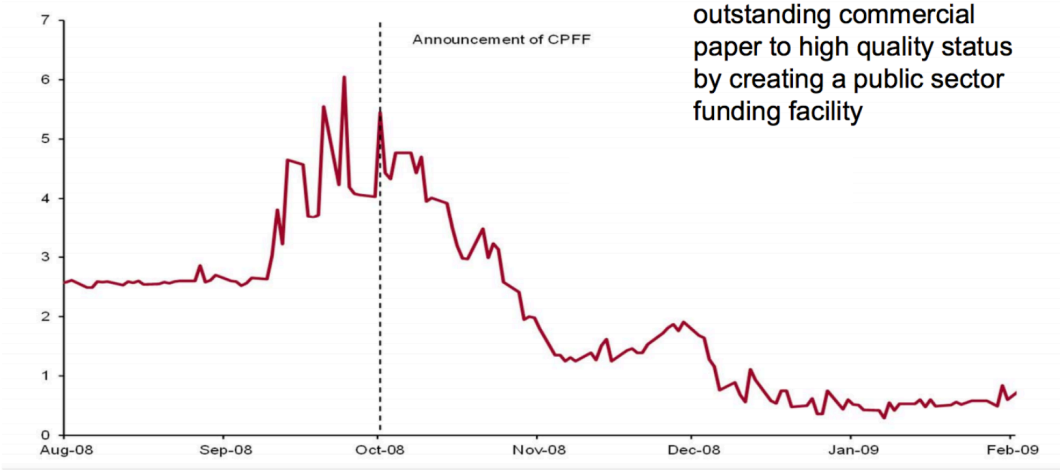
The bigger picture | Central bank's implicit bailouts

- **In times of crisis, central banks lower accepted collateral quality**
  - In 2008, the Fed started accepting collateralized debt obligations (CDO = a repackaged loans) as collateral to obtain dollar loans.
    This lead to increases in prices for CDOs (recall from previous slide: lower interest rate = higher loan value).
  - Self-securitization with the ECB:
    "Self-securitization is defined as those securitization transactions ***done solely for the purpose of using the securities created as collateral with the central bank in order to obtain funding"***

High Quality Collateral is…

3. Whatever the central bank dictates

Interest rate on CDOs



The Fed's Commercial Paper Funding Facility restored outstanding commercial paper to high quality status by creating a public sector funding facility

Source: Thomson Reuters DataStream, Federal Reserve Board

The bigger picture | Central banks lifting asset prices

The principal transmission channel to the real economy

CB buying has lowered real interest rates

Global CB balance sheet, YoY change $bn, v. blended US v. European 5y5y real rate, YoY change, bp

Source: Citi Research, Bloomberg.

S&P tied to Fed's balance sheet for 7 years

S&P 500 vs. Fed's holdings of securities, $ tn

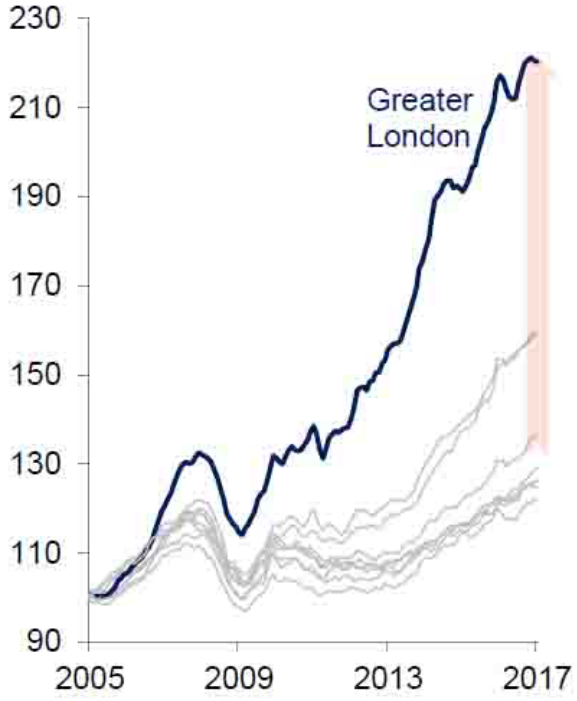
Source: Citi Research, Bloomberg..

