THE UNIVERSITY OF SYDNEY

ECON1002: Introductory Macroeconomics

Lecture 13: Review

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Dr Sam Wills
Lecturer | Assistant Professor
School of Economics | University of Sydney

samuel.wills@sydney.edu.au
https://samuelwills.wordpress.com/

What have we learned in this course?

Course overview

Introduction	1. Measurement: Output
	2. Measurement: inflation, savings, wealth
	3. Measurement: employment and labour market
Short run	4. Short-run Keynesian model
	5. Fiscal and monetary policy I
	6. Monetary policy II
Short to Long run	7. Aggregate Supply and Aggregate Demand
Long run	8. Long run growth I: Intro
	9. Long run growth II: Solow-Swan model
Open economy	10. International Trade
	11. Exchange rates and balance of payments

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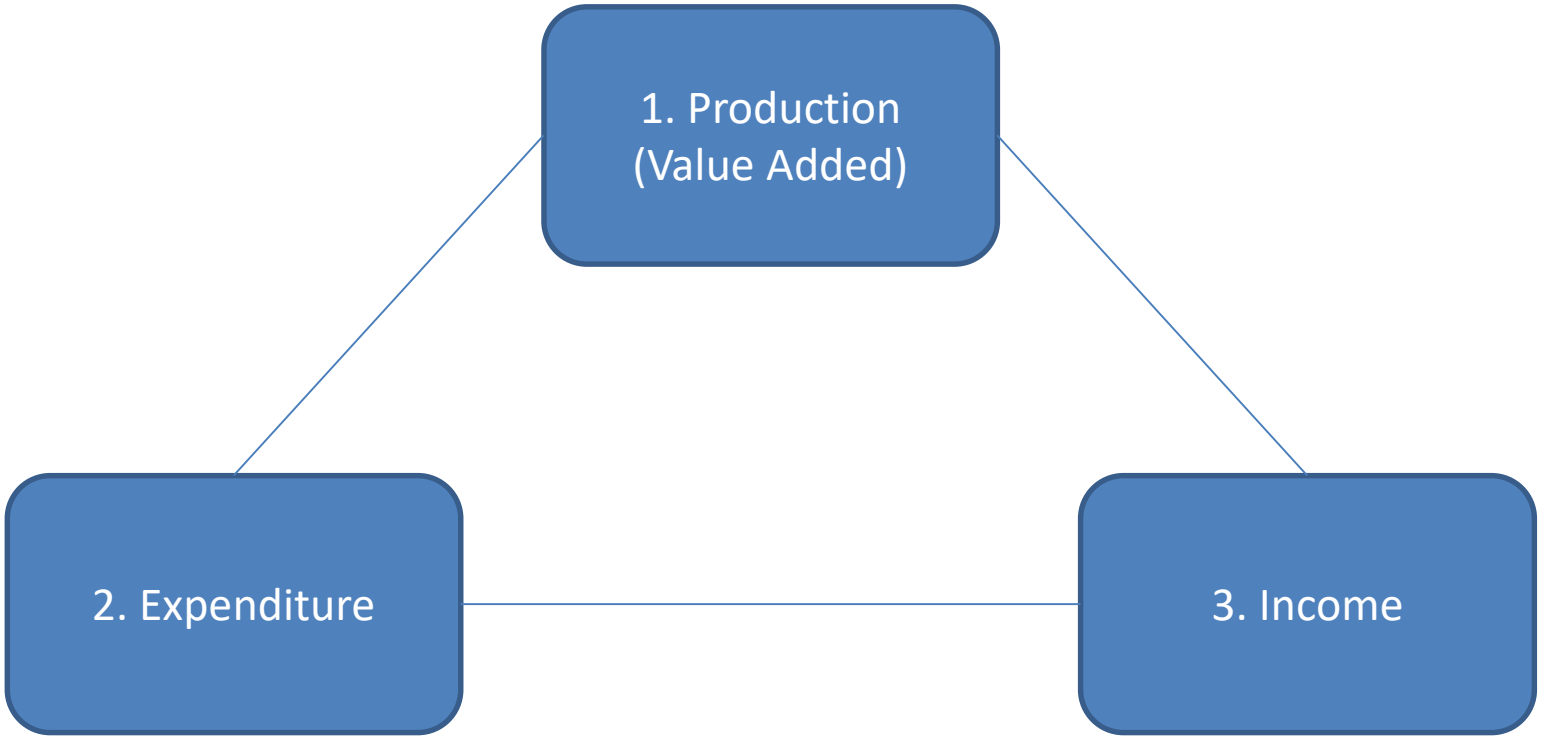
GDP can be calculated in three ways: using production, expenditure and income, which should all produce the same result.



These three methods are all the same because everything that is produced (1.) must be bought by someone (2. - including inventories which are bought by the producer), which generates income for the seller (3.).

Example: calculate GDP from selling a loaf of bread for $2.00 using the value-added, expenditure, and income methods

A loaf of bread is sold in Australia for $2.00:

TABLE 1.1 Value added in bread production

COMPANY	REVENUES	–	COST OF PURCHASED INPUTS
ABC Grain	$0.50		$0.00
General Flour	$1.20		$0.50
Hot 'n' Fresh	$2.00		$1.20
Total			

- ABC Grain pays:
  - Rent to tractor owner ($0.20), Rent/Profit to landowner ($0.20), Wages to farmer ($0.10)
- General Flour pays:
  - Rent/Profit to mill owner ($0.50), Wages to millers ($0.20)
- Hot 'n' Fresh pays:
  - Rent to store owner ($0.10), repaying loans for oven ($0.20), wages for baker ($0.30), profits for franchisee ($0.20)

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How do you measure inflation?

Inflation is the change in CPI. It is the difference between nominal and real interest rates, as seen in the Fisher equation

The Consumer Price Index

$$CPI = \frac{\text{Cost of basket in current year}}{\text{Cost of basket in base year}}$$

Laspeyres Index:

Use basket from base year

Paasche Index:

