ECON1002: Introductory Macroeconomics

Lecture 8: Money, Prices and the Reserve Bank

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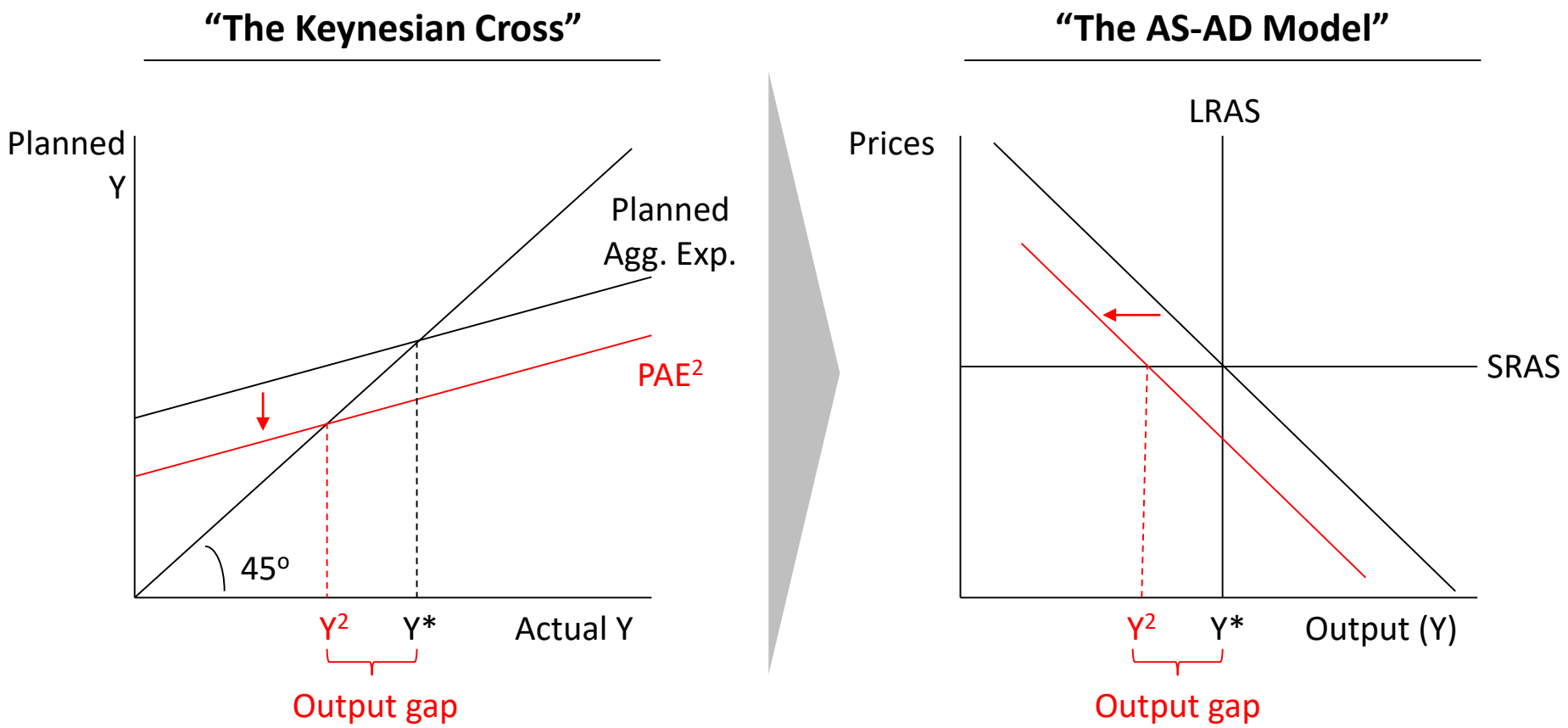
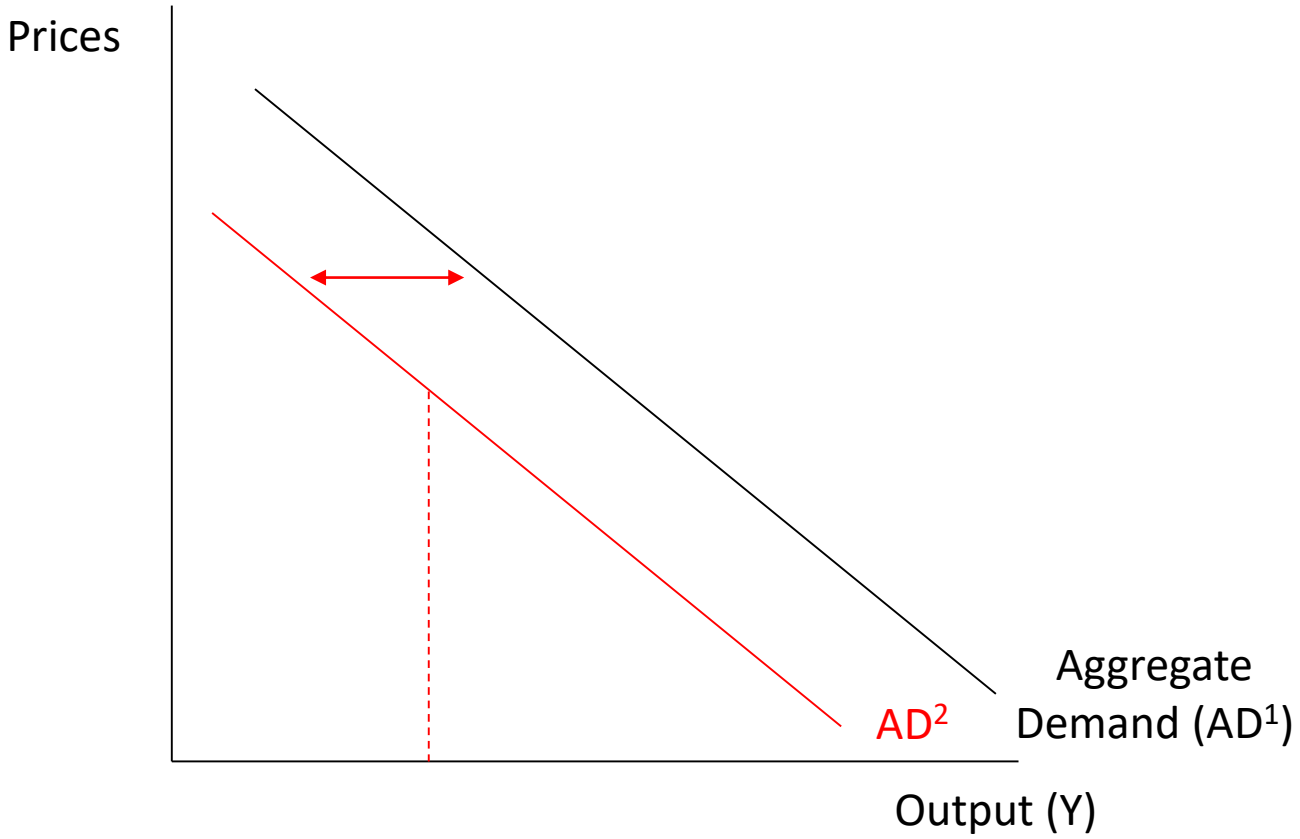
Putting everything in context

In previous lectures we learned how to use the "Keynesian Cross" to analyse aggregate expenditure, which fed into the AS-AD model



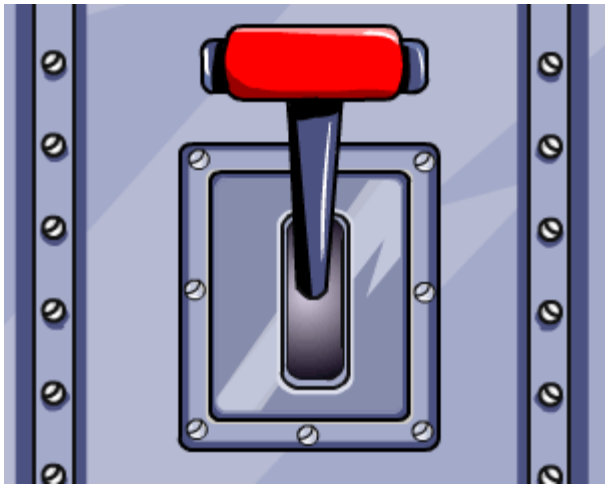
- The Keynesian cross studies how "planned expenditure" can differ from "actual output", which underpins the movements in aggregate demand which cause negative output gaps ("recessions")

We have discussed a number of factors that cause aggregate demand to change, including fiscal policy…