Lifting asset prices

The bigger picture | Central banks lifting **all*** asset prices

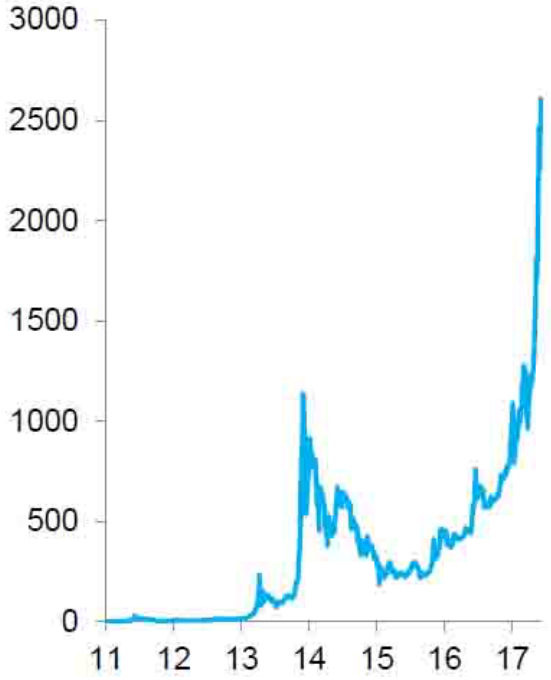
Facilitating recovery comes at a high cost to the future (iv)

Location, location, location
UK property prices by region, Jan-05=100



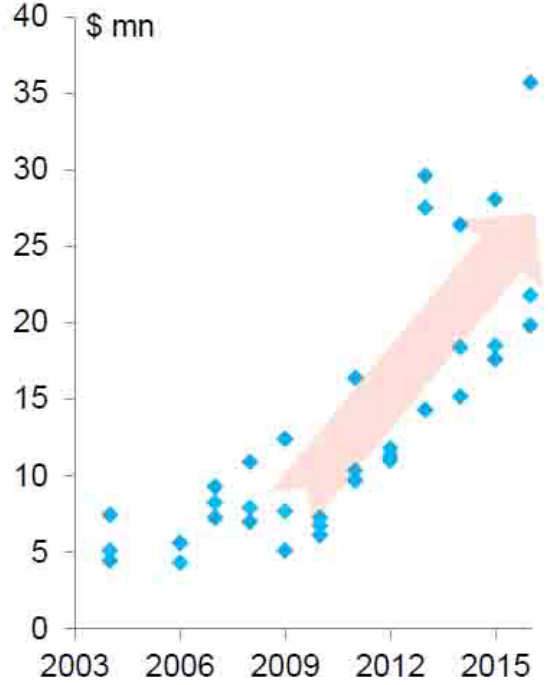
Source: Citi Research, Haver.

Bit by bit by bit?
Bitcoin spot, $



Source: Citi Research, Bloomberg.

Old cars selling like never before
3 most expensive cars sold at auction per year



Source: Wikipedia.

Wealth effect stretching farther and farther afield

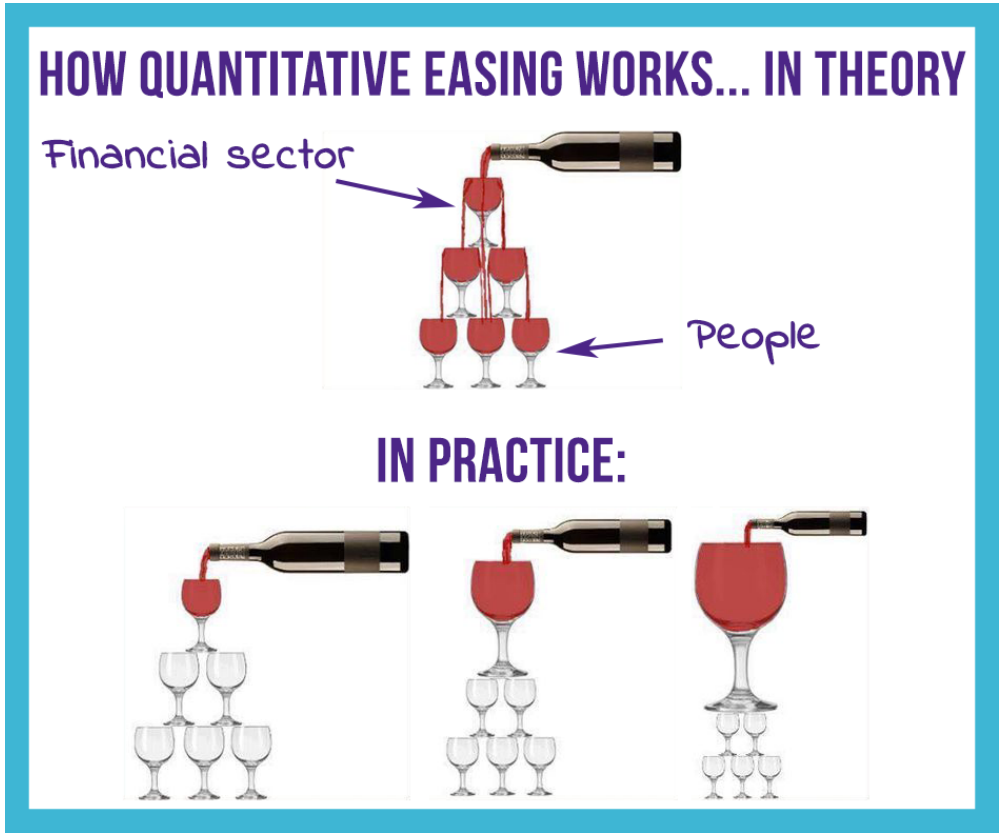
“Trickle Down Economics” according to Ben Bernanke