Use basket from current year

The Fisher Equation

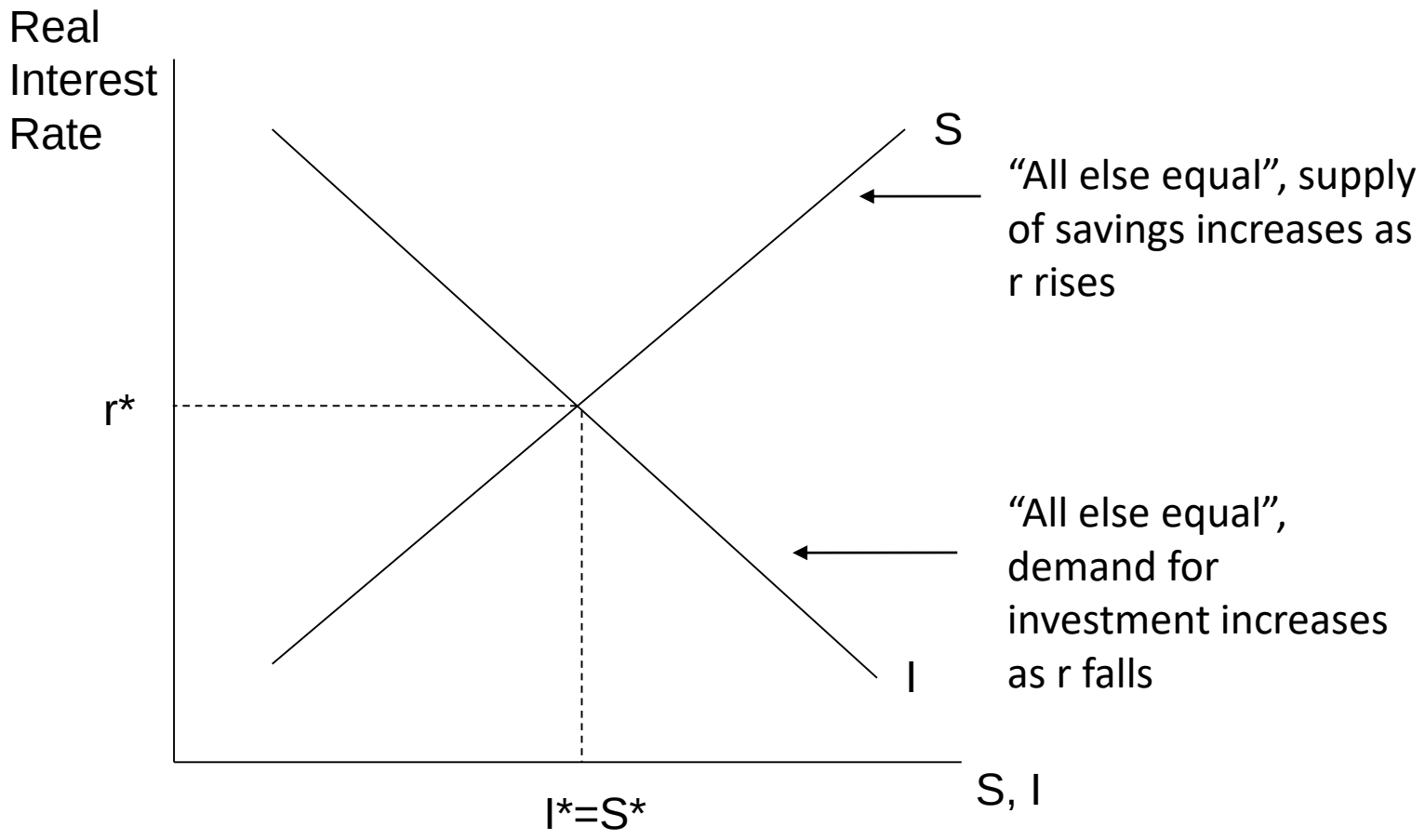
Exact: $(1 + i) = (1 + r)(1 + \pi)$

Approximate: $i \approx r + \pi$

i = nominal interest rate, r = real interest rate, π = inflation

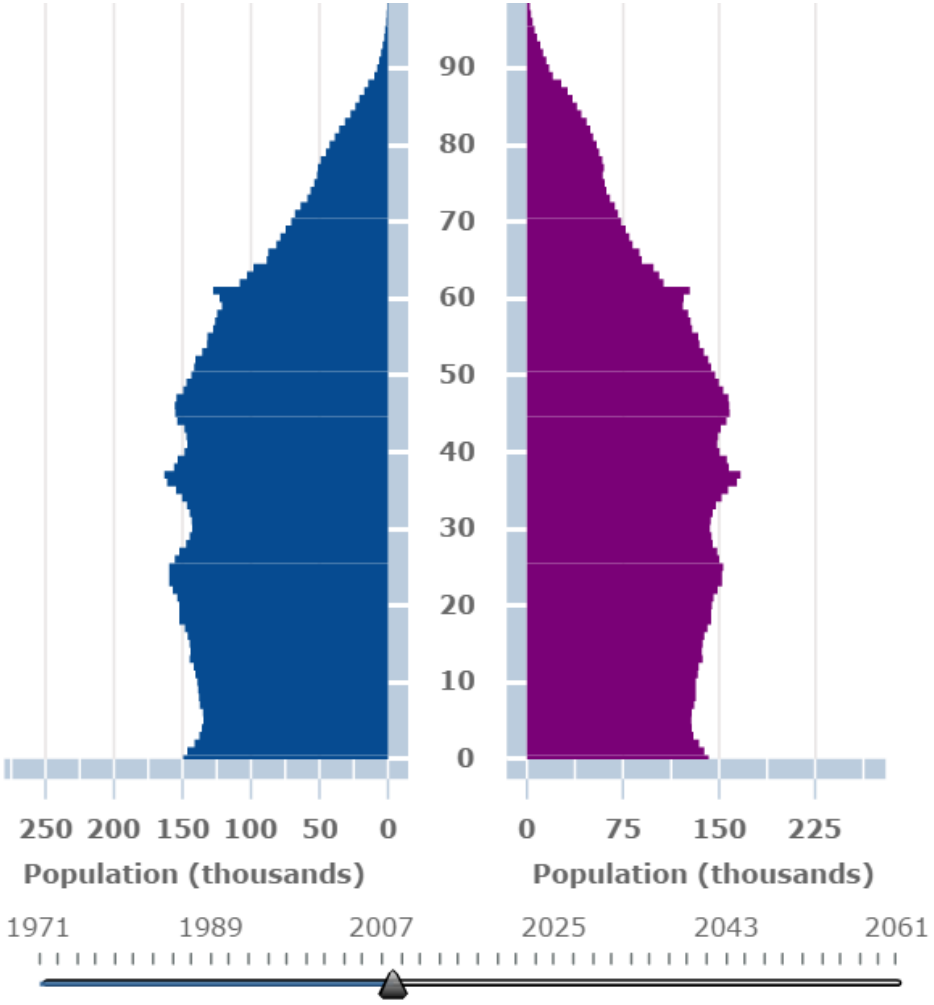
In a closed economy, the real interest rate will adjust so that national savings equals national investment