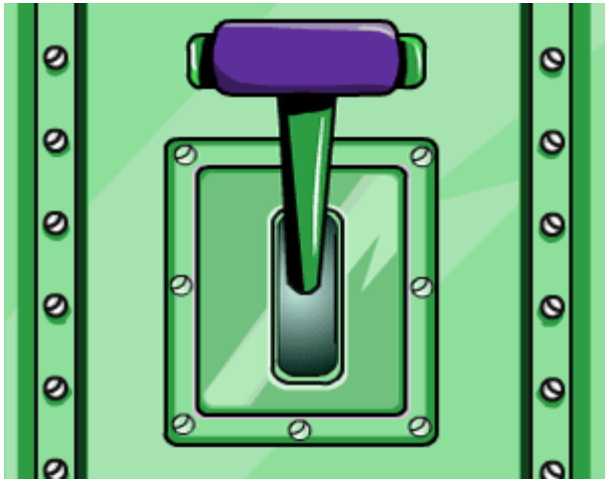
This lecture we will focus on the other main lever of policy that can be used to influence planned aggregate demand

There are two main "levers" of economic policy in the economy:



Fiscal Policy:

- ***Engineer:*** the government
- ***Lever:*** taxes and spending
- ***Objective:*** full employment
- ***Considerations:*** Balanced budget over the business cycle
- ***Channel:*** Aggregate government demand (G)
- ***Reaction speed:*** slow

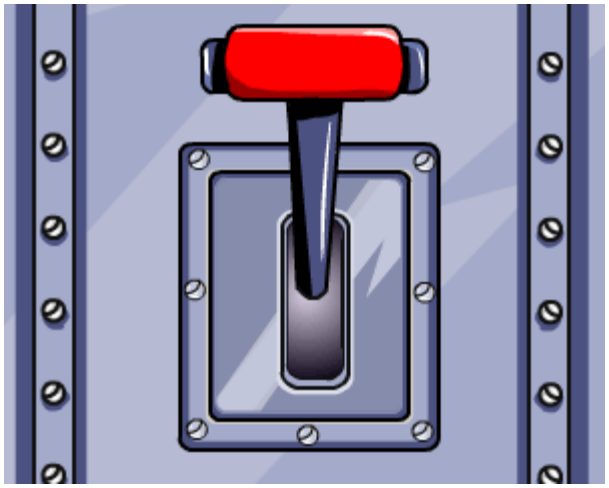


Monetary Policy:

- ***Engineer:*** the central bank (RBA)
- ***Lever:*** nominal interest rates
- ***Objective:*** Stabilize inflation (neutralize sticky prices)
- ***Considerations:*** Asset price bubbles
- ***Channel:*** Aggregate private demand (C, I, NX)
- ***Reaction speed:*** fast

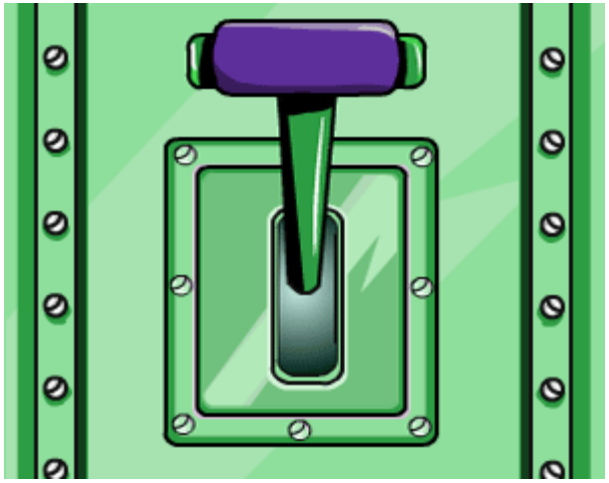
We have already covered fiscal policy (Lecture 4, Ch 6). Now we will start on monetary policy (Ch 7) and discuss it further next lecture (Ch 8)

There are two main "levers" of economic policy in the economy:



Fiscal Policy:

- **Lecture 4**
  - BOF Chapter 6



Monetary Policy:

- **What is money?**
  - BOF Chapter 7
  - **McLeay et al. (2012a)
  - **McLeay et al. (2012b)
- **How does the Reserve Bank conduct monetary policy?**
  - BOF Chapter 8

Chapter 7

Money, Prices and the Reserve Bank

For this section the main text will be two articles from the Bank of England, supplemented with the BOF textbook

You must read the following two articles:

- McLeay, M., Radia, A., & Thomas, R. (2014). Money in the modern economy: an introduction. *Bank of England Quarterly Bulletin*, Q1.

- McLeay, M., Radia, A., & Thomas, R. (2014). Money creation in the modern economy. *Bank of England Quarterly Bulletin*, Q1.

Also: Bernanke, Olekalns and Frank: Chapter 7

This video is also very instructive – well worth 30 minutes.

- https://www.youtube.com/watch?v=2jj2ye0XuXE
- Ray Dalio founded Bridgewater, one of the largest hedge funds in the world.

Learning Objectives

7.1 How does the financial system allocate saving to productive uses?

7.2 What are the three principal uses of money?

7.3 How does the government measure Australia's money supply?

7.4 In what sense do commercial banks create money?

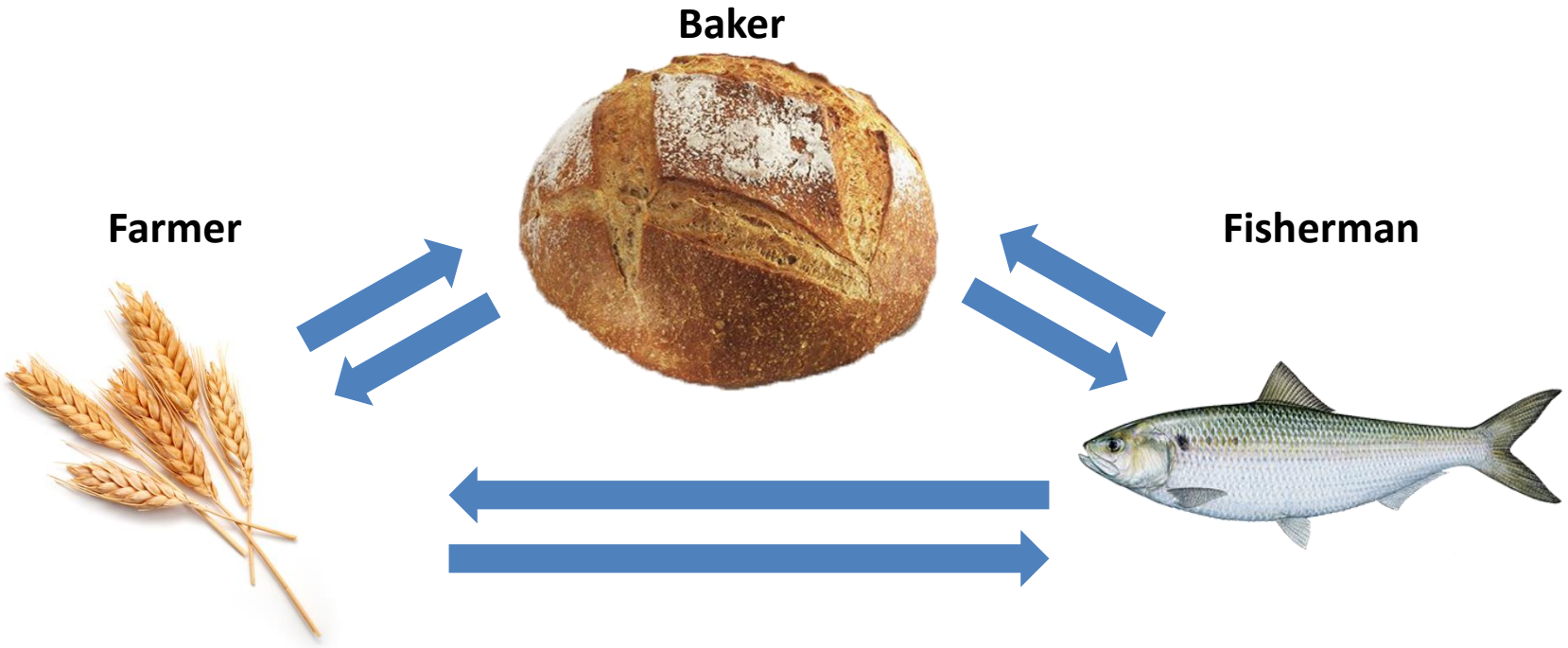
7.5 What is the relation between the money supply and the general level of prices?

7.6 What roles does the Reserve Bank play in the economy?

7.7 How can the Reserve Bank affect the level of interest rates in the economy?

The evolution of money

Start with a very simple "barter" economy with three people. They don't use money and just exchange what they produce



Problems:

- What if the farmer doesn't want fish? (the "double coincidence of wants")
- What if the farmer wants to compare the value of fish and bread (esp if the quality of fish changes)?
- What if the farmer wants fish but doesn't have grain until harvest?