- *“Easier financial conditions* (= low interest rates) *will promote economic growth. For example, lower mortgage rates will make housing more affordable and allow more homeowners to refinance. Lower corporate bond rates will encourage investment.* ***And higher stock prices will boost consumer wealth and help increase confidence, which can also spur spending.*** *Increased spending will lead to higher incomes and profits that, in a virtuous circle, will further support economic expansion.”*

  – Ben Bernanke, at the time chairman of the Federal Reserve, Op-Ed in the Washington Post (Nov. 2010)

Central Banks causing inequalities | No trickle down?

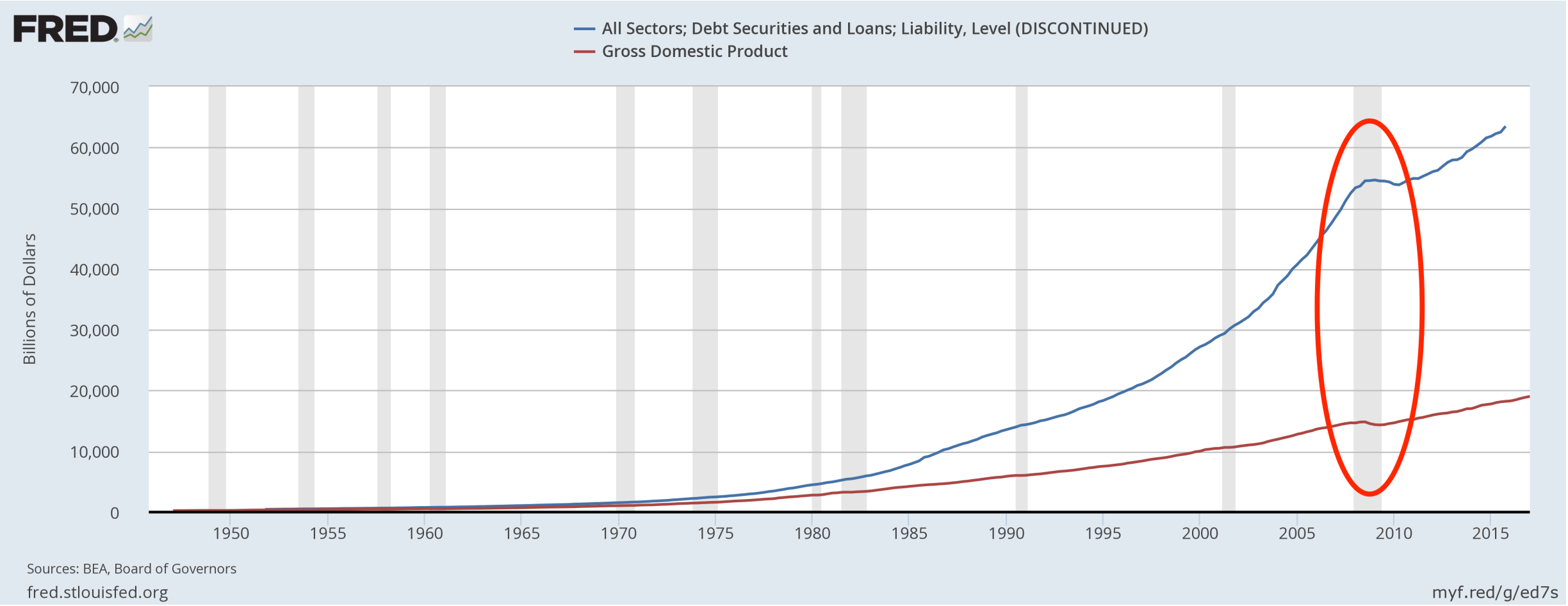
- Bank of England finds that QE increases inequalities.
- By the ECB latest annual report:
  The most relevant period for assessing wealth effects is the one since mid-2014, as it is mostly ***asset purchases that are viewed as creating asset price inflation****. […] For the euro area, there has been an absolute gain: households of all wealth levels have seen their wealth increase as a share of their mean income. […]* ***Wealthier households, however, benefited more in relative terms compared with poorer households***.



Source:

- Bank of England, The distributional effects of asset purchases
- European Central Bank, The euro area economy, the ECB's monetary policy and the European financial sector in 2016
- qe4people.eu

All credits instruments vs GDP (USA) | Ponzi Scheme?



