Global Financial Systems
Chapter 5
The Central Bank and Monetary Policy

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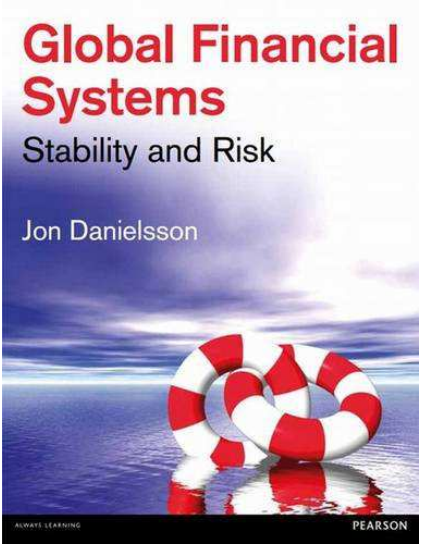

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The central bank (CB)

- The most important institution in the financial system
- Has monopoly on *printing money*
- Common functions — differ by countries
  1. Price stability
  2. Macroeconomy
  3. Financial stability
  4. Supervision
  5. Stimulating the economy
  6. Funding governments
  7. Environment/climate
  8. Equality (income and wealth)
- 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, Bank of Scotland in 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) (1694)
- Bank of Japan (BoJ) (1882)
- Federal Reserve System (Fed) in the US (1913)
- People's Bank of China (PBoC) (1948)
- European Central Bank (ECB) (1998)

Money

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

Gold standard

- Gold is money
  - either we use gold to trade
  - or central bank issues paper money that is transferable to gold with 100% certainty
  - BoE issued paper money only around 40% backed by gold
    - explains the "To stop the Duke, go for gold" in the Runs chapter
  - brings stability (1873–1914)
  - but supply cannot be adjusted to suit the economy, like when it is growing or in crisis
- Gold supply concentrated the control over monetary conditions
  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 its value
- We have to 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 11th century — led to high inflation
- Often ends up in too much money being printed, inflation and failure of the issuing bank

Digital currencies

Covered in the Digital Currencies chapter

Base money (M0)

- Base money is comprised of two things
  - commercial banks have special accounts with CBs called *reserve accounts*
  - physical money, like coins and notes
- When we say "print money" it refers to increasing base money

Reserve Accounts

- Banks can be required to have some amount in it (required reserves)
- The banks usually prefer to hold more
- Creating money
  - CB buys a bond from a bank worth X
  - increases the amount in the bank's reserve account by X — base money (M0) increases by X
  - the CB does *not* transfer X in
  - simply increases the amount on deposit by X
  - which becomes a liability of the CB

Who creates money?

- Central banks create base money
- 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 debt obligations (IOU) to transact with, then
- They have created more money
- A feature of the Japanese economy and many others

Monetary aggregates

M0 Monetary base — sum of currency in circulation and reserves

M1 Narrow money, currency in circulation 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
- The central bank only fully controls M0 (why it is so hard to control inflation)

Fractional reserve banking

This is an oversimplified textbook version

1. Person X deposits \$100 (M0) 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

In the limit, M1= $100 + 90 + 81 + ... = \frac{100}{\delta} = 1000$

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

5. Hence δ can be used to control credit

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

Monetary policy

Monetary policy

- The core 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

Relationship between money and output

- Money $\times$ velocity of money = prices $\times$ output

$$M \times V = P \times Q$$

- Monetarism focused on controlling M, ignoring V
  - Modern use of that term, referring to the past, is often very historically inaccurate
- We have only a vague idea of the magnitude of these variables
- Stable P does not imply stable V — after 2008 M grew far faster than Q, and velocity fell to absorb it
- But if we expect inflation to rise, we use money faster — $V \uparrow$
- Which in turn fuels yet more inflation
- So management of *inflationary expectations* is particularly important

Money supply and objectives

- Money is M (recall M0, M1, M2 and M3)
- *Expansionary monetary policy* — M↑ to combat unemployment, stimulate the economy or prevent *deflation*
- *Contractionary monetary policy* — M↓ to reduce *inflation* and stop economy from overheating

