

Global Financial Systems

Chapter 5

The Central Bank

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To accompany

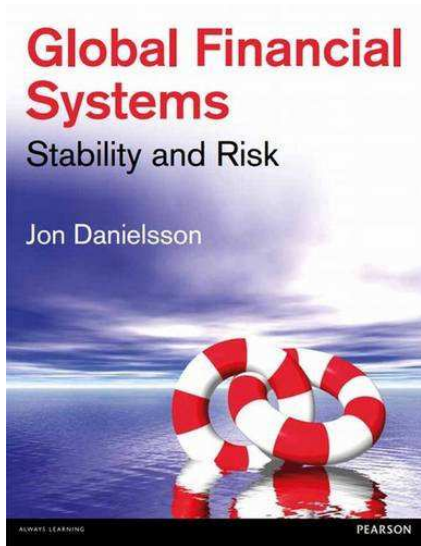
Global Financial Systems: Stability and Risk

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Book and slides



- Updated versions of the slides can be downloaded from the book web page www.globalfinancialsystems.org



The central bank

- The most important institution in the financial system
- Has monopoly on *printing money* — liquidity, QE,...
- Functions
 1. Price stability
 2. Macroeconomic objectives (e.g. growth and employment)
 3. Financial stability (Chapter 13)
 4. Supervision (Chapter 13)
 5. *(Stimulating the economy)*
 6. *(Bailing out governments)*
 7. Increasingly environment (Chapter 21)
 8. And equality
 9. In this Chapter we stop in 2019, as post 2019 is discussed in Chapter 21
- Over time, the relative importance of those changes frequently

Background

- Often was a private bank
- Perhaps established to help in war financing
- And may retain some private ownership or connections (like in Switzerland)
- But generally is under the control of the government
- In some countries private banks may issue money under a full reserve arrangement
 - Danske bank in Northern Ireland, Scotland, HSBC in Hong Kong, etc.
- May have other names such as *monetary authority* or *reserve bank* or *federal reserve system* or *people's bank* or *bank of*
- We use the term *central bank* to encompass all these

Some central banks

- First: Swedish Riksbank 1668
- Second: Bank of England (BoE, Bank) 1694
- Last among major countries: Federal Reserve System (*Fed*) in the US, 1913
- ECB, 1998

Money

- We have used many things for money
- Sea shells, cigarettes, pearls, etc.
- Over time we converged to using metals, copper, but especially precious metals like silver and gold
- We now use fiat money
- Will we moved to cryptocurrencies?
- Or digital currencies?

Gold standard

- Gold is money
 - either we use gold to trade
 - or central bank issues paper money that is transferrable to gold with 100% certainty
 - brings stability (1873–1914)
 - but supply can not be adjusted to suit economy (e.g. when it is growing or in crises)
- The one who controls gold mining, controls the world
 1. Did not work so well for Spain
 2. UK invasion of South Africa

Fiat money

- Money created by governments
- No asset, like gold, guarantees money keeps their value
- We have the trust the government
- Printed by central banks
 - either physically on paper
 - or virtually by increasing the reserve accounts at the central bank
- First example in China in the 12th century — led to high inflation
- Often ends up in too much money being printed, inflation and failure of the issuing bank

Crypto- and digital currencies

- Crypto
 - Emulate gold standard
 - Fixed mining schedule
 - No central control
- Digital
 - Combine some elements of the cryptocurrencies
 - With central-bank fiat money
- (discussed in detail a bit later)

Who creates money?