Supply and demand for savings in the financial market



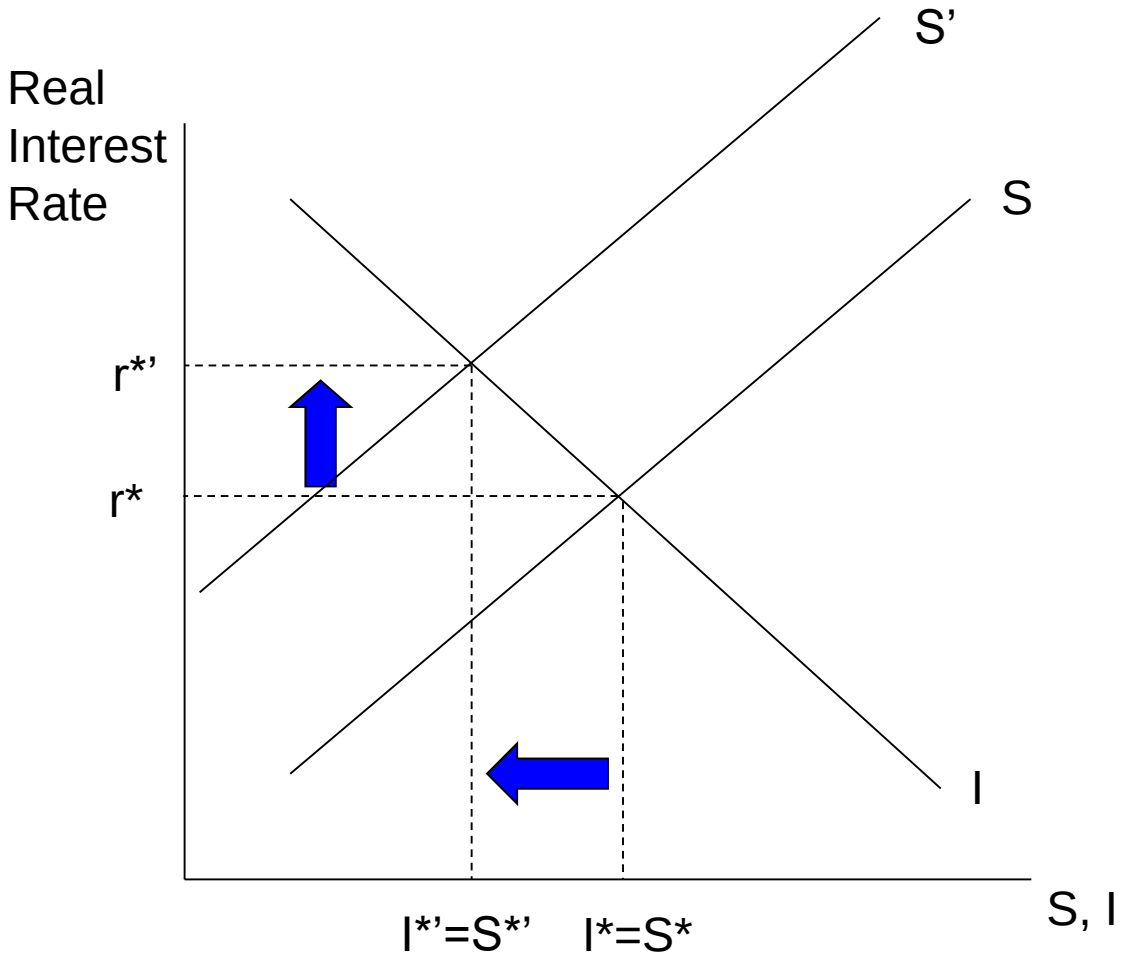
Example: What happened when the large “baby boomer” generation retired?

Australian Population Pyramid, 2007



Source: http://www.abs.gov.au/websitedbs/d3310114.nsf/home/Population%20Pyramid%20-%20Australia

As baby-boomers retire, they will consume their savings, reducing the supply and raising the real interest rate



See also: https://www.federalreserve.gov/pubs/ifdp/2005/847/ifdp847.pdf

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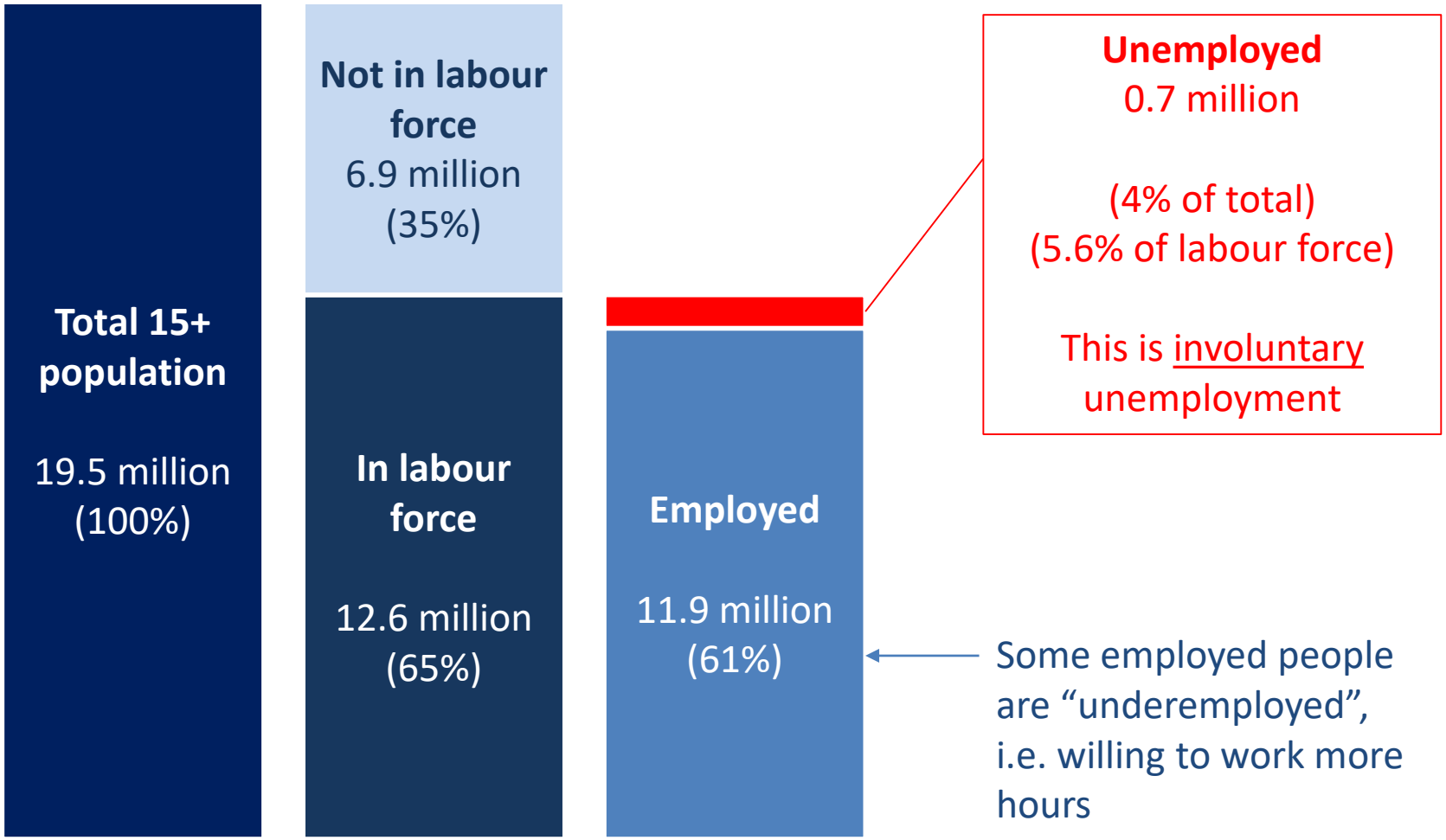
Every person in Australia over the age of 15 is either in or out of the labour force