Interest rates

- Central banks directly control only the shortest rate, typically overnight
- They stand ready to borrow or lend almost without limit at that rate
  - the lending rate is a *ceiling*, the rate paid on reserves a *floor*
- If the market rate drifts below the target, they borrow to pull it back up
- If it drifts above, they lend to pull it back down
- Knowing this, the market self-corrects — the central bank rarely has to intervene
- Longer-maturity rates are left to the market, though twist operations can influence them
- Also the channel for emergency liquidity in crises

Open market operations

- Most common procedure — trading government bonds on the open market
- Buying M0↑ — 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 lower r, and vice versa
- Most common in developed economies
- This is quite related to quantitative easing discussed later

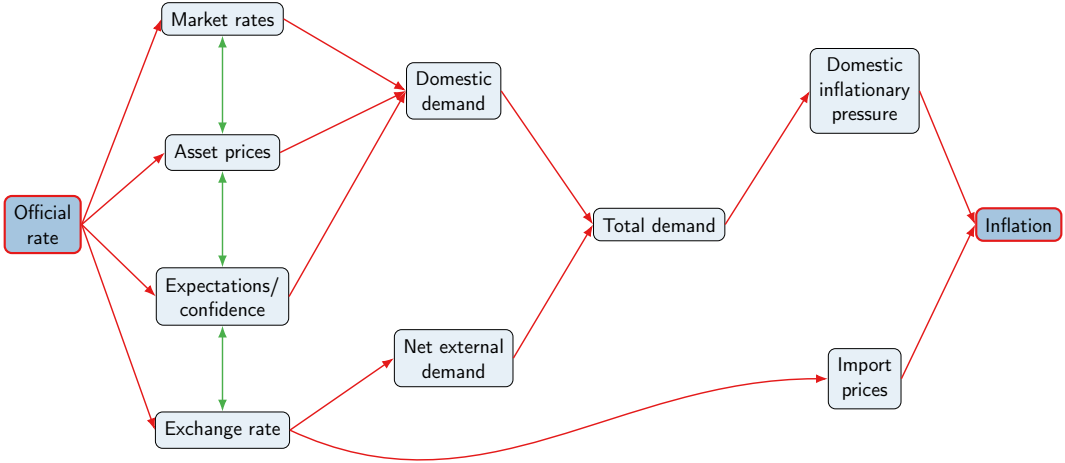
Reserve requirements: Traditional tool

- 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 — $r \downarrow$
- Most common in emerging markets

Zero lower bound

- Typically, the central banks can exercise control by changing short-term interest rates
  - increase them if the economy is heating up and inflation is high
  - lower them if economy is 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



Targets and mandates

- Most central banks operate under *inflation targeting*, with a target often around 2%
- But the objective, and who sets it, varies
  - sometimes the government sets the target, as in the UK
  - sometimes the central bank sets its own, as the ECB and Fed do
- Not all target inflation alone
  - the Fed has a *dual mandate* — inflation and employment
  - some peg the exchange rate instead — Denmark, Hong Kong, the Gulf states
  - others pursue broader goals with more discretion — China

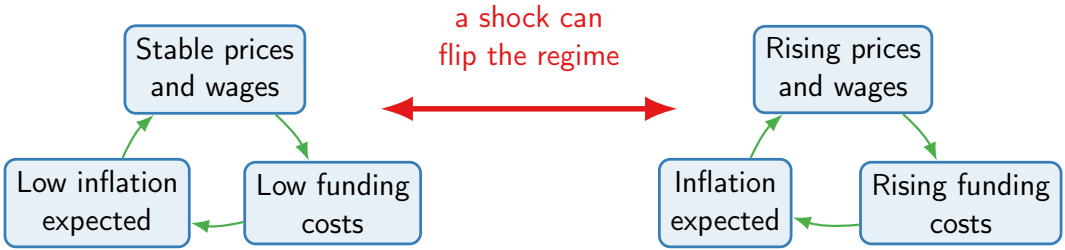
Costs of inflation and deflation

- Inflation
  - erodes purchasing power, especially for those on fixed incomes
  - the cost of constantly updating prices
  - holding cash expensive, so people hold less cash, more transactions
  - distorts price signals and investment decisions
  - redistributes wealth from savers to borrowers
- Deflation
  - increases real debt burdens
  - postponing consumption — why buy today if cheaper tomorrow?
  - can trigger deflationary spiral — Japan 1990s
  - makes monetary policy ineffective (zero lower bound)
  - raises real wages, increasing unemployment