- Central banks create *base money* — see next slide
- Money in circulation is mostly created by commercial banks
- More broadly, money is created by the interaction of economic agents
- For example, if people lend and borrow from each other, and use the IOUs to transact with
- They have created more money
- That is for example a feature of the Japanese economy

Creating base money

- Commercial banks have special accounts with CBs called *reserve accounts*
- They are required to have some amount in it (required reserves) and can more, optional
- CB buys a bond from a bank worth X
- And increases the amount in the reserve account that by X — base money ($M0$) increases by X
- The CB does *not* transfer X in
- It simply increases the number (amount on deposit)
- It then is a liability of the CB

Monetary aggregates

M0 Monetary base, this is sum of currency in circulation and reserves

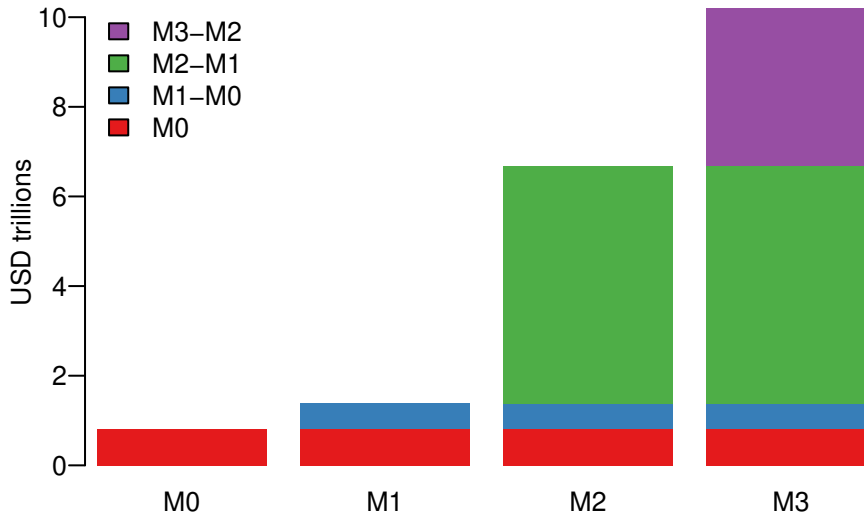
M1 Narrow money, monetary base plus checkable accounts

M2 M1 plus saving accounts

M3 Broadest formal measure of money. M2 + large time deposits, institutional money market funds, short term repurchase and other larger liquid assets

- M2 and M3 are a good indication of inflation and credit expansion.
- They increase in booms and fall in recessions
- Money is other things. We often can use debt promises — IOU — as money. Very common in Japan
- The central bank only fully controls M0

2005 US money supply



Fractional reserve banking

This is an oversimplified textbook version

1. Person X deposits \$100 (M_0) into bank A
2. Bank A keeps 10% (δ) which is the *reserve requirement*
3. Lends \$90 to Person Y who deposits \$90 at bank B
4. Which keeps δ and lends out \$81 and so on

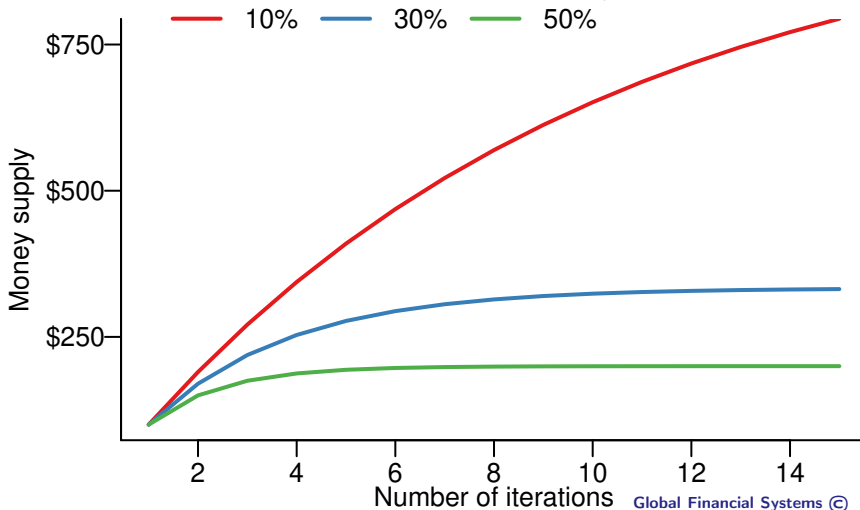
$$\text{In the limit, } M_1 = 100 + 90 + 81 + \dots = \frac{100}{\delta} = 1000$$

$$M_1 = \gamma \times M_0$$

5. Hence δ can be used to control credit

Credit expansion of \$100

for various reserve requirements



Fragilities of the fractional reserve banking system

- A Bank lends deposits out at *long maturities*
- But deposits are payable *on demand*
- If a sufficient number of depositors want money, the bank can't pay — *bank run*
- Bank runs are contagious