Breakdown of Australian labour force, December 2016



Source: ABS 6202

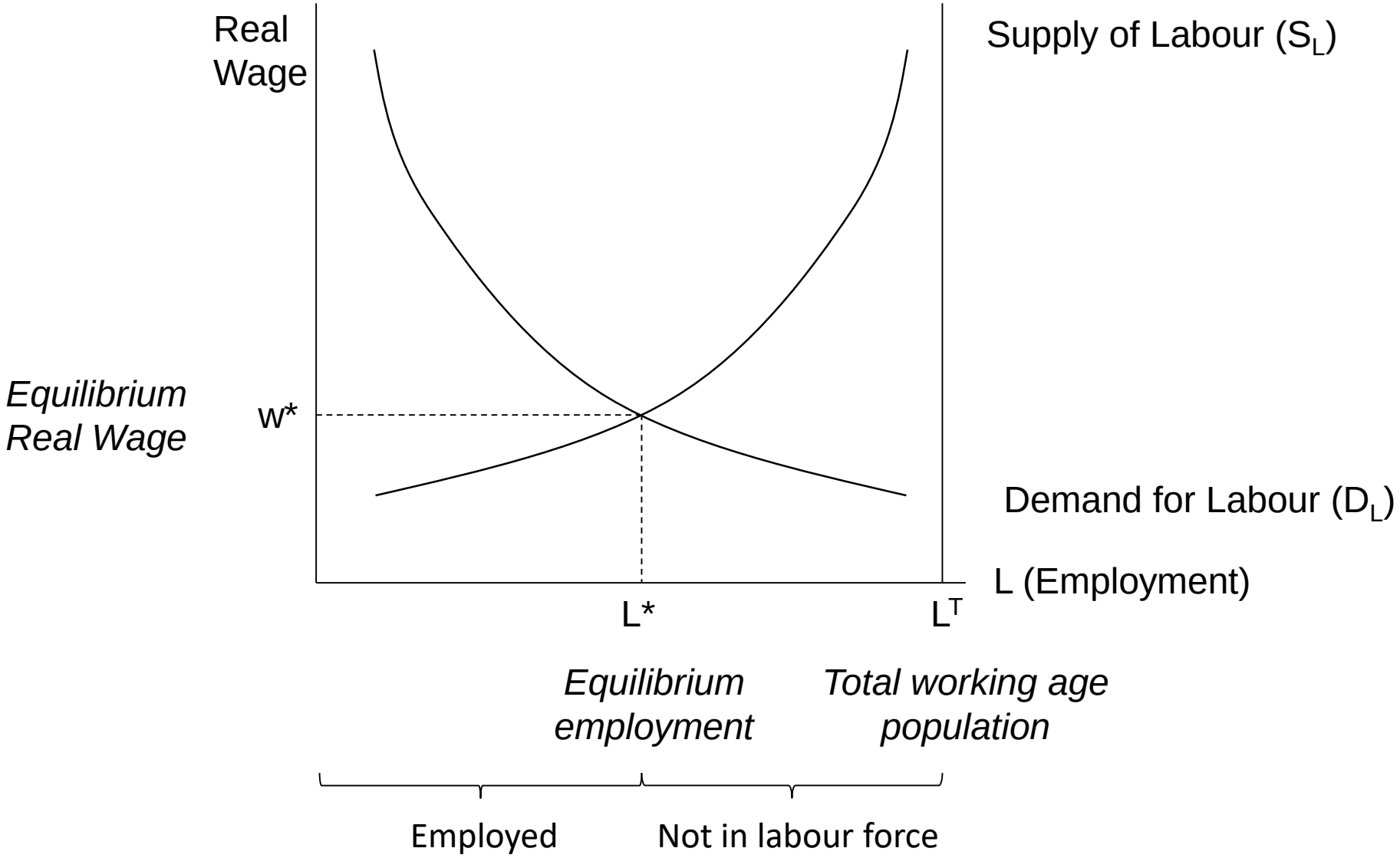
Some labour force definitions

Labour force = employed + unemployed

$$\text{Unemployment} = \frac{\text{Number of unemployed}}{\text{Labour force}}$$

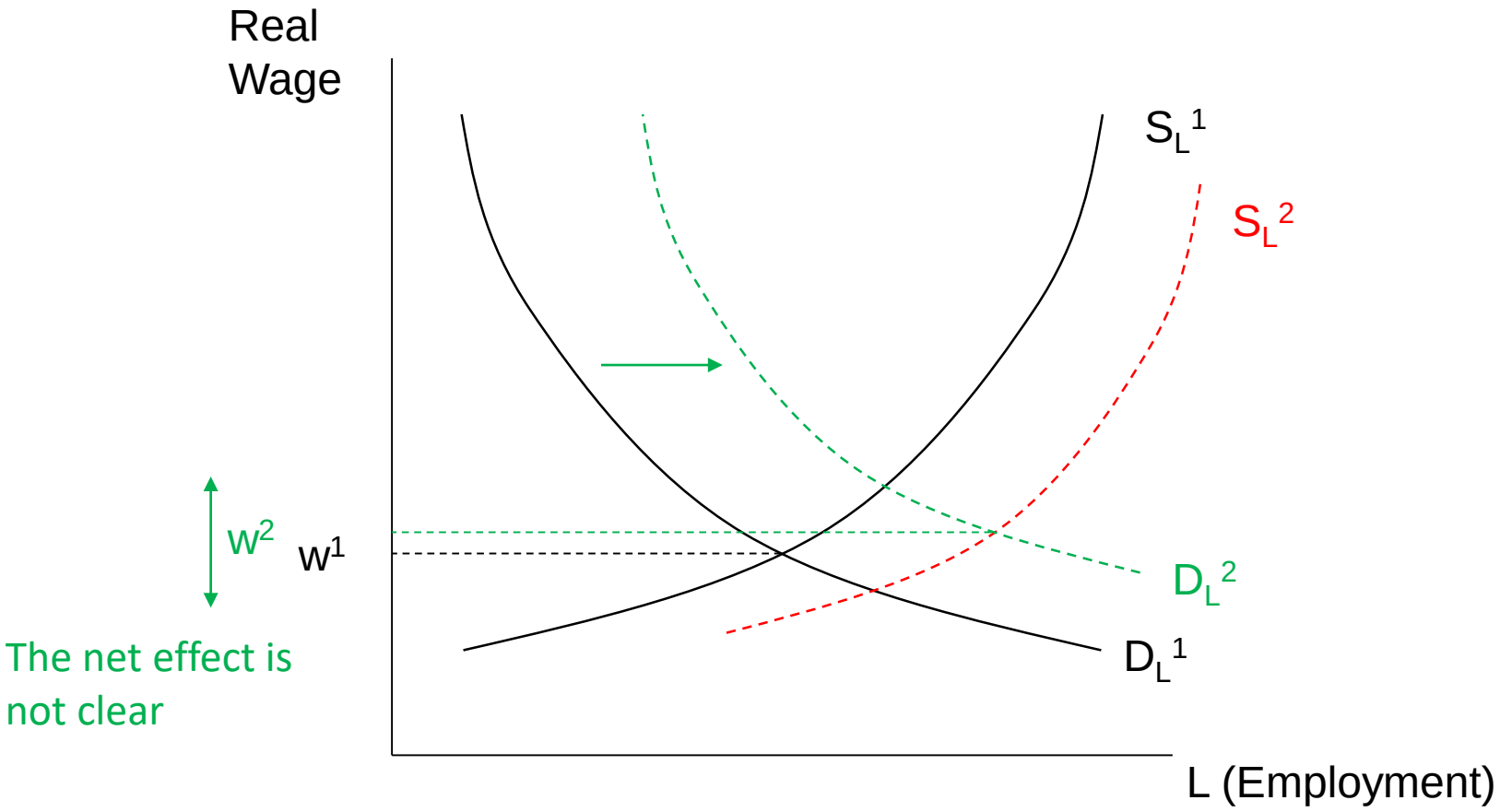
$$\text{Participation rate} = \frac{\text{Labour force}}{\text{Working-age population}}$$

The labour market consists of the supply of labour (willing workers) and the demand for labour (available jobs)



What if Australia accepts new immigrants?

Answer: Both supply and demand for labour increases!