Money solves the basic problems of a barter economy, especially the "double-coincidence of wants". It should play three roles

1. Medium of Exchange

- Money solves the need for a "double coincidence of wants" before exchange takes place
- Requires everyone to accept money: "trust"/"confidence"

2. Unit of Account

- Money should also be used to measure the value of goods (divisible)
- Makes sense if also the medium of exchange

3. Store of Value

- Money should be able to hold wealth from one period to the next (doesn't disintegrate)

Throughout history many things, from rocks to rum, have been used as money, to varying success.

Rai Stones, Micronesia, ~500-1900 CE

- Fashioned from limestone and left stationary
- Suffered from inflation after iron tools introduced in 1870s
- Bad medium of exchange (heavy) and unit of account (indivisible)

Shells, Global, ~7,00 BCE-1900s CE

- Used globally. In 1800s *arbitrage* of cowrie shells between west and central Africa earned 500% returns.
- In China so important that the character for cowrie(貝) appears in many financial characters.
- Bad unit of account (indivisible – shell flakes, varying value)

Rum, Australia, 1788-1812

- Start of British colony: no need for currency. Wages paid in rum
- Rum traded between convicts and troops
- Gov. Macquarie replaced with Spanish dollars, with centre punched out (“holey dollar”) in 1812.
- Bad store of value.

Gold has been used as currency at least as far back as ~3000 BCE in Egypt. It has no inherent value, it all comes down to trust.

Oldest coin: Electrum Stater of Lydia, 800-700 BCE

- Electrum: natural alloy of gold and silver (..shiny)
- Found in Lydia (Hellenic city on coast of Asia Minor)

- Gold and silver are shiny, and don't rust.

Egypt, 1324

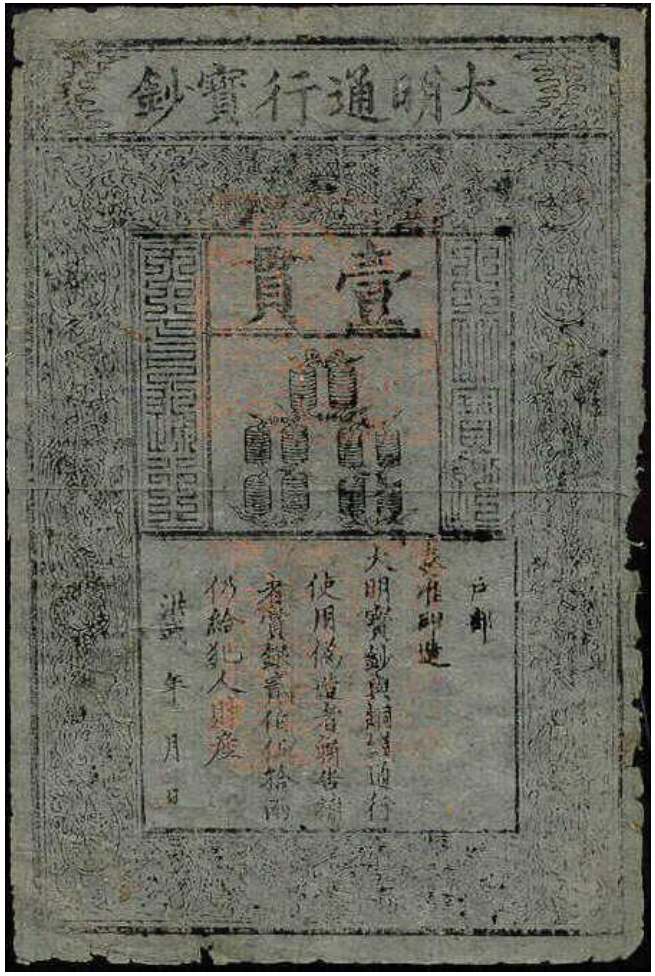
- Mansa Musa, Emperor of Mali (trading empire) made Hajj pilgrimage to Mecca.
- Gave so much gold to poor in Cairo, inflation destroyed the economy

Spain 16th Century

- Gold and silver used for currency
- Extracted gold and silver from Latin America worth $1.5 trillion (1990 USD)
- Severe inflation: "Everything is dear in Spain except silver"

Paper money originated because it was easier to carry than gold (better medium of exchange). For centuries it was backed by physical gold

- Goldsmiths issued receipts for coins they were making
- Receipts were traded, becoming money
- Paper money has always been an IOU – (“I owe you”)



Oldest surviving paper money, China, 1380

The Bank of England originally backed all notes and coins with gold (the "gold standard"), but abandoned this during the great depression

- The Bank of England was founded in 1694. Second oldest central bank (after Swedish).
- Model for modern central banks.

- Originally all notes and could be exchanged for gold in their vaults
- The gold still exists today. (I've seen it!)

- Abandoned "gold standard" in 1931 to let money supply vary and manage the Great Depression (next lecture)
- It thus became "fiat money" – (fiat means "formal decree" or "arbitrary order")

The money in the UK today still shows its history as a bank-issued IOU

"I promise to pay the bearer on demand the sum of"

Today you can't redeem it for £5 of gold, but you can get another £5 note.

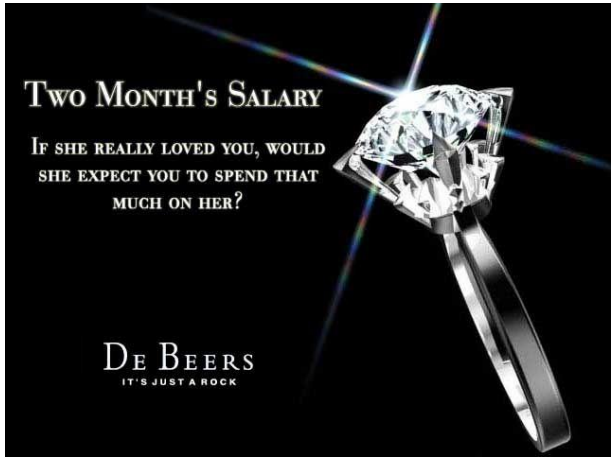
This reveals the fundamental point about money. It has no inherent value. Like much of macroeconomics it is all about a "feedback loop"

- The value of money stems from its ability to simplify transactions
  - Solves the "double coincidence of wants" problem.
- It can only perform this function if sellers trust that other people will also accept it. A network equilibrium.
- If people believe that money has value, then it has value. It is a self-fulfilling prophecy (see Bitcoin).
- The Bank of England could only abandon the gold standard because people already believed that money had value.

…Many other things in macroeconomics are like this. They are self-fulfilling prophecies based on people's beliefs

Consumer confidence affects aggregate demand

In 1993 George Soros convinced people that the UK pound was overvalued.



De Beers convinced people that diamonds are very valuable

This Sydney house is worth $1m because that is what people are willing to pay

Money doesn't need to issued by the government if it is trusted, but government support helps.

- In the UK the Royal Bank of Scotland (a private/commercial bank) also issues bank notes.
- They are broadly accepted, but not always.

During the UK Civil War (17th Century) – traders would issue their own tokens as currency, because the government couldn't spare the metal