CB
ooo

Money
oooooo
ooooo

MP
●oooo
oooooo

QE
oooo

Bailing
oooo

ECB
ooo

2008
ooooo

2009-2019
oooooo

Monetary policy

Monetary policy

- The main-day-to-day function of the central bank
- Used to meet (political) objectives like
 - level of aggregate output
 - employment
 - inflation
- By controlling
 - the supply of money
 - availability of money
 - cost of money or rate of interest

Money supply and objectives

- Money is M (recall M0, M1, M2 and M3)
- *Expansionary monetary policy* — $M \uparrow$ Typical objective to combat unemployment or stimulate the economy, or prevent *deflation*
- “Printing” money is creating M0 (base money)
- *Contractionary monetary policy* — $M \downarrow$ Combat *inflation* and overheating economy

Interest rates

- The central banks control the shortest interest rates
- Why?
- There are many different names and mechanisms
- CBs do not directly control rates for longer maturities
 - Twist operations can be used on longer maturities
- Often they use *inflation targeting* and some form of the *Taylor rule* (next page)
- Inflation targeting is where the government tells the central bank what inflation should be, perhaps 2%
- And the central bank uses its tools to achieve that inflation

Taylor rule

- By having a formal rule, a central bank may avoid inefficiencies induced by a discretionary policy

$$i_t = \pi_t + r_t^* + a_\pi(\pi_t - \pi_t^*) + a_y(y_t - \bar{y}_t)$$

- i_t is the target short-term nominal interest rate
- π_t the inflation rate (the GDP deflator)
- π_t^* the desired rate of inflation
- r_t^* is the equilibrium real interest rate
- y_t an estimate of the logarithm of real GDP and \bar{y}_t is the logarithm of potential output, obtained by a linear trend
- $y_t - \bar{y}_t$ is the *output gap*
- The parameters are restricted to be positive, $a_\pi, a_y > 0$, and Taylor proposed setting them at 0.5

Central bank lending

- Effectively a *ceiling* for market (risk-free) rates
- In some countries also a *floor* by setting a slightly lower rate on reserves held by banks
- Also used to provide emergency liquidity in crises

Open market operations

- Most common procedure — trading government bonds on the open market
- Buying $M0 \uparrow$ — increase the reserve account of seller's bank
- Increases the total volume of reserves in the system
- If there are aggregate excess reserves, market rates are competed down
- Hence expansionary open market operations do $r \downarrow$
- And vice versa
- Most common in developed economies

Recall reserve requirements

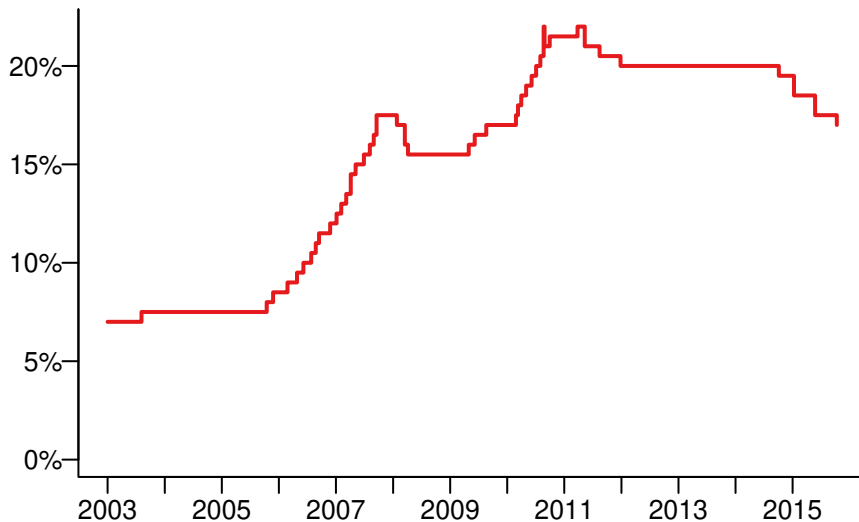
- Reserve requirement — the minimum reserve a bank must hold at the CB
- Lowering reserve requirements reduces the demand for reserves
- Contrast with expansionary open market operations which increase the supply of reserves
- But roughly the same effect — $r \downarrow$