Drivers of inflation

- Strong aggregate demand and/or weak aggregate supply drive up prices
- For some developing countries, fluctuations in global commodity prices significantly affect inflation
- Some countries deliberately create money to fund themselves
- Expectations — if we expect prices to rise in the future when making contracts today (salaries, goods) we build in price rises
- *Anchoring* — long-run inflation expectations remain anchored to some level — ideally the central bank target
- If we expect high inflation it remains high, and if we expect low inflation it remains low

Self-reinforcing stable regimes of low and high inflation



Low-inflation regime

High-inflation regime

Classical inflation fighting playbook

- Slow down the economy to reduce aggregate demand
- Assumes inflation is coming from demand running ahead of supply
- Do that by raising the cost of money — policy rate
- Deliberately creating a recession to fight inflation — difficult cost-benefit analysis
- But raising rates also signals that the central bank and government are serious about inflation
- That signal by itself helps — it dampens inflation expectations, so less of a recession may be needed

Effectiveness

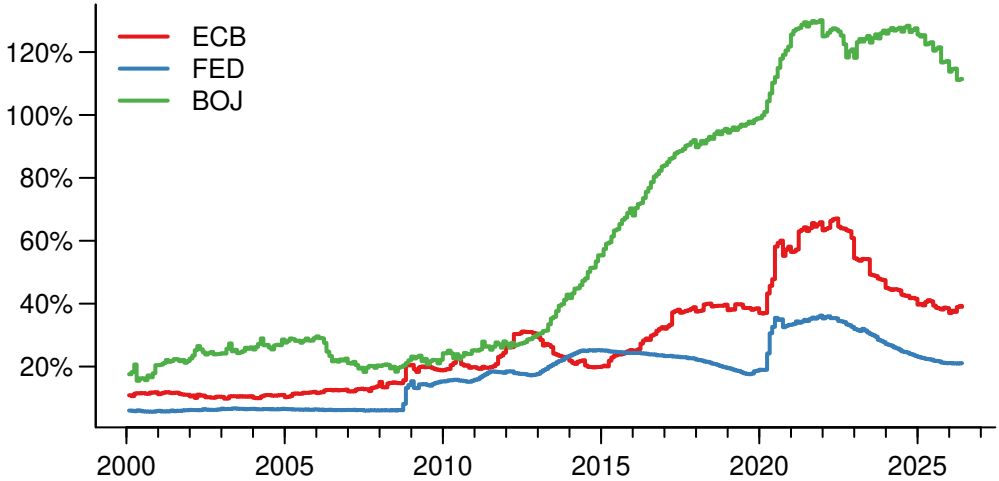
- If expectations shift — i.e. the central bank is credible — then hopefully inflation gets anchored to the central bank target
- Politically difficult — US in 1982, UK in 1981
- The political leadership needs to be firmly and visibly in support
- Turkey is an example of what happens when government has a different view

Bailing out governments

Bailing out governments

- Not typically listed as a core central bank function
- But always has been a core function
- Even a founding function
  - BoE was founded to help with war funding
- In practice, it finances the government by buying its debt with newly created money — the machinery of open market operations and QE
- Usually viewed as dirty or unseemly
- Appropriate under the right conditions, but carries significant economic dangers
- Japan and the ECB have been especially enthusiastic

Central-bank assets to GDP



When is it justified?