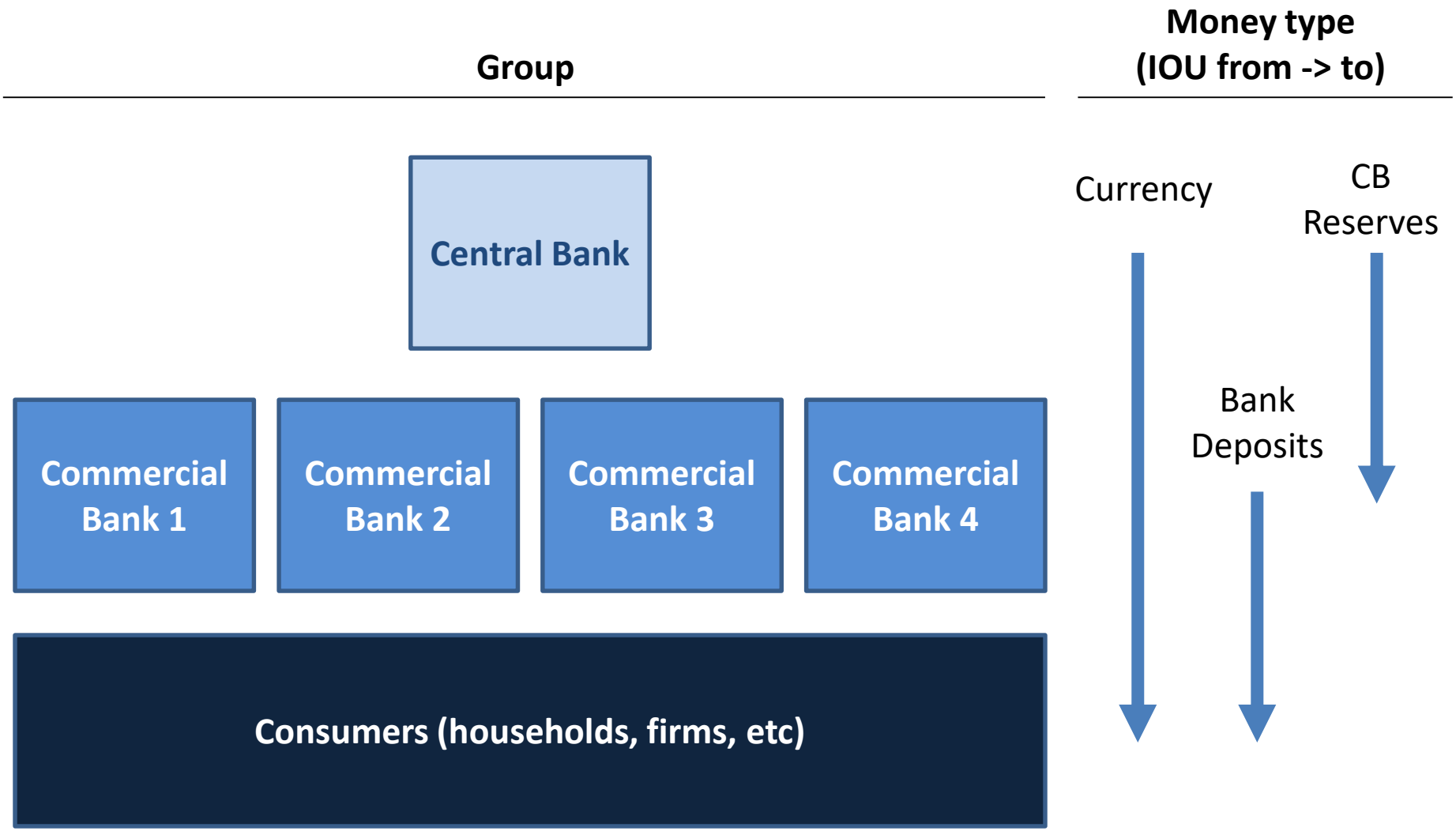
Bitcoin is an interesting innovation. It is like a “stateless currency” with a monetary regime similar to a gold standard.

- Created from nothing
- Only has value if people believe that others will accept it
- Similar to gold:
  - Bitcoin supply constrained by algorithmic “mining”
  - Treated like an asset. Buy and hold
- Exchange rate with other currencies varies
- Is there a future where people use currencies based on the type of transaction, rather than the country where it is transacted?

These beliefs can be destroyed, like when hyperinflation destroyed belief in the value of Zimbabwe's currency, and it was replaced with the USD

Types of money in the modern economy

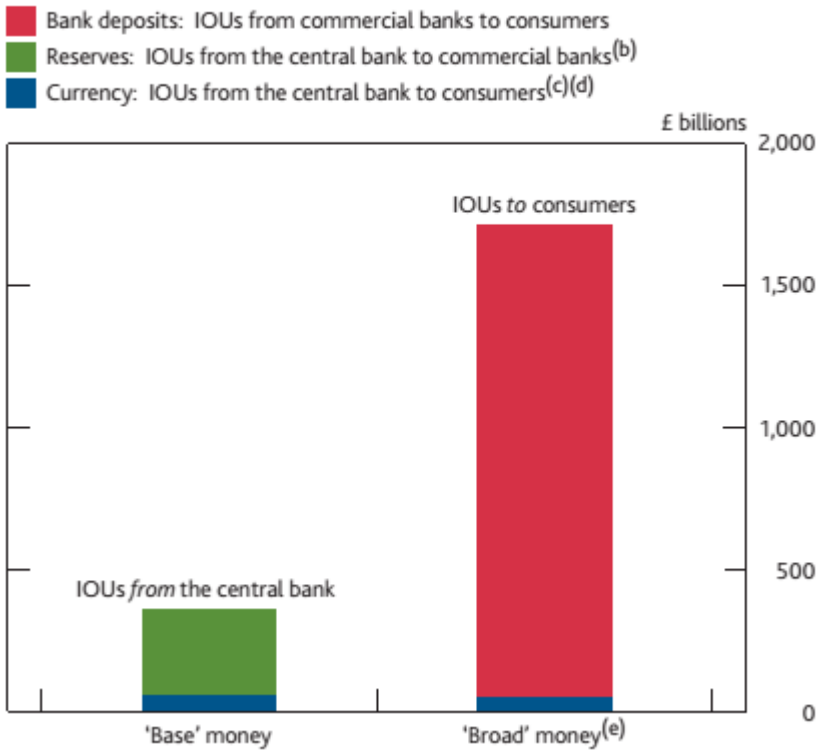
Modern money is a set of IOUs between three groups in the economy: the central bank, commercial banks and consumers.



In a modern economy bank deposits make up the vast majority of money held by households (97% in the UK)

Amounts of money in circulation in the UK, £ billions

Chart 1 Amounts of money in circulation[a]



(a) All data are for December 2013.
(b) Reserves balances at the Bank of England held by banks and building societies, non seasonally adjusted. Data are measured as the monthly average of weekly data.
(c) Currency in base money includes notes and coin in circulation outside the Bank of England, including those in banks' and building societies' tills. Data are measured as the monthly average of weekly data.
(d) Currency in broad money includes only those notes and coins held by the non-bank private sector, measured as the month-end position.
(e) M4 excluding intermediate other financial corporations.

Source: McLeay, Radia and Thomas (2014), "Money in the modern economy: an introduction"

Notes and coins are IOUs from the central bank to households (households claim over central bank assets)

- Notes and coins are “fiat money”
- There are 1.5 billion banknotes in circulation, worth $73 billion
- $50 and $100 account for two thirds
  - In December the Revenue and Financial Services minister suggested removing the $100 due to black market
  - India withdrew its largest banknotes in 2016 and this created chaos

Bank deposits are IOUs from commercial banks to consumers

- When a consumer deposits currency in their bank account they exchange an IOU from the central bank for an IOU from the commercial bank
- The IOU is in the form of an electronic number on a screen
- Bank deposits are held because:
  - They are more convenient than cash
  - They are safer than cash
  - They earn interest (term deposits)
- Technology is increasing the demand for bank deposits relative to cash:
  - Paywave, M-PESA, online transactions, electronic money (eg PayPal, etc)

Central Bank reserves are IOUs from the central bank to commercial banks. They are used to settle transactions between banks

- CB reserves are IOUs from the central bank. They are electronic numbers on a screen, but are equivalent to banks holding cash in a vault.

- Every day people buy and sell things from one another
  - If buyer and seller from the same bank – cancel out
  - If buyer and seller are from different banks – settle at end of day electronically using reserves

- Commercial banks hold reserves to meet withdrawals
  - Don't need 100% of deposits held in reserves (hard currency). This is called "fractional reserve" banking

Fractional reserve banking: imagine if commercial banks had to hold all their cash deposits in a vault (100% reserves)

An IOU from the commercial bank to the consumer

TABLE 7.3 Consolidated balance sheet of Gorgonzolan commercial banks (initial)

ASSETS		LIABILITIES	
Currency = reserves	1 000 000 guilders	Deposits	1 000 000 guilders

This could be:
- notes and coins in a vault, or
- reserves at the central bank (very safe, as the CB prints money)

However, very rarely does everyone need all their money at once, so…

Fractional reserve banking: if commercial banks are only required to hold 10% in reserves, the rest can be loaned out for higher interest

Only 10% is held in cash/CB reserves, earning the "overnight cash rate" (this is the RBA cash rate you hear in the news)

The interest paid on deposits is less than the interest earned on reserves and loans, which is how banks make money

TABLE 7.4 Consolidated balance sheet of Gorgonzolan commercial banks after one round of loans

ASSETS		LIABILITIES	
Currency (= reserves)	100 000 guilders	Deposits	1 000 000 guilders
Loans to farmers	900 000 guilders		

The remaining 90% is loaned to farmers, which is riskier (uncertain harvests) but earns a higher return

Fractional reserve banking: in equilibrium, the 90% loaned to farmers is spent, so ends up back in banks as more deposits, which can be loaned

2. The extra deposits end up in reserves, which can be loaned out again.

1. The $900,000 loaned to farmers ends up as extra deposits in commercial banks

TABLE 7.5 Consolidated balance sheet of Gorgonzolan commercial banks after guilders are redeposited

ASSETS		LIABILITIES	
Currency (= reserves)	1 000 000 guilders	Deposits	1 900 000 guilders
Loans to farmers	900 000 guilders		

The ultimate effect is that the $1,000,000 in currency ends up as reserves, and multiplies up to $10,000,000 in deposits in equilibrium.