$$M1 = \gamma \times M0 = \frac{1}{\delta}$$

Changing the reserve requirements, δ , changes the money multiplier, γ , and hence the volume of M1 given an amount of M0

- Most common in emerging markets (e.g. China)

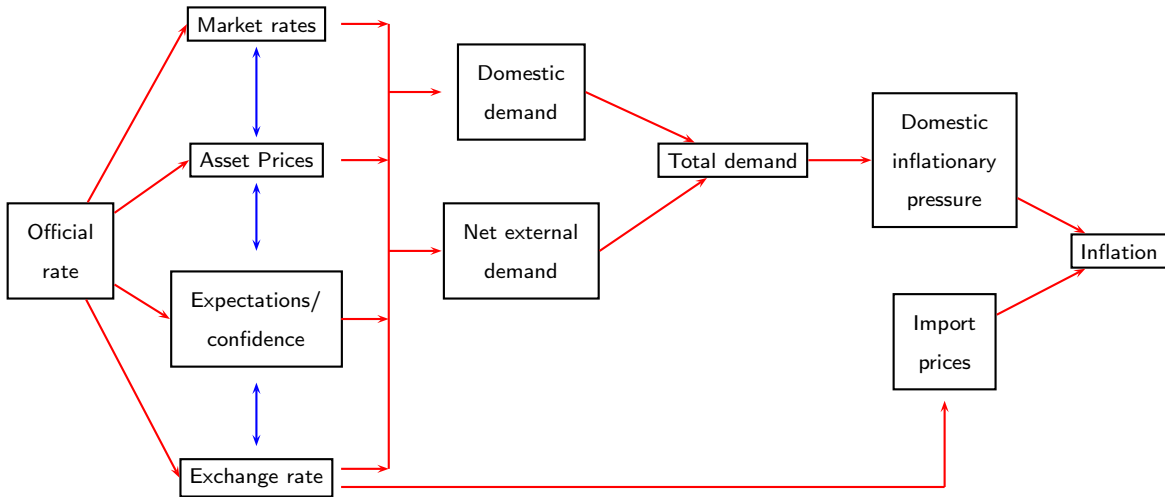
Chinese reserve requirements



Zero lower bound

- Typically, the central banks can exercise control by changing short-term interest rates
 - increase them if economy is heating up and inflation is high
 - lower them if economy slowing down and inflation is low
- What if inflation is low, the economy is slowing down, and interest rates are close to zero?
- It is not possible to make interest rates very negative, they can be slightly below zero
- That is the *zero lower bound*
- In that case, we may do quantitative easing

Transmission mechanism



CB
○○○

Money
○○○○○○○
○○○○○

MP
○○○○○
○○○○○

QE
●○○○

Bailing
○○○○

ECB
○○○

2008
○○○○○

2009-2019
○○○○○○

Quantitative easing — QE

Quantitative easing — QE

- Used when danger of deflation and interest rates are close to 0
- Traditional monetary policy tools don't work
 - Interest can't be below 0 and banks hoard balances at the central bank
- Involves buying securities — typically government bonds but can be anything — from the public
- The difference between QE and open market operations is *scale*, *scope* and *motivation*
- More efficient might be *helicopter drops of money* (next slide)