The net effect is not clear

Unemployment is driven by a negative output gap, which relies on "sticky prices". It is described by "Okun's Law"

Okun's Law

$$\frac{y - y^*}{y^*} = -\beta(u - u^*)$$

% output gap *Change in unemployment rate p.p*

Example

Q: If the following hold, and β =1.8m what was the output gap?

u = 10.3%, u^* = 8.08%, y^* = \$118,658.3m

A: \$4,746.33 million or –4% of y^*

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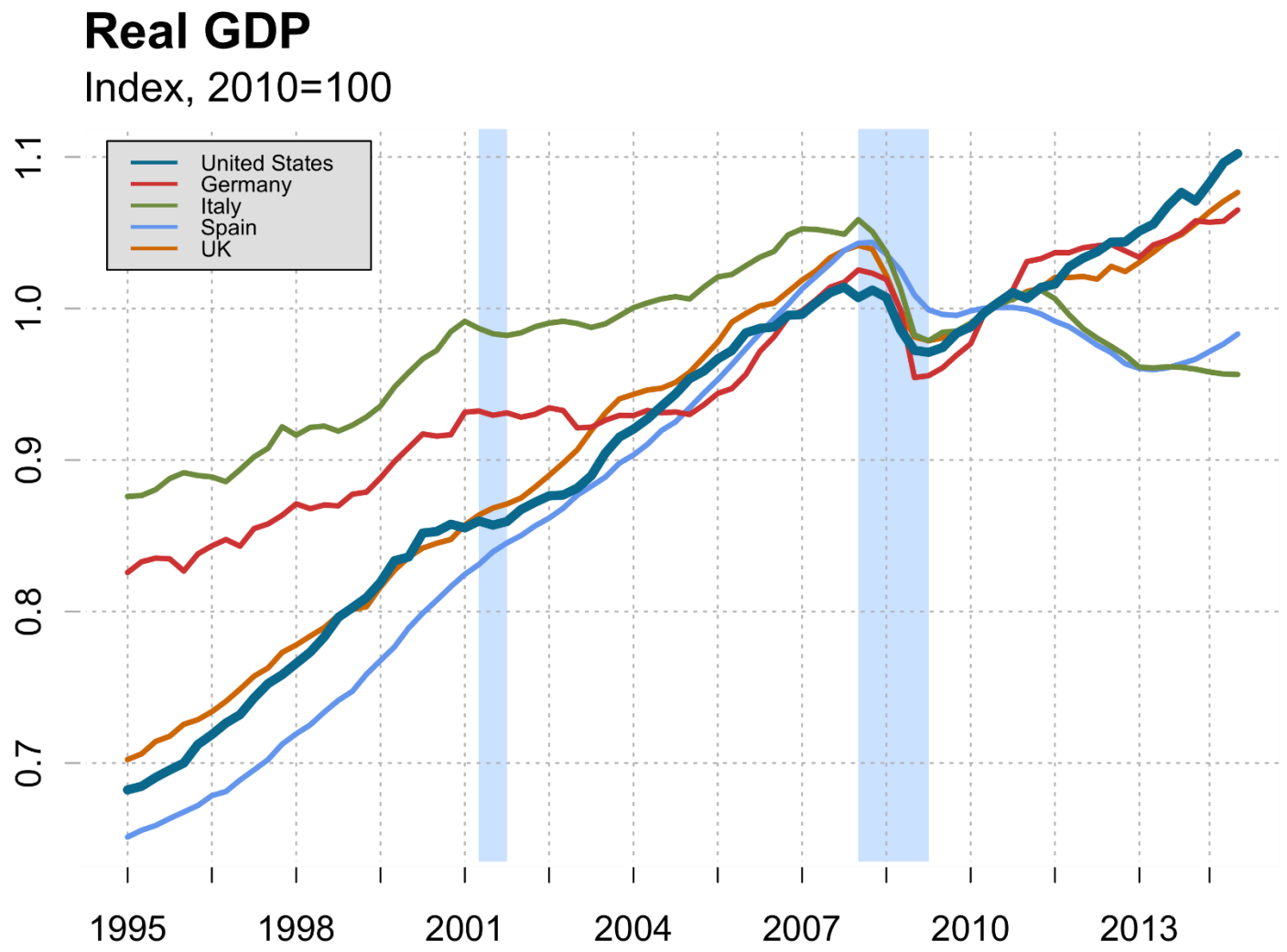
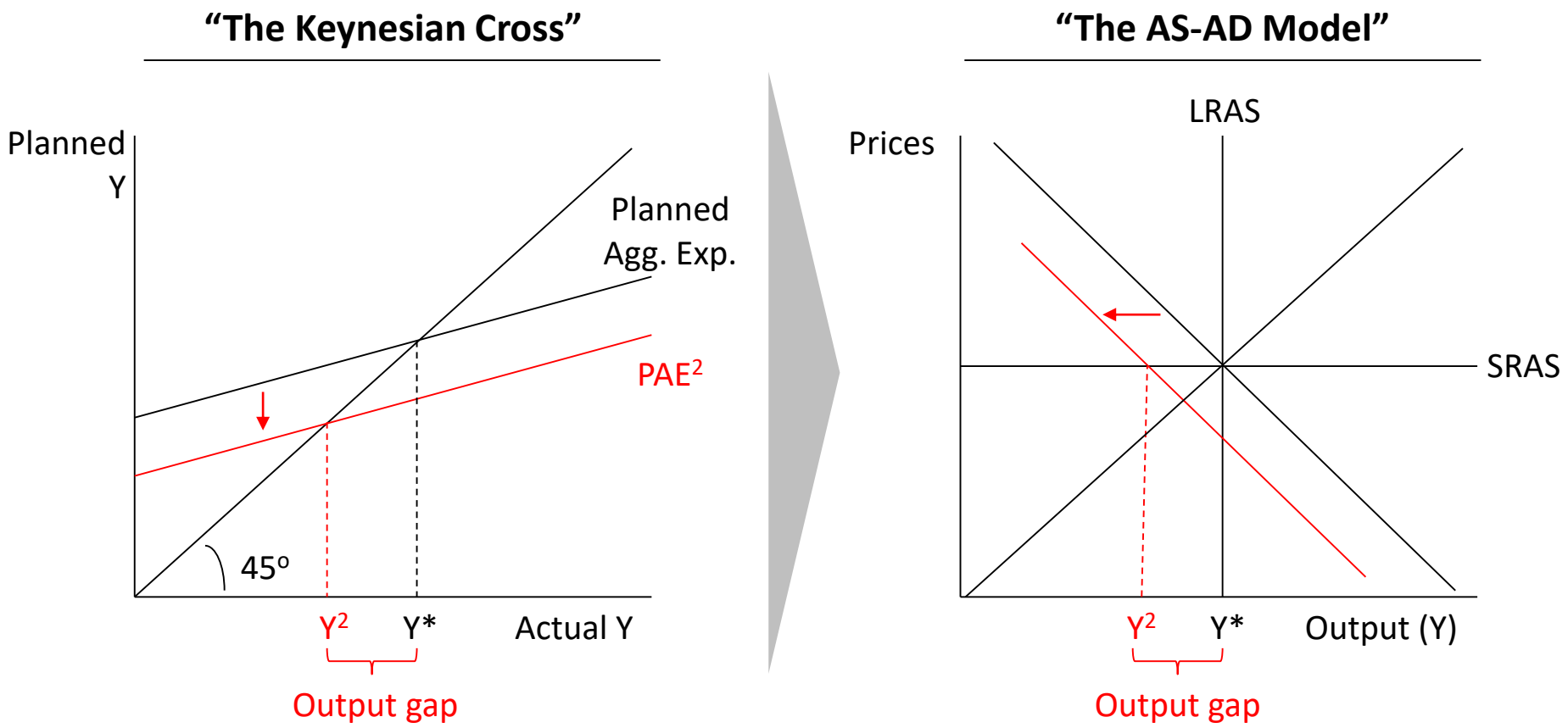
How should the government respond to a recession?