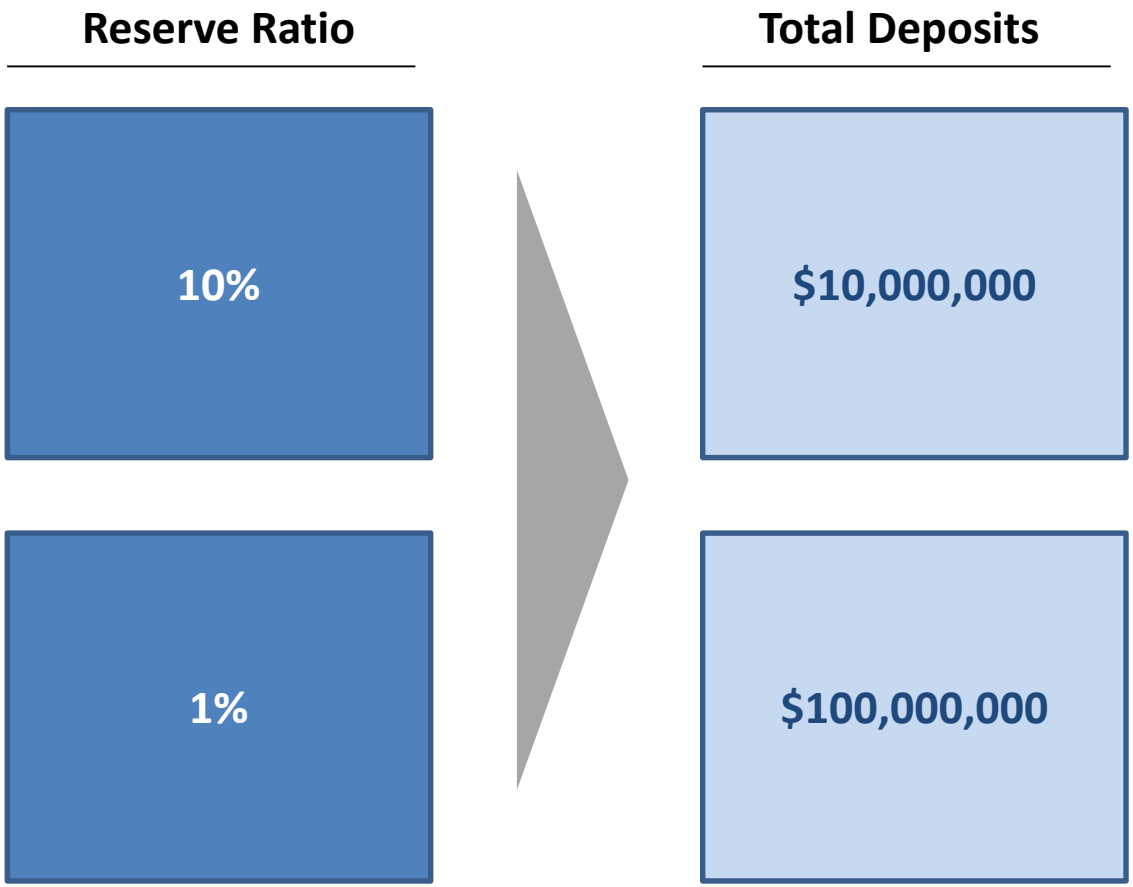
TABLE 7.7 Final consolidated balance sheet of Gorgonzolan commercial banks

ASSETS		LIABILITIES	
Currency (= reserves)	1 000 000 guilders	Deposits	10 000 000 guilders
Loans to farmers	9 000 000 guilders		

If some farmers hide cash under their bed, then not everything ends up as bank deposits, and the "multiplier" effect of fractional reserves on the money supply is less

This shows that reserve requirements for commercial banks affects the money supply

For $1,000,000 in hard currency (…or CB reserves)



NOTE! It does not describe how money is usually made and destroyed (unlike the textbook says). We discuss this now

- The money supply changes very frequently
- Reserve requirements change very infrequently
- The central bank creates and destroys money by changing the interest rate
  - This causes commercial banks to change their lending (discussed now)
- "Unconventional policy" might include changing reserve requirements in the future
  - "Macro-prudential policy": changing reserve requirements with the business cycle. The Bank of England and RBA are considering this.
  - Important if interest rates don't work (zero lower bound).

Sometimes bank reserves are not enough to meet withdrawals, such as during a “bank run” – when trust in the banks runs out

Northern Rock was a UK bank that suffered a bank run in 2007.

- Needed to approach the Central Bank for a loan to meet withdrawals
- Led to more withdrawals: self-fulfilling prophecy
- Taken over by the UK gov’t in 2008 and bought by Virgin Money in 2012

How is money created in the modern economy?

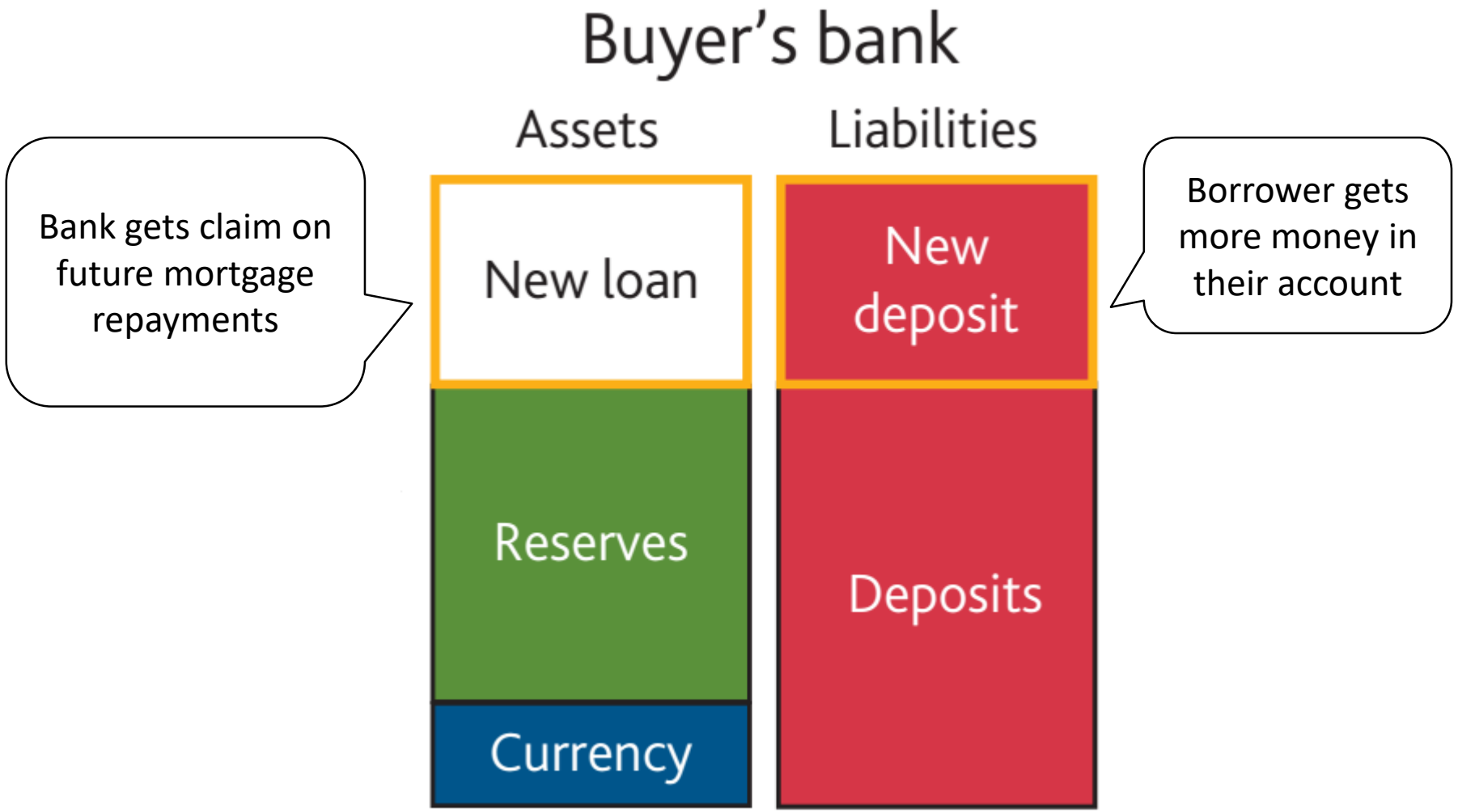
Based on: McLeay, Radia and Thomas (2014), “Money creation in the modern economy”