Helicopter drops of money

- The central bank directly increases money supply

“Let us suppose now that one day a helicopter flies over this community and drops an additional \$1000 in bills from the sky, ... Let us suppose further that everyone is convinced that this is a unique event which will never be repeated,”

Milton Friedman 1969
- Friedman suggested that a monetary authority can escape a liquidity trap by bypassing financial intermediaries to give money directly to consumers or businesses
- This is referred to as a money gift or as helicopter money

Biden's helicopter drops

- \$1.9 trillion Covid relief bill
- Direct \$1,400 payments to each American sent immediately to their bank accounts
- “Monetized” by QE

Bailing Out Governments

Bailing out governments

- It's not one of the four core functions listed above
- But always has been a core function
- Even a founding function
 - BoE founded to help with war funding
- Usually viewed as dirty or unseemly
- However, under the right conditions it is appropriate
- We see the danger a few slides down
- Japan and ECB especially enthusiastic

Mechanisms

- Print money and buy government bonds
- *Unexpected* inflation
 - Why can't it be expected?
 - Cagan double exponential model below
- Seigniorage

Pros and cons

- Only recommended in exceptional circumstances
- When done routinely it locks in inflationary expectations — very costly to eventually fight
- If the economy is in deep recession (way below output potential)
- And inflation negligible
- Justified for two reasons
 1. relieves pressure on government
 2. reverses contracting money supply

Case of one CB — one nation state

- Most of the time, the CB belongs to a single nation state
- In that case, using the CB to bail out the state is effectively a *tax*
- And like any other tax has distributional effects
 - Disproportionately falling on pensioners and savers (who often can't do much about it)
 - And benefiting borrowers
- Most of the cost falls on domestic residents

Europe's central bank

- Belongs to 19 governments
- By using the ECB to bail out (private or public entities) it is a tax on all residents of the euro zone for the benefit of some countries only
- Turns the EU into a *transfer union*
- This limits the legitimacy of the ECB to fulfil its core functions
- Two possibilities
 - Because the ECB belongs to no one, it is easy to abuse it
 - And therefore it is subject to excessive amounts of rules and restrictions — limiting its flexibility

How ECB sells QE

1. The European Central Bank buys bonds from banks
2. This increases the price of these bonds and creates money in the banking system
3. As a consequence, a wide range of interest rates fall and loans become cheaper
4. Businesses and people are able to borrow more and spend less to repay their debts
5. As a result, consumption and investment receive a boost
6. Higher consumption and more investment support economic growth and job creation
7. As prices rise, the ECB achieves an inflation rate below, but close to, 2% over the medium term