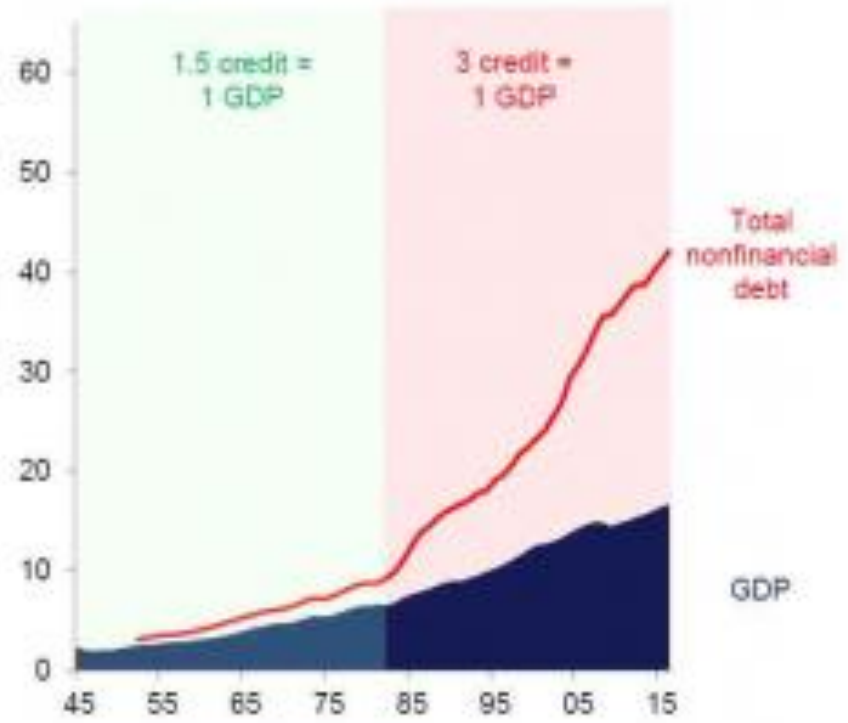
All credits instruments = shadow bank liabilities + traditional bank liabilities

Credit addiction| US vs China

Central banks' response to the lack of inflation?

The US' credit addiction began in 1982

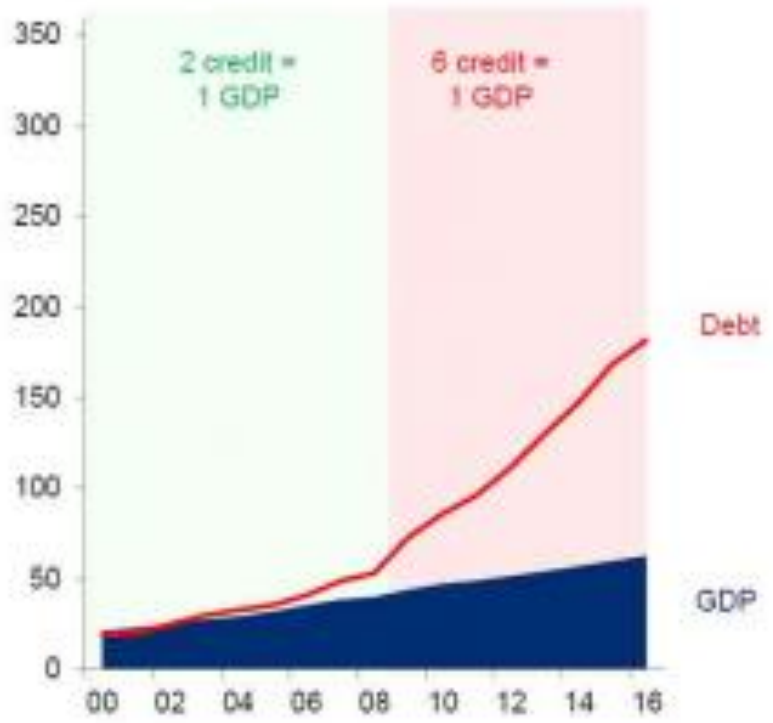
Real value of US GDP vs debt, tn 2009 $



Source: Federal Reserve, BEA, Citi Research

In China it was 2009

Real estimated value of Chinese GDP vs debt, tn 2015 yuan



Source: PBOC, BIS, Citi Research. For more colour, see e.g. Can China Really Walk It Off?, M. Pettis, Jan'17

They simply stopped worrying about credit

Maybe we need a fairer economic system?

- Stop using 3 letter economic models? Not a good way to explain complex systems.
- Current central bank policies not working. Alternatives:
  - helicopter money?
  - Fund (green) infrastructure projects via central banks?
  - Provide (“real”) foreign aid via central bank funding?
    (The world bank just discovered financial engineering, c.f. Ted Talk with Jim Yong Kim. World bank budget could be increased via central banks.)

Thank you for listening!

Questions?