Econsnapshot.com

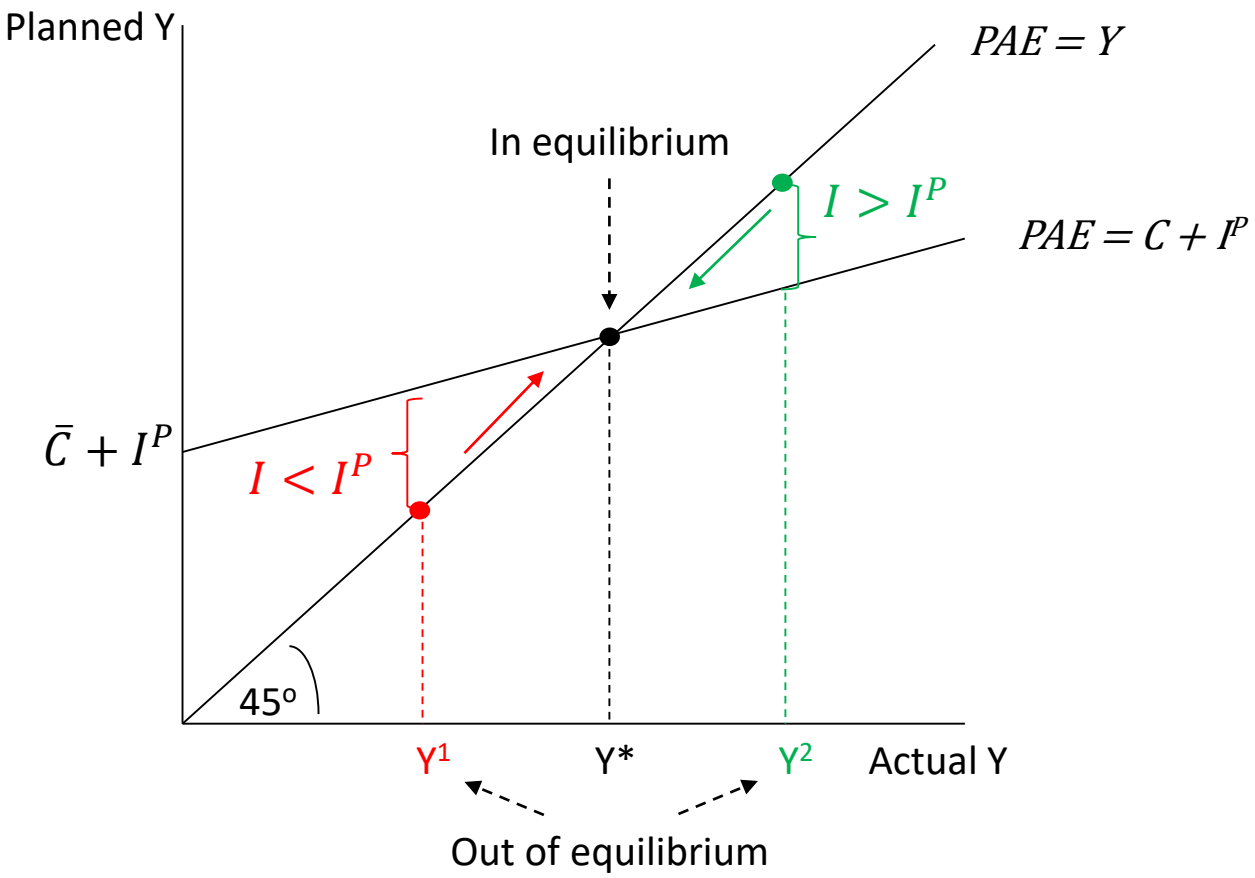
Source: OECD Main Economic Indicators, GDP Constant Prices

The Keynesian Cross is used to understand how aggregate demand shifts in 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")

Keynesian Cross: if actual output is above planned output, firms will accumulate inventories, until the economy returns to equilibrium



The Paradox of Thrift: Output falls if everyone spontaneously (exogenously) starts saving more

The Paradox of Thrift

Savings is income that isn't consumed:

$$S = Y - C$$

However, income is just consumption plus investment:

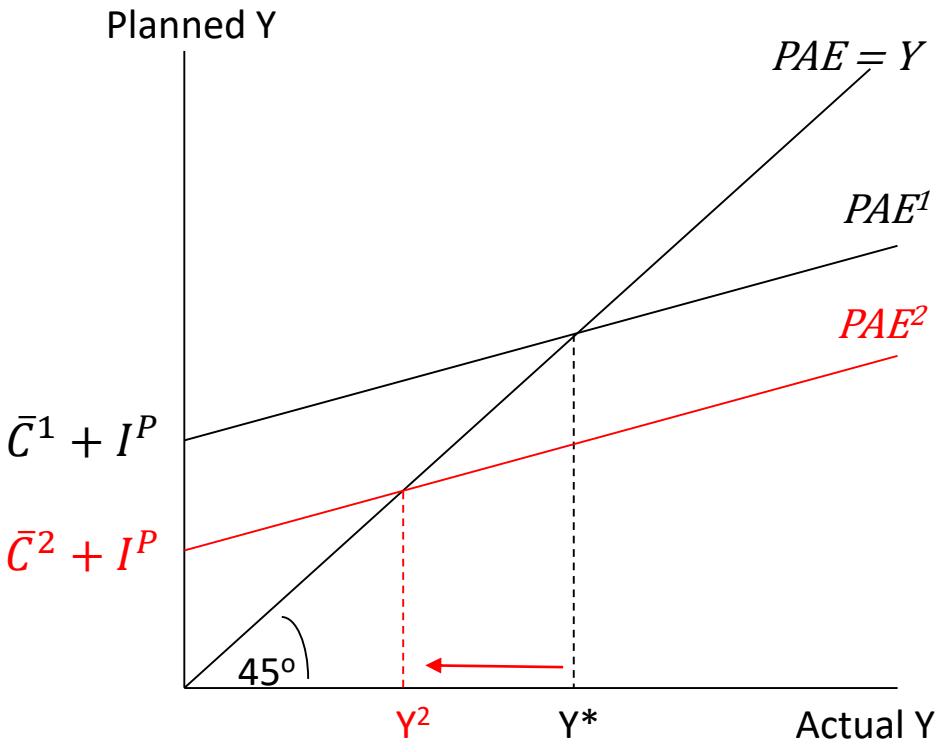
$$Y = C + I^P$$

Therefore, in this closed economy savings must equal investment:

$$S = I^P$$

If $\bar{C}$ falls, both output (Y) and consumption (C) fall by the same amount, so aggregate savings doesn't change because I^P doesn't change.