2008 crisis

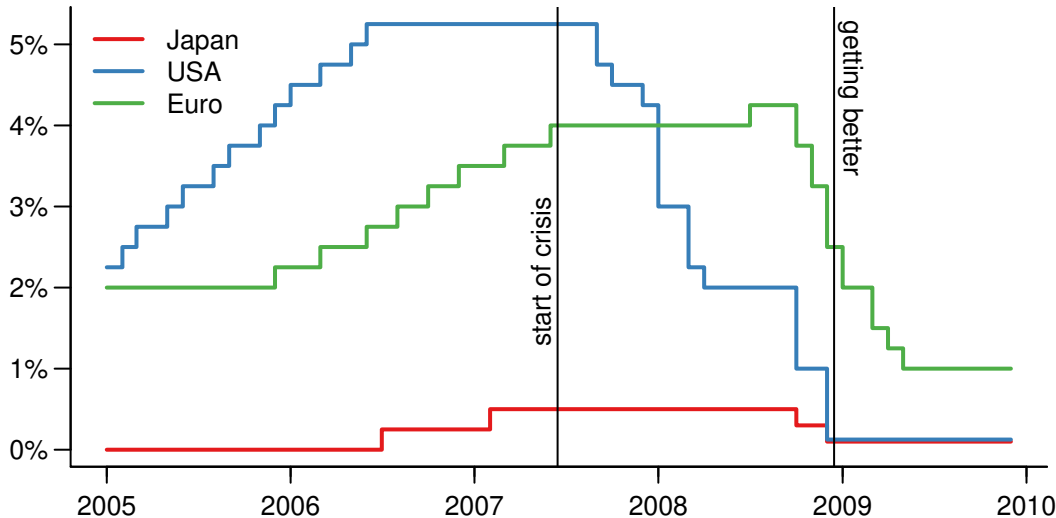
Chapter 17

- The worst global crisis since the Great Depression
- Biggest impact in Europe and the US
- Developing and/or Asian countries (Chapter 6) had memories of recent crises and hence were in a better place
- Caused by rapidly increasing liquidity risk that was hidden until too late
- We don't discuss the causes here (see Chapter 17)
- And focus on how central banks reacted

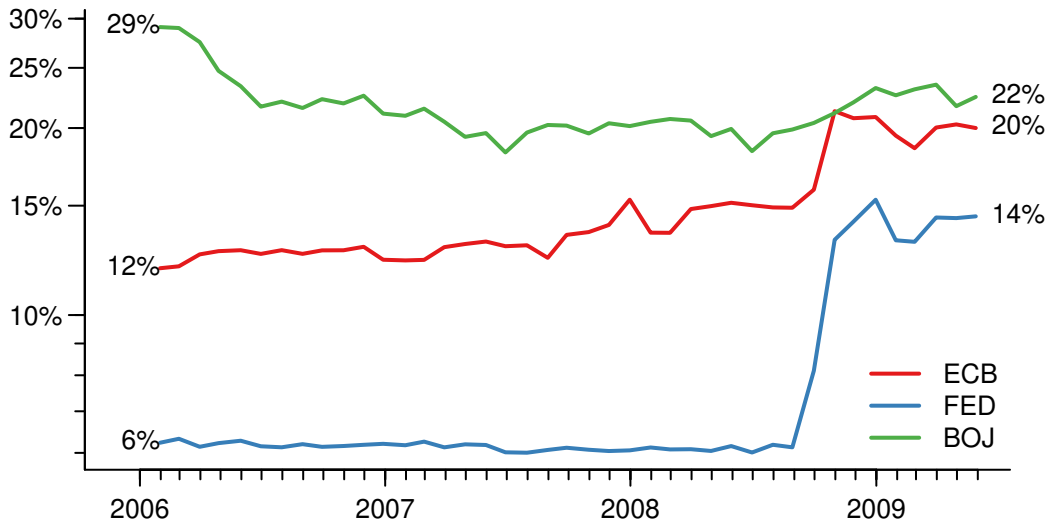
Central bank response

- Did not want to repeat mistakes from Great Depression
- “I looked at the portrait of my predecessor in our main meeting room from the Great Depression and opted to do the opposite”
- We discuss bailouts in chapter 14
- Bail out banks
- Massive liquidity injection
 1. quantitative easing
 2. low interest rates
- Note how slow the ECB is to react
- And how little BoJ reacts