- Only recommended in exceptional circumstances
- When done routinely, it locks in inflationary expectations — very costly to eventually fight
- Justified when the economy is in deep recession — way below potential — and inflation is negligible
- It then
  1. relieves pressure on the government
  2. reverses a 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, it 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

- The Eurosystem comprises the ECB and the national central banks of the 21 euro area member states
- By using the ECB to bail out (private or public entities) it is a tax on all residents of the eurozone for the benefit of some countries only
- Turns the EU into a *transfer union* — fiscal transfers between member states
- This limits the legitimacy of the ECB to fulfil its core functions
- Two contradictory dynamics:
  - ECB lacks clear political ownership — vulnerable to abuse
  - Compensating with excessive rules and restrictions — limiting operational flexibility

The ECB in practice

- Legally barred from financing governments directly — Article 123 bars primary-market purchases
- Secondary-market purchases for monetary policy are permitted, and the Court of Justice upheld them in Gauweiler and Weiss
- Seen throughout the sovereign debt crisis
  - buying the bonds of stressed members — Greece, Italy
  - Draghi's 2012 "whatever it takes" and OMT
  - large-scale purchases again in the pandemic — PEPP
- Deeply controversial — critics call it monetary financing by the back door, and it has been fought in the courts

Hyperinflation

Hyperinflation

- *Hyperinflation* — over 50% per month
- Paper-money inflations recorded in China from the 13th century; the first hyperinflation on the modern definition was revolutionary France, 1795–96
- Most of the important episodes occurred in
  - Europe after WWI and WWII
  - Latin America in the 1980s and 1990s
  - Former Soviet Union in the 1990s
- All-time record: Hungary 1945-1946, prices tripled daily
- Venezuela in the 2010s, ending around 2021
- Enormous costs — the price system breaks down and money stops working

Causes

1. Governments resort to financing themselves by printing money — *seignorage*
   - War
   - Inability to tax enough
2. It can be a political decision
   - Lenin is said to have declared — "The best way to destroy the capitalist system is to debauch the currency" (Keynes 1920)
   - Germany, in part, created hyperinflation in the early 1920s to avoid paying reparations
3. As countries continue printing money, their ability to raise taxes diminishes, making governments increasingly dependent on seignorage
4. However, nowadays, money usually created electronically — Venezuela

World record

Country	Highest month	Highest monthly inflation rate	Prices double
Hungary	Jul 1946	4.19×10^{16}%	15.0 hours
Zimbabwe	Nov 2008	8×10^{10} %	24.7 hours
Yugoslavia	Jan 1994	3×10^{8}	1.4 days
Germany	Oct 1923	29,500 %	3.7 days
Greece	Oct 1944	13,800 %	4.3 days
China	April 1949	5,070 %	5.34 days

The Weimar republic (Germany) 1921–1923

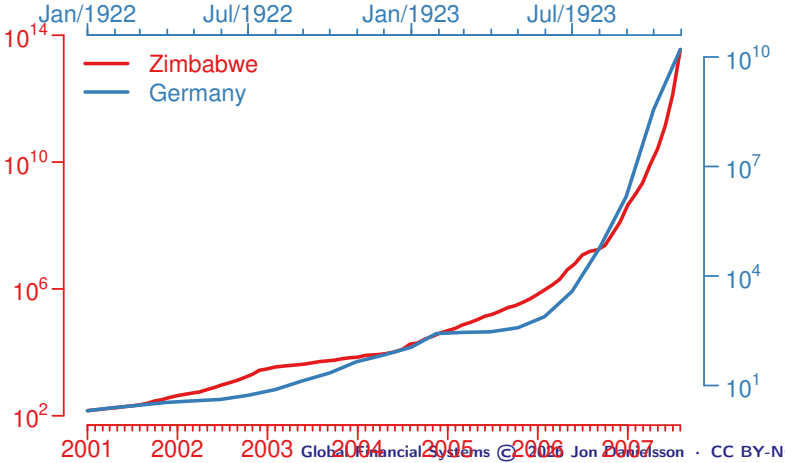
- First *well-documented* economic behaviour of hyperinflation
- Dramatic increases in prices and interest rates, redenomination of the currency, flight from cash to hard assets, etc.
- The main cause was the Treaty of Versailles and war reparations
- 60 marks per dollar in 1921 to 8000 end of 1922
- Ended with the Rentenmark — a new currency worked because issue was capped and the Reichsbank stopped financing the deficit