The central bank controls how many notes and coins are created in the mint

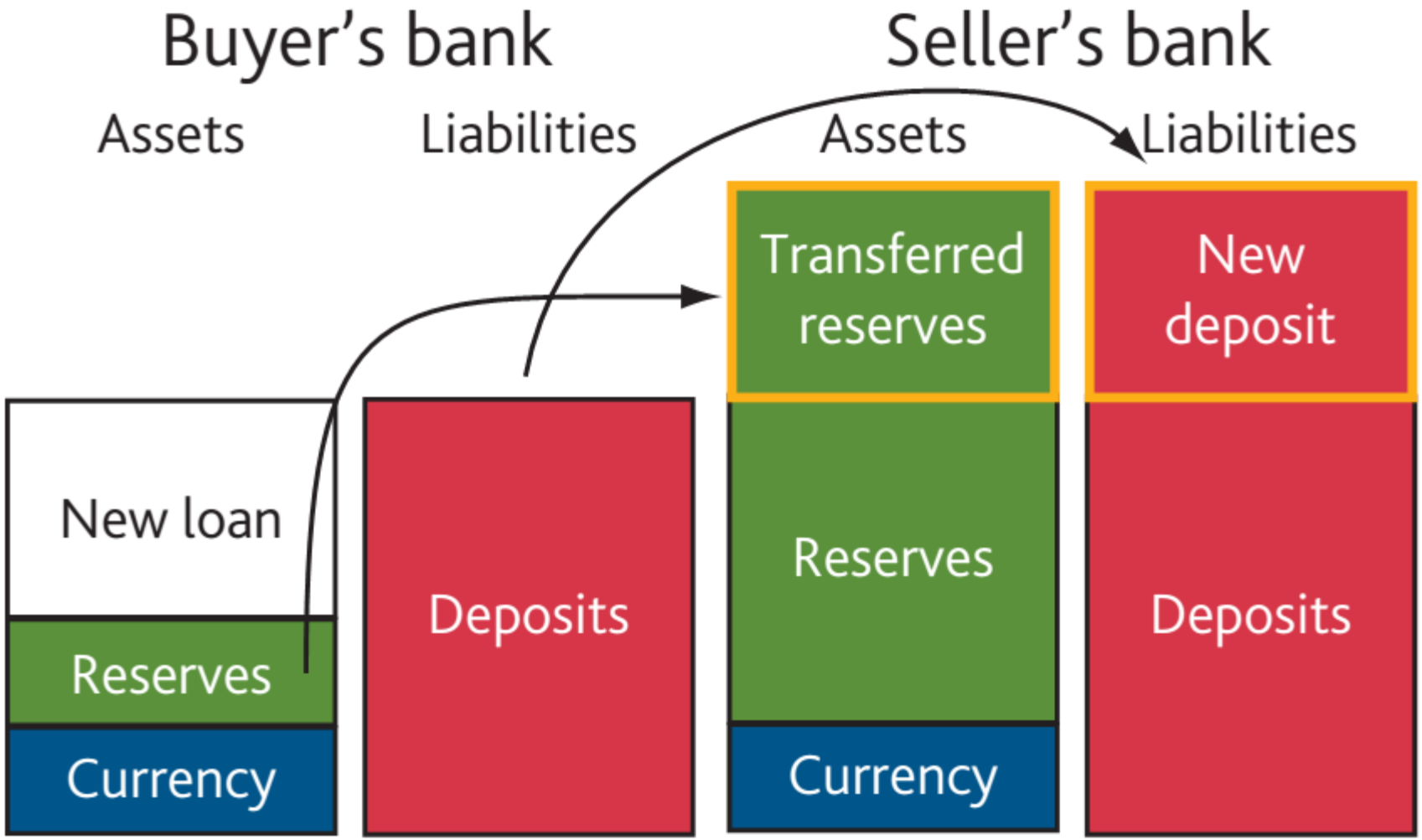
Commercial bank deposits, like all money, are IOUs, and so can be created at will by the bank. Banks create money out of nothing!

(..actually, it's created out of the trust that people place in their ability to redeem bank deposits…)

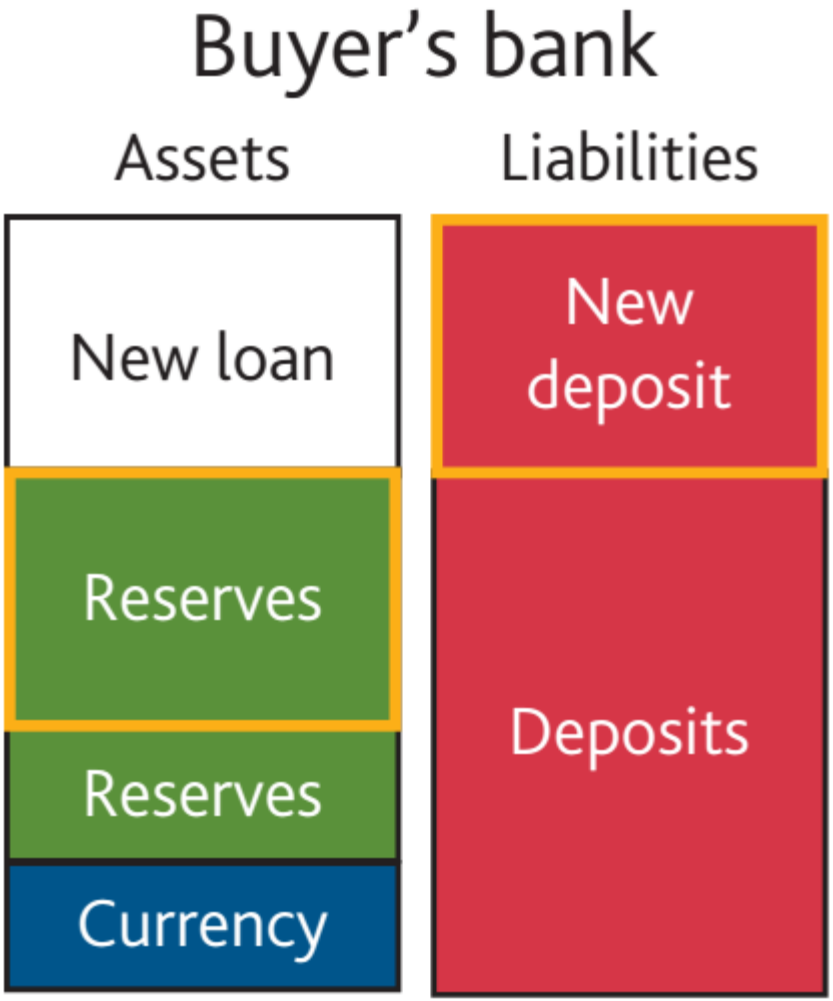
E.g. When a bank makes a new home loan, it just adds electronic numbers to the borrower's account. This increases total deposits.



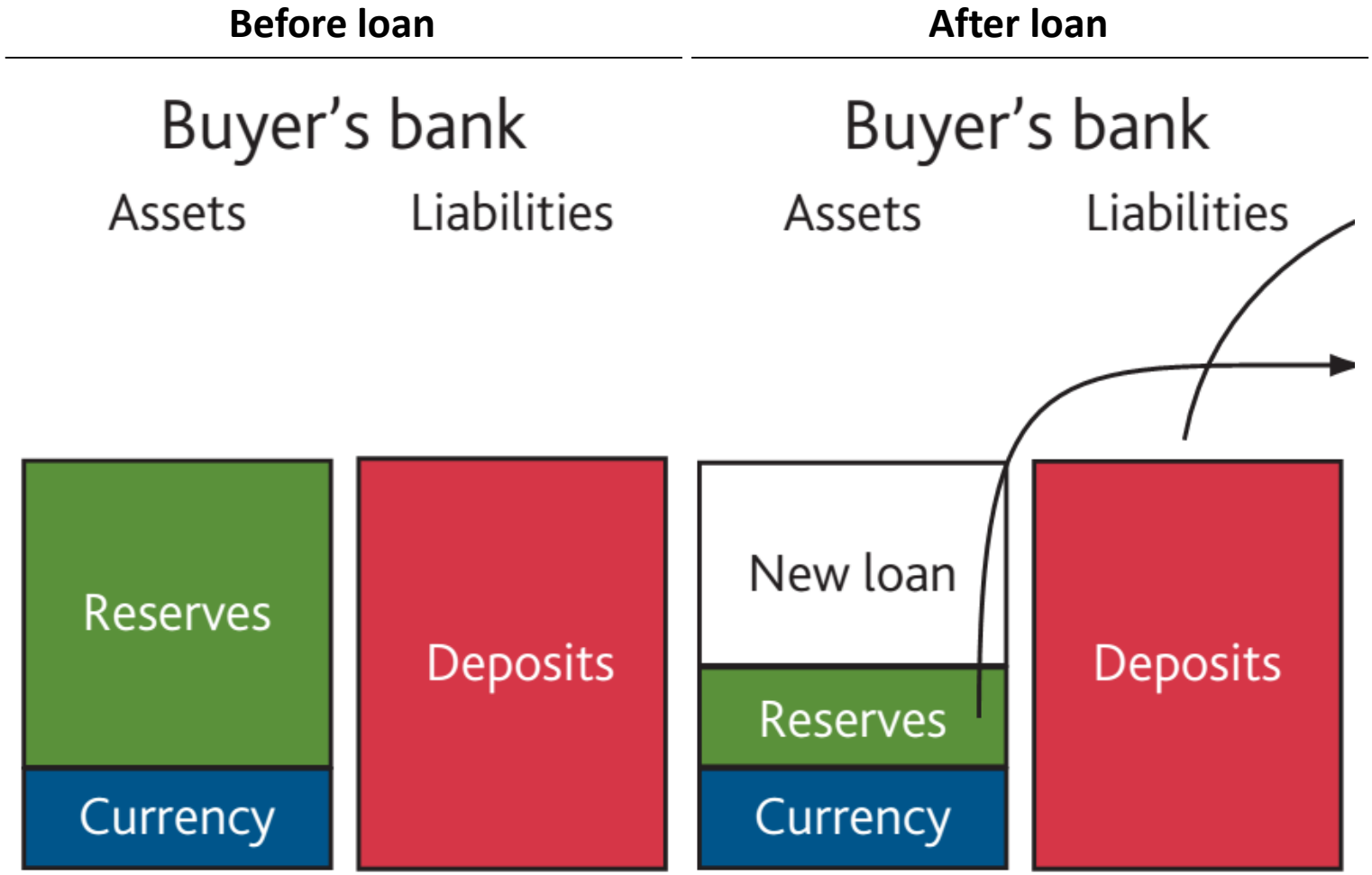
…The borrower will then withdraw the electronic numbers as cash (reserves) and give it to the house seller, who deposits with their bank