Illustration



The Keynesian Multiplier: If there is a negative shock to consumption, it will multiply up to a bigger effect on output

The Keynesian Multiplier

A fall in exogenous consumption of A causes a larger fall in aggregate output B, because it also reduces household income (Y), which in turn reduces endogenous consumption:

$$\text{PAE} = \bar{C} + cY + I^P$$

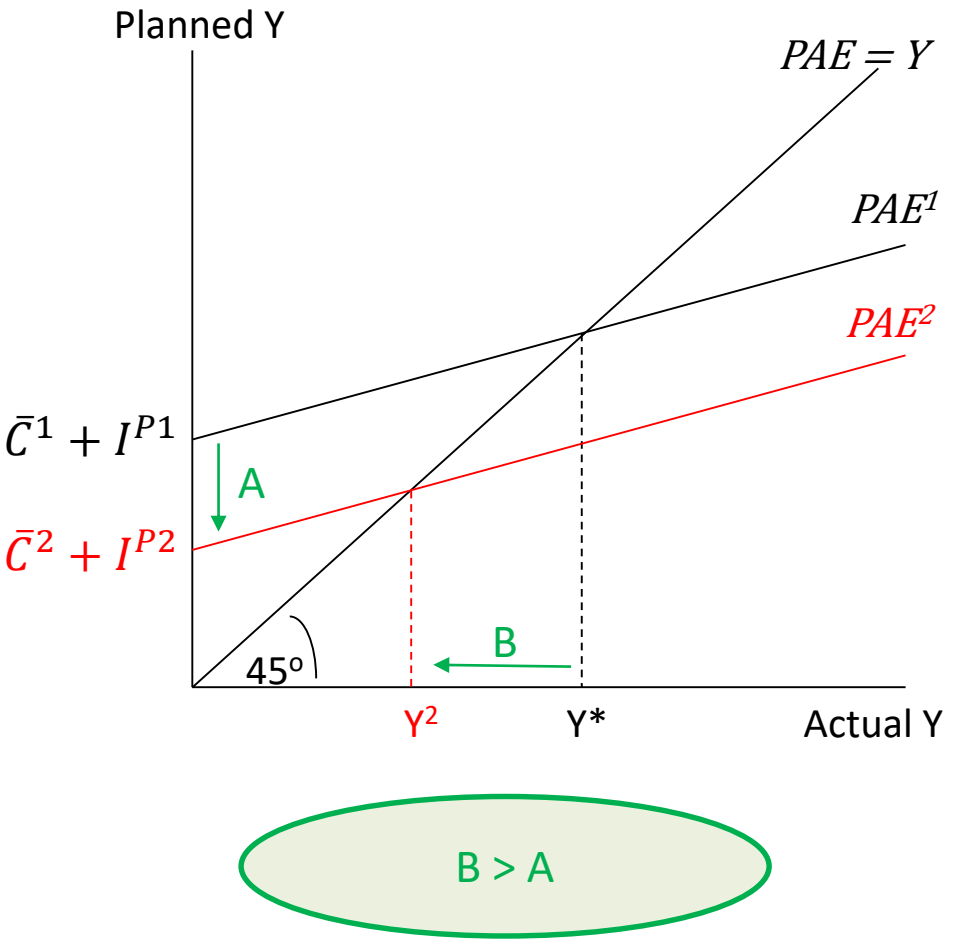
Along the 45º line:

$$\text{PAE} = Y$$

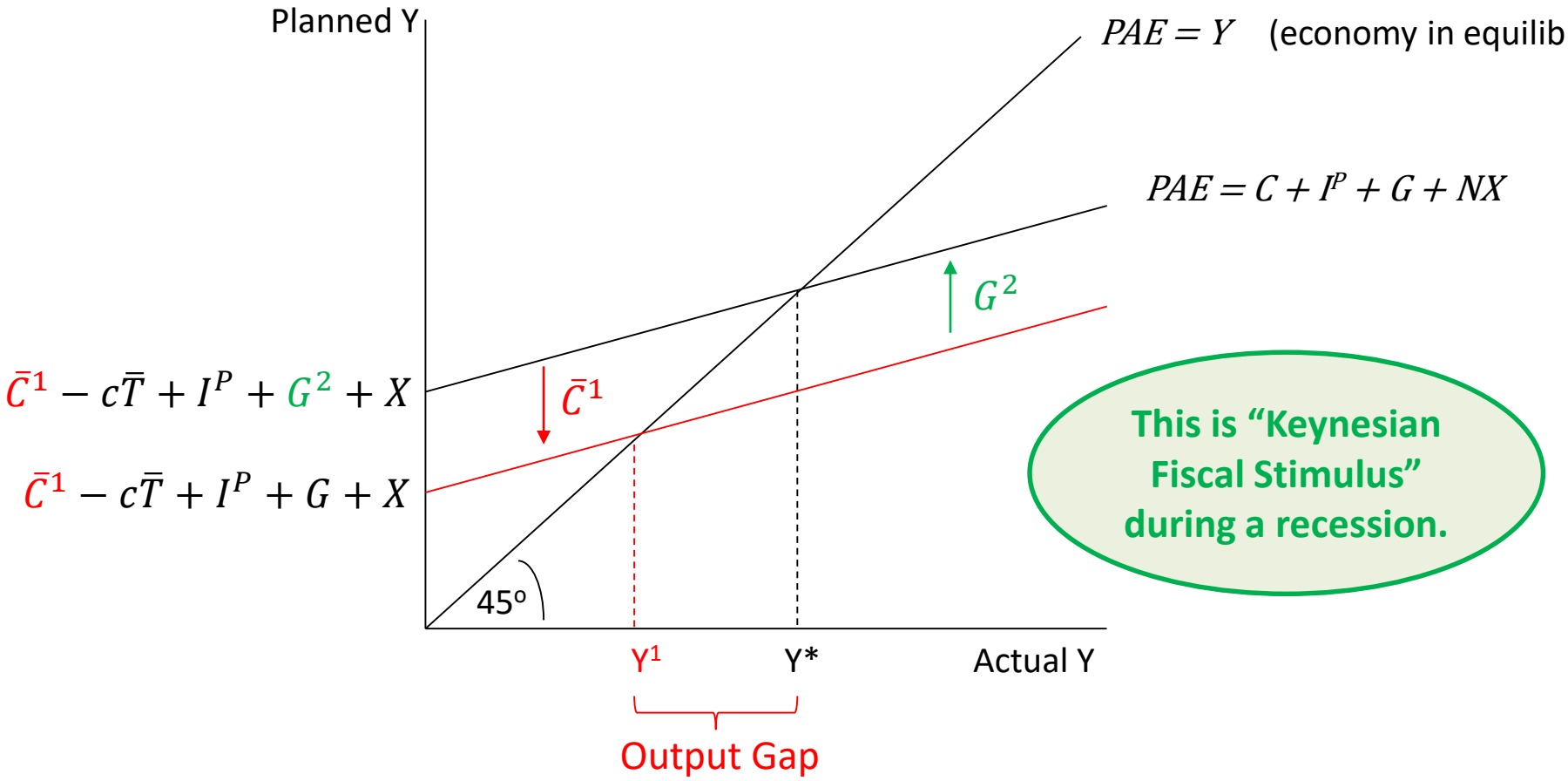
Therefore:

$$Y = \bar{C} + cY + I^P$$
$$(1\text{-c})\text{Y} = \bar{C} + I^P$$
$$\text{Y} = \underbrace{\frac{1}{(1-c)}}_{\text{Multiplier (> 1)}}(\bar{C} + I^P)$$