Zimbabwe from 1980

- Relative price stability until the late 1990s, then accelerating inflation, reaching hyperinflation in the late 2000s
- 1 Zimbabwe dollar was worth about USD 1.5
- Inflation reached 624% in January 2004, fell back, then hit 1,730% by February 2007
- August 2006 revalued currency at 1,000:1
- Inflation 11,000% 2007, issue of larger denomination notes
- 100m, 250m, 500m, 25b, then 100b between May and July
- November 2008, inflation 89.7 sextillion per cent (annualised, Hanke)
- On 16 January 2009, issued a ZWD 100 trillion bill
- Redenomination on February 2009 removing 12 zeroes (and ten zeroes in August 2008)

Hyperinflation in Germany and Zimbabwe

- Notice the similar course of price growth
- Consistent with the empirical model of Cagan (1956)



How they end

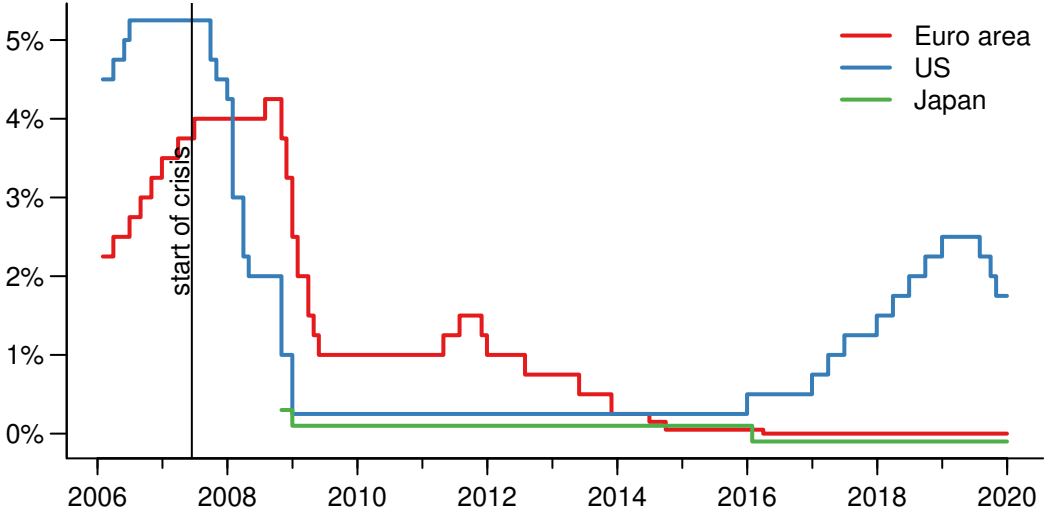
- They stop only with a decisive break, not gradually
- A new currency or a credible anchor — Germany's Rentenmark in 1923
- Or abandoning the currency altogether — Zimbabwe adopted the US dollar in 2009
- Sometimes the government simply runs out of money to print — Zimbabwe could not afford the paper
- Or a political decision — a new regime imposing a new order, as the Bolsheviks did building the Soviet system
- The real fix is fiscal — the government must stop financing itself by printing, and be believed

2008 and QE

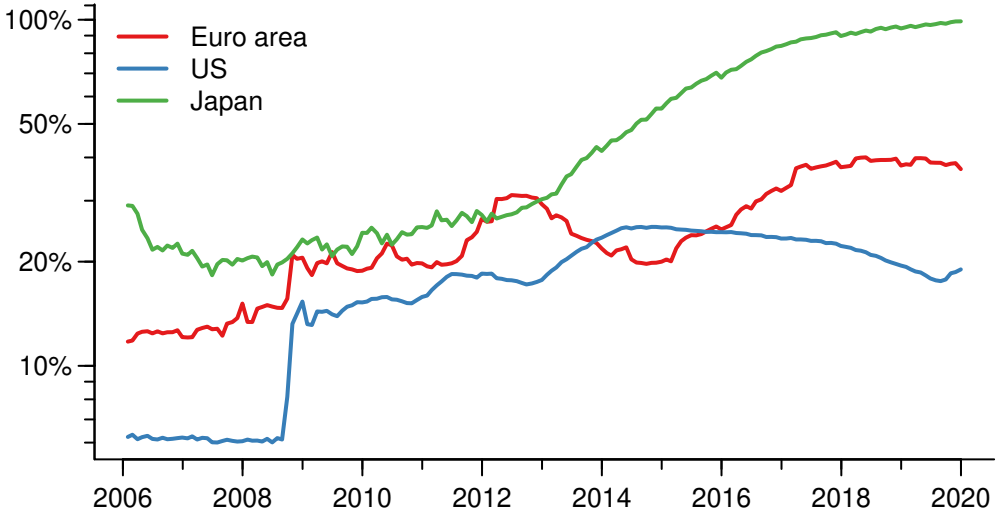
2008 crisis — Central bank response

- This is exactly the deep-recession, negligible-inflation case where printing money is justified (recall "When is it justified?"), unlike the routine financing that drives hyperinflation
- Did not want to repeat mistakes from the 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 of the 2008 response