…Or, if the house buyer and seller have the same bank, the bank's balance sheet will just get bigger

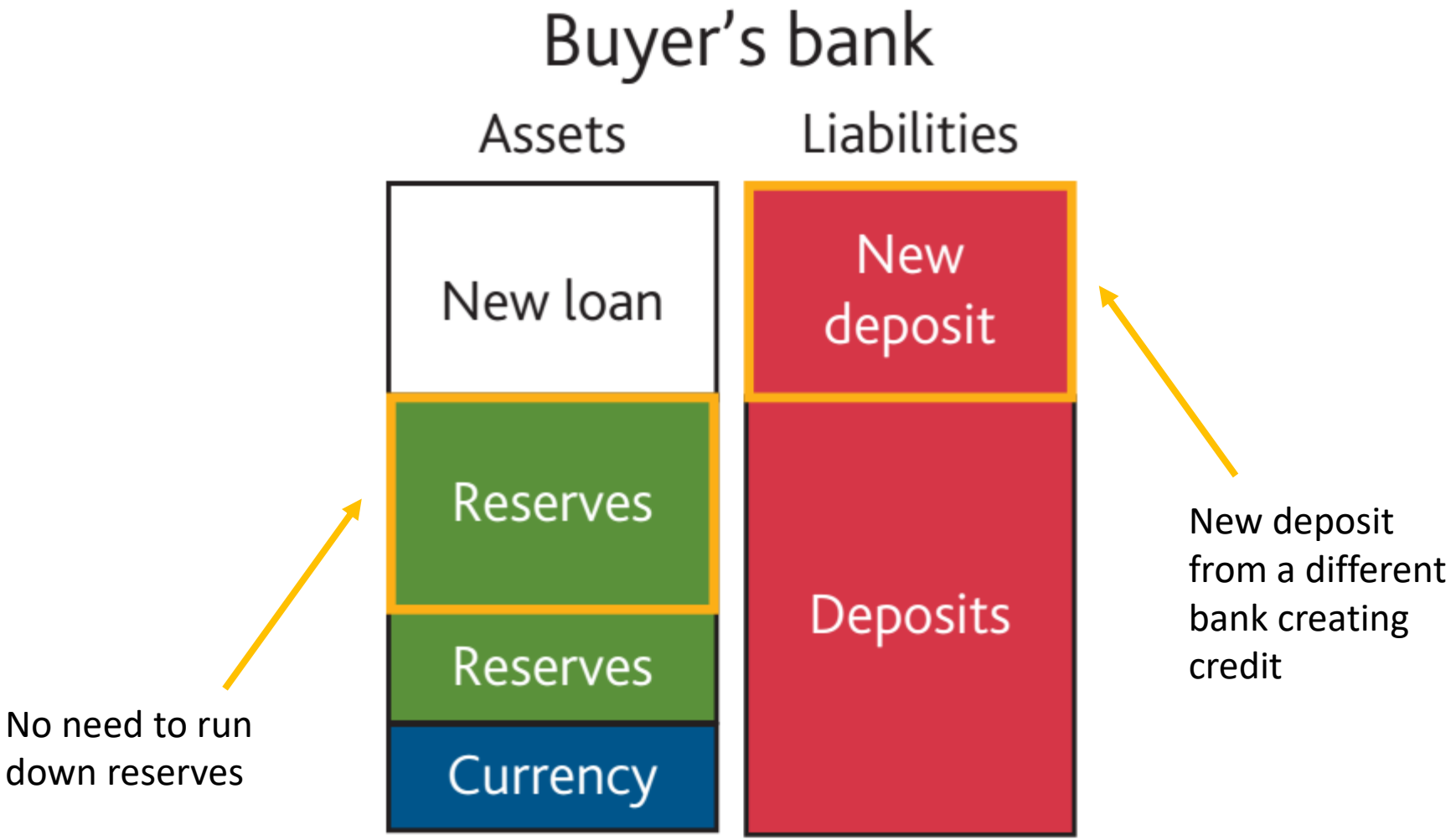


Why don't banks just lend money infinitely?? Because they need to make a profit, which is determined by interest on reserves



The bank had to settle the transaction in cash (reserves), so it has less. To get more it needs to borrow from the CB at the overnight cash rate (1.5% p.a. in Aus)

But, when all banks are lending more, they will each also receive more deposits. Bank credit is self-reinforcing, leading to credit booms.



The three limits on banks creating money are: the cash rate, capital requirements and consumers destroying money

1. Cash Rate

- Banks settle loans using cash/reserves
- The opportunity cost of fewer reserves is the "overnight cash rate"
  - Loan must earn a risk-adjusted return > cash rate
- The Central Bank sets the cash rate monthly

2. Capital Requirements

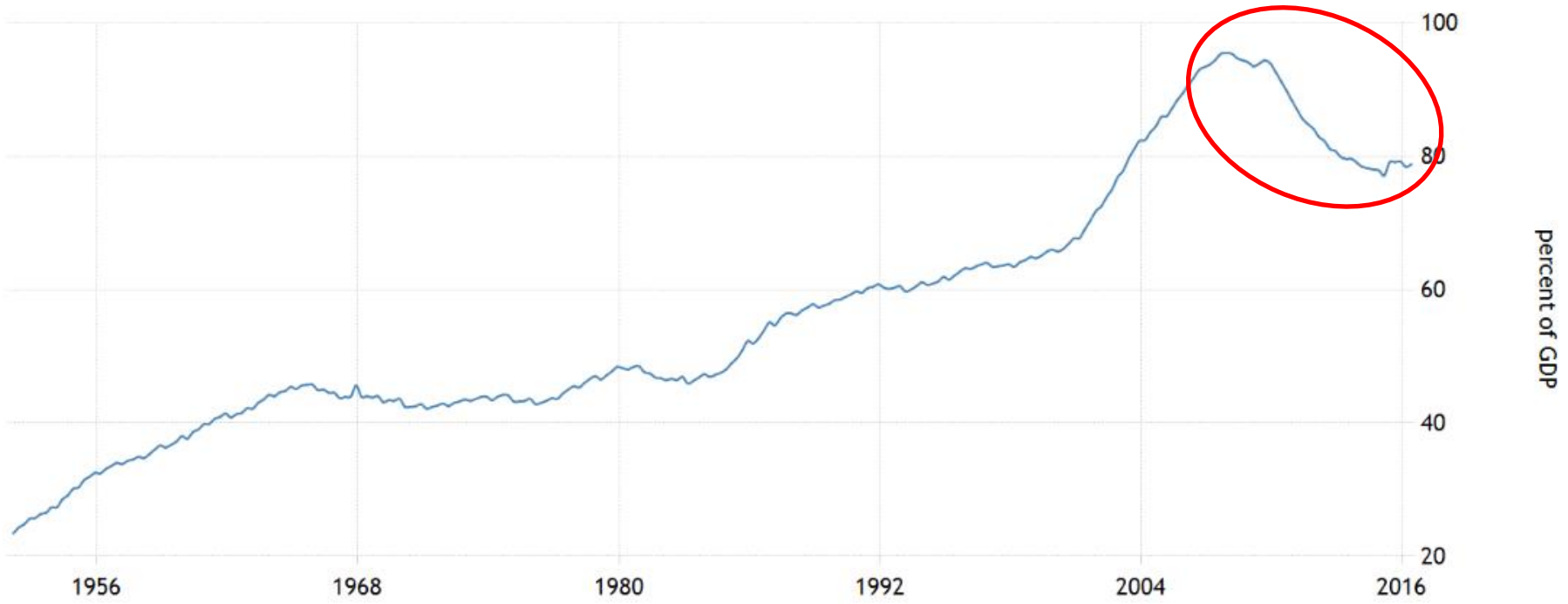
- Banks have limits on the amount of deposits they can have relative to reserves
- This is usually not the binding constraint

3. Households destroy money

- If a households borrows a loan then money is created.
- If a household repays a loan then money is destroyed.
  - E.G. Buying a home from someone who has a mortgage.
  - Rising house prices, less money destroyed, higher money supply: feedback loop.