Central-bank interest



Central-bank assets



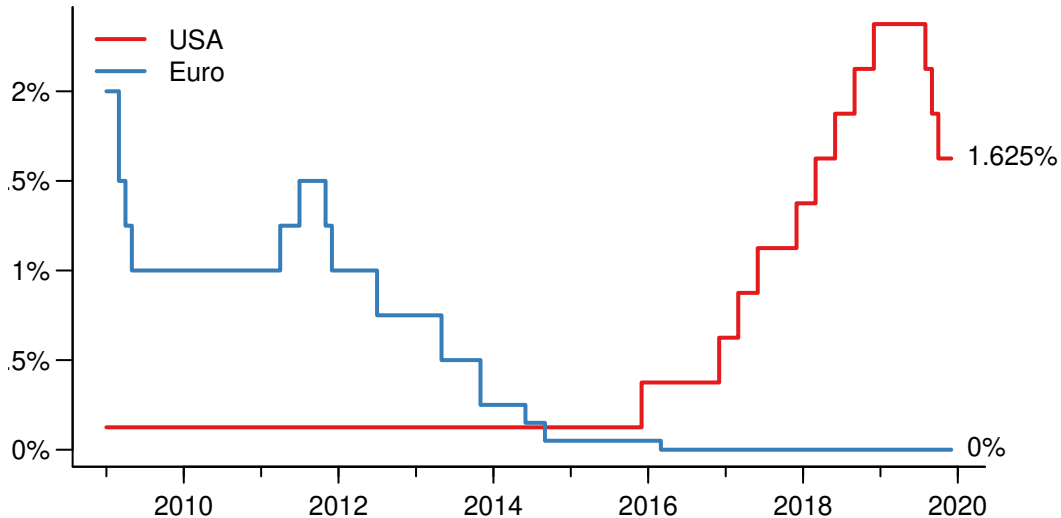
Effectiveness

- Did prevent 2008 from becoming another Great Depression
- However, fostered the idea of the central banks being responsible for growth
- Affected inequality — see later section
- Created moral hazard — discussed latter

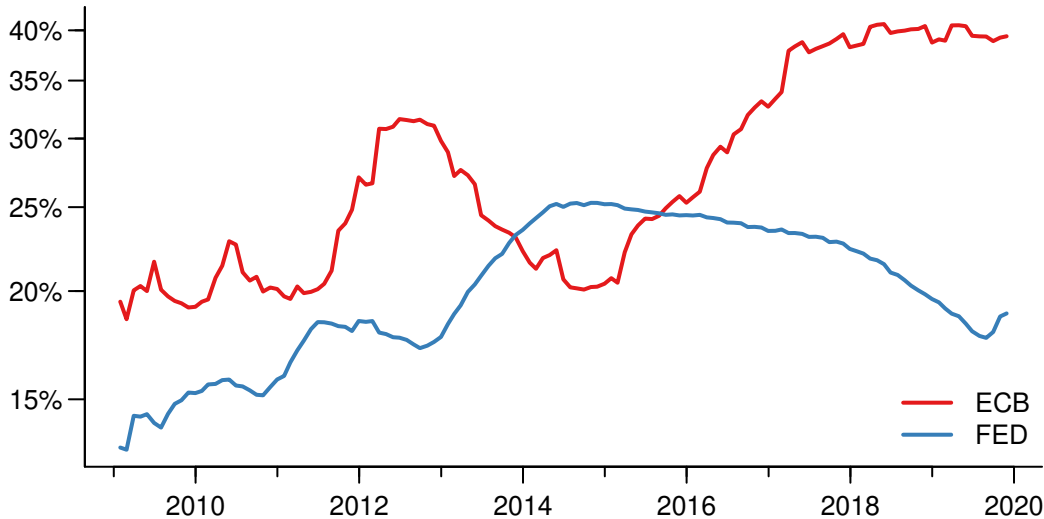
Assets — QE

- BOJ did not react to 2000, and ECB reacted less than Fed
- The Fed reacted quicker and more forcefully than ECB to Covid-19
- The US got out of 2008 much better than Europe
- But, a question for later is what is the appropriate reaction to Covid 19

Central-bank interest



Central-bank assets



Post 2008

- The immediate reaction to the crisis in 2008 was
 - sharp reduction of central bank interest rates to almost 0
 - massive QE
 - direct liquidity assistance (discussed in a later chapter)
- Since then, interest rates have remained very low
- Some countries, especially EU, continue to do QE
- Is this a permanent structural break?
- What are the dangers?

Debate about QE and low interest rates since 2008

have to, else depression

depression when it ends

save the banking system from collapse

encourages reckless behavior
moral hazard

without it economic activity would
collapse

excessive debt was the cause of the
crisis

creates jobs for the poor

benefits the super wealthy

there is deflation

inflation will happen

structural reforms too hard

prevents structural reforms

bad for savers

lifeline for borrowers

Consequences

- Equality
- Reforms
- Inflation
- Market disruption