- Did prevent 2008 from becoming another Great Depression
- But fostered the idea that central banks are responsible for growth
- Worsened inequality
- Created moral hazard
  - rescuing banks and markets signals they will be rescued again
  - so they take more risk — the *central bank put*

Quantitative easing — QE

- Used when there is a danger of deflation and interest rates are close to zero
- Traditional monetary policy tools become ineffective
  - Interest rates cannot be significantly below zero, and banks hoard central bank balances
- 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* — the money goes straight to spending rather than into financial markets (next slide)

Helicopter drops of money

- The central bank directly increases the 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,"*
  >
  > *Friedman (1969)*

- Later interpreters, notably Bernanke, framed this as a way to 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 payments of up to $1,400 per person sent straight to bank accounts
- "Monetised" by QE
- See connection to MMT (modern monetary theory)

Unwinding — quantitative tightening

- The balance sheet can later be shrunk — *quantitative tightening*
- Letting bonds mature or selling them
- But unwinding is disruptive — draining reserves can strain funding markets
  - the US repo market spiked in September 2019, forcing the Fed to step back in
- So it is done slowly and cautiously

The long low-rate era

- Since the crisis, interest rates stayed very low for over a decade
- Some, especially the EU, kept doing QE
- The US recovered better than Europe
- Is this a permanent structural break?
- What are the dangers?

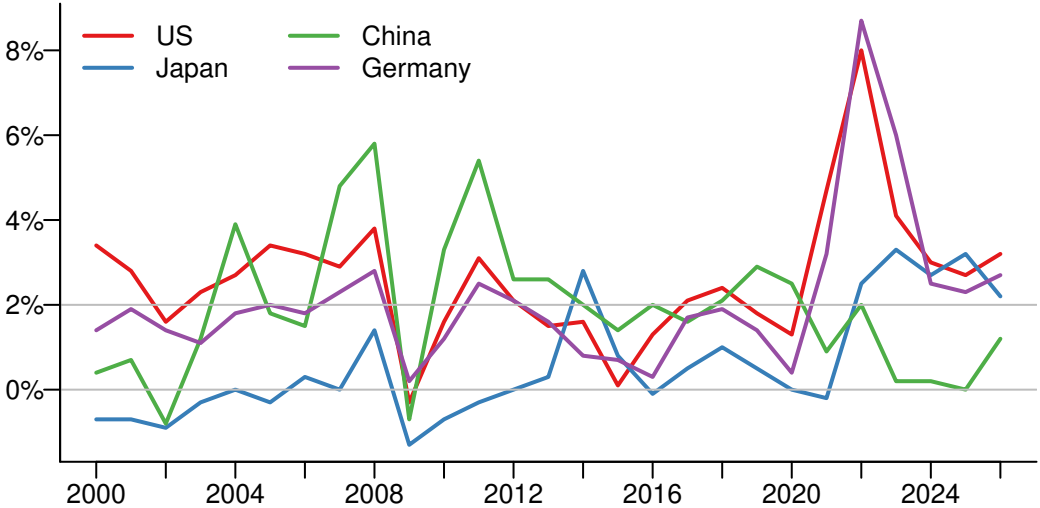
Debate about QE and low interest rates

have to, or else depression	depression when it ends
saves the banking system from collapse	encourages reckless behaviour — 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 come
structural reforms too hard	prevents structural reforms
bad for savers	lifeline for borrowers

Inequality

- Low rates and QE work mainly by pushing up *asset prices*
- Equities, bonds and housing all rose
- The wealthy own most assets, so their wealth grew — savers earned nothing
- A sharp rise in *wealth inequality*
- Wages, meanwhile, diverged
  - many workers' pay stagnated for years
  - while top earners and the highly skilled pulled away