A deleveraging reduces the amount of debt (loans) in the economy, and therefore the amount of bank deposits (money)

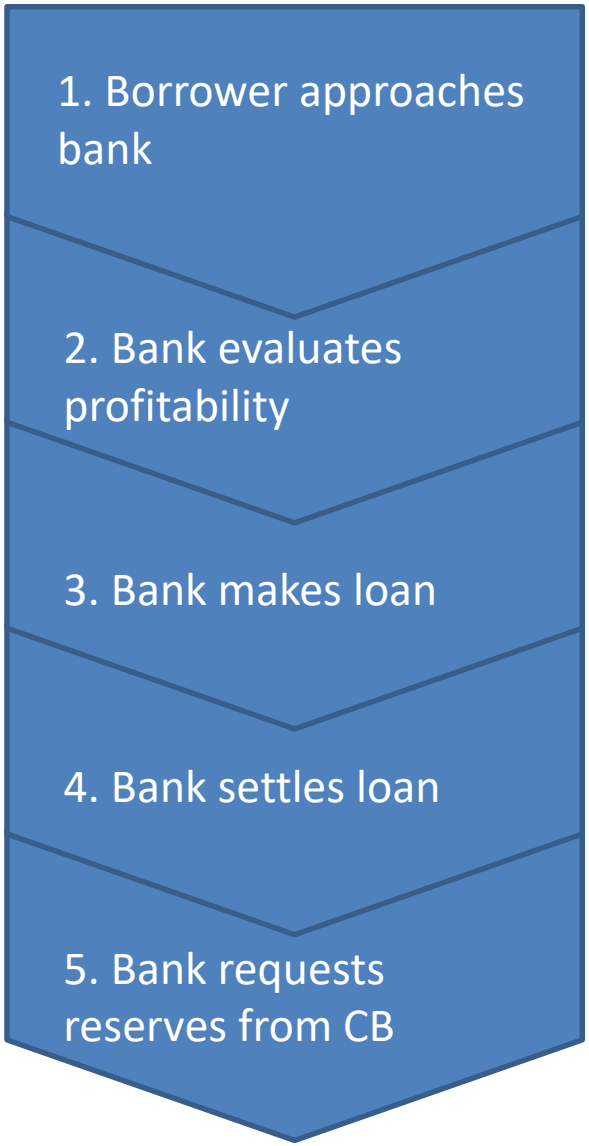
US household debt to GDP, %



See also the youtube video on slide 26

Source: www.tradingeconomics.com

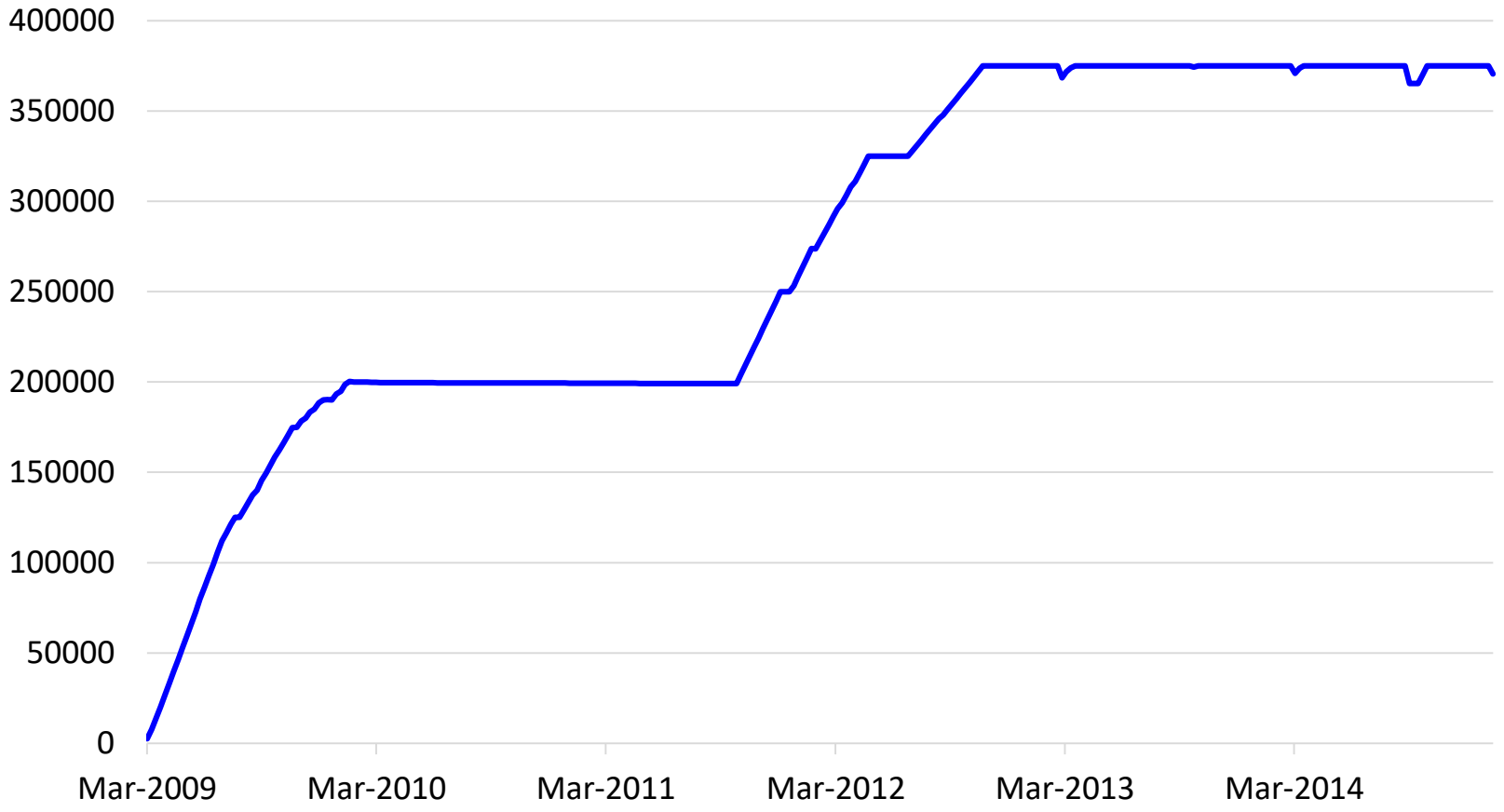
Recap: The decision process for a commercial bank to make a loan



- Loans typically initiated by borrower who sees a need for investment
- Bank checks: interest earned, probability of receiving it, cost of financing by having fewer reserves
- Adds electronic numbers to borrower's account (L), and creates claim on the borrower's asset (A)
- Transfers reserves to bank of person selling house/machine/etc
- Requests more reserves if necessary to meet future deposits (exchange reserves for other assets)

Reserves are created when the CB buys assets from banks or the gov't, as with Quantitative Easing, and destroyed when assets are sold

Quantity of assets purchased by the creation of Central Bank reserves, £ millions



Source: Bank of England, *Monetary and Financial Statistics,* Jan 2015

So, money is created by banks making new loans. Not by multiplying deposits, or by the CB multiplying up reserves

How money is not created:	Why:
1. Fractional reserve banking	Banks don't need to gather more deposits before they make a loan Saving more doesn't increase loanable funds (if it is spent it will still end up in a bank deposit – Paradox of Thrift).
2. Fractional reserve central bank	Banks don't need to draw down their central bank reserves to make a loan (only if can't finance with new deposits)

Next Lecture

- How the Central Bank controls money supply via interest rates
- How this affects the economy (bonds, stocks, etc)