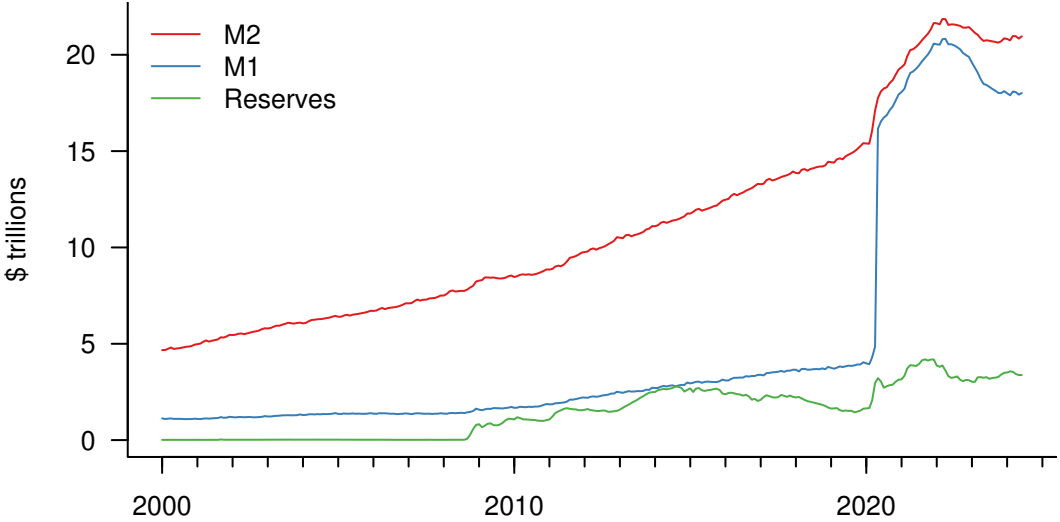
CPI inflation since 2000



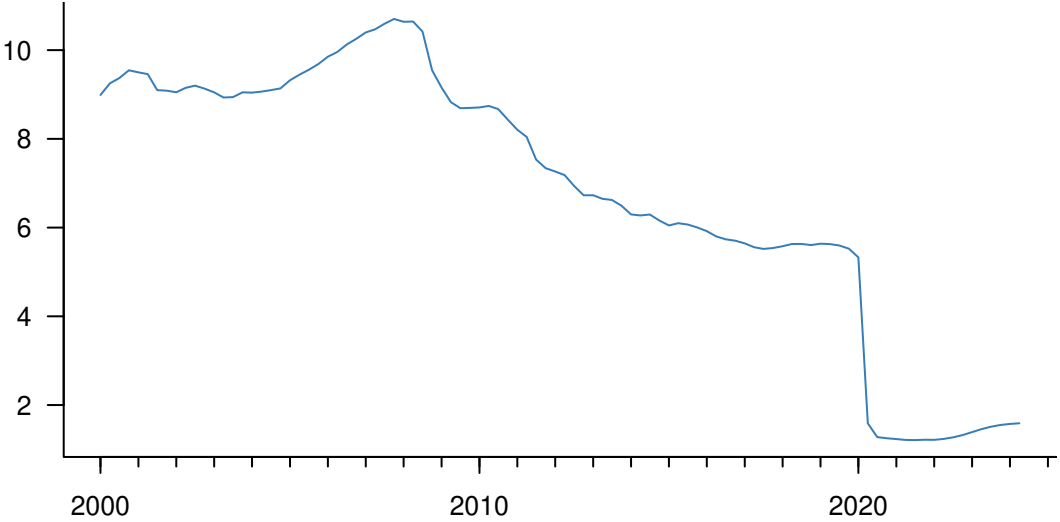
Where did the inflation go between 2009 and 2021?

- Puzzle: massive QE since 2007 and very low interest rates
- Yet inflation remained low despite tight labour markets
- QE money did not circulate as expected
- Broad money rose, but its velocity collapsed — it was not spent on goods and services

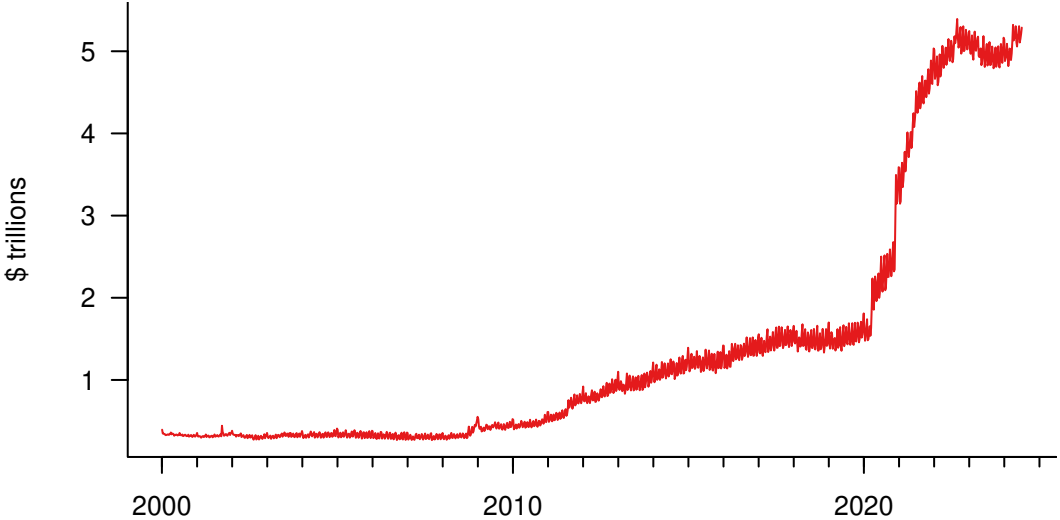
US money



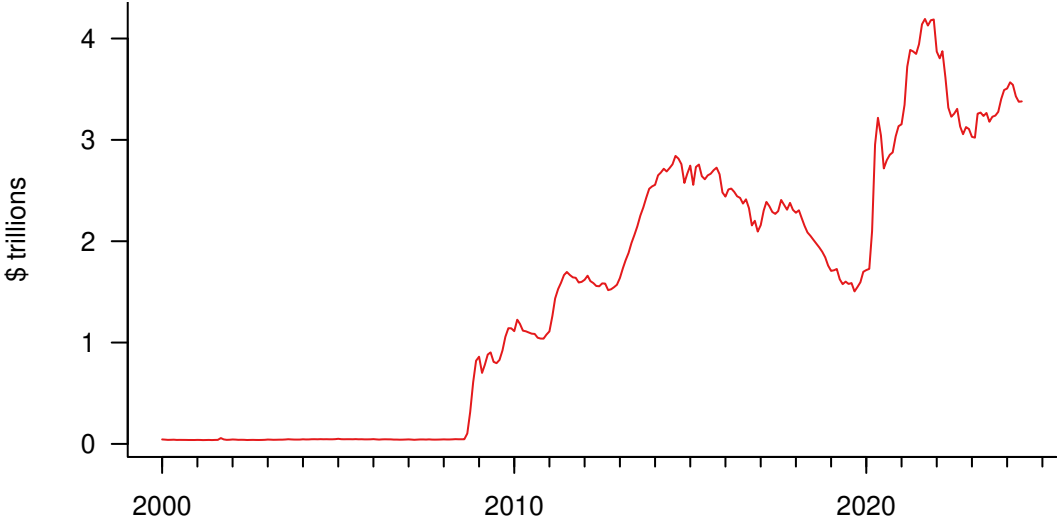
US money M1 velocity



Demand deposits



Bank reserves at Fed



Why inflation never came

Benigno and Pesenti (2021)

- The Fed bought bonds, mostly from non-banks such as insurers and pension funds
- Sellers received deposits, and their banks received reserves at the Fed
- Those deposits sat in current accounts rather than financing new spending
- So the new money never entered circulation, and velocity collapsed

Why inflation came after all

- Covid changed everything
- Fiscal transfers put money directly into households — and this time it was spent
- Supply constraints — broken supply chains, energy, the war in Ukraine
- A large overhang of money met constrained supply
- Inflation surged in 2021–2023, the highest in forty years

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