Illustration

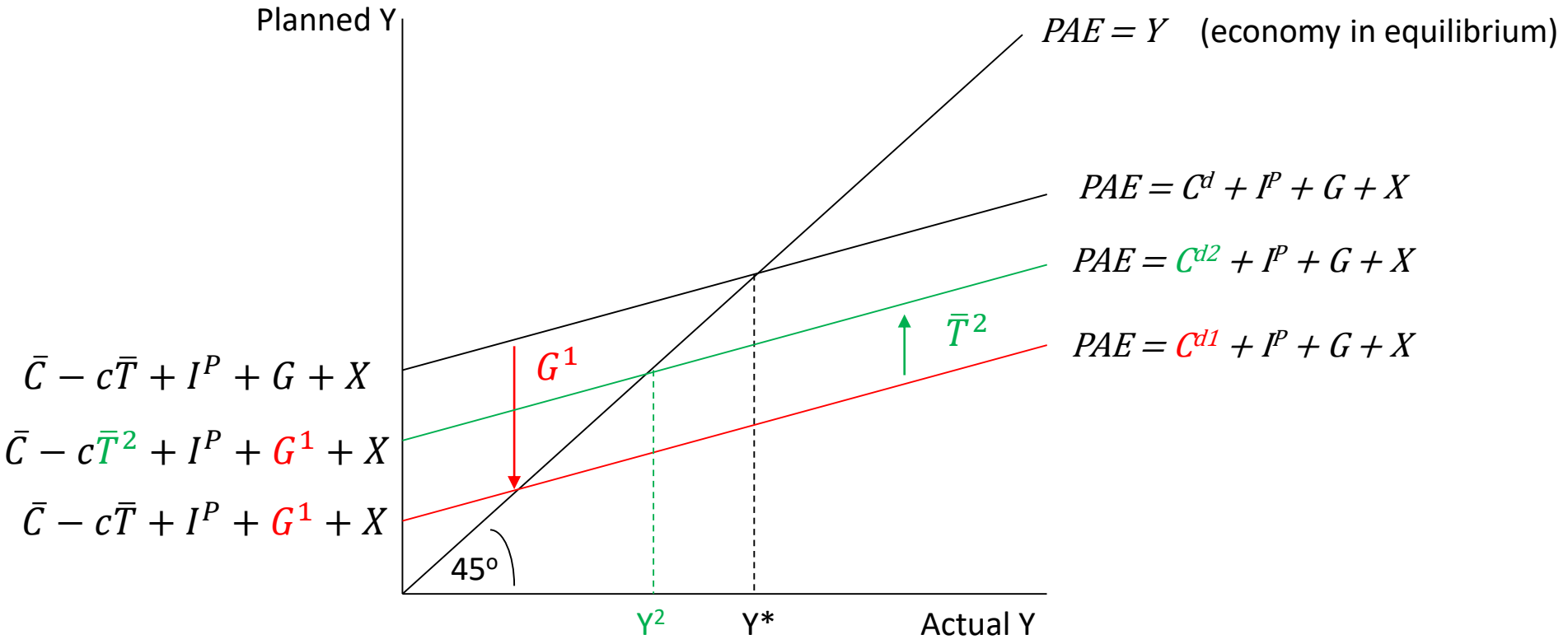


Keynesian Stimulus: The government can offset lower demand by spending more



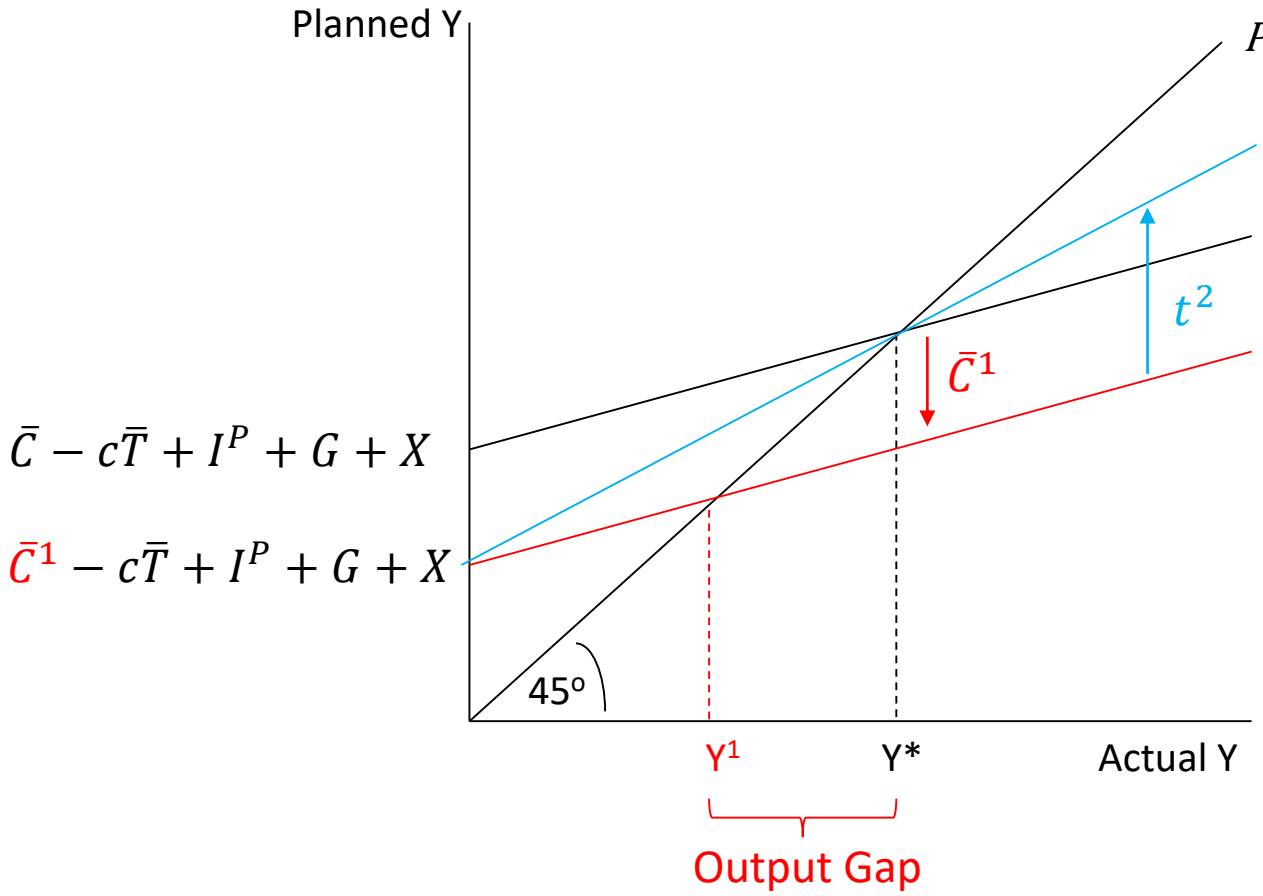
Note, government spending has a multiplier effect on total output, $(Y^* - Y^1) > G^2$

Balanced Budget Multiplier: The level of government spending can affect aggregate demand, even if the budget remains balanced



If the government cuts taxes and spending at the same time ("smaller government") aggregate demand will fall, because some of the tax cut will be saved.

Alternatively, the government can cut taxes (or increase transfers) to stimulate planned aggregate demand



$PAE = Y$ (economy in equilibrium)

$PAE = C^{d2} + I^P + G + X$

$PAE = C^d + I^P + G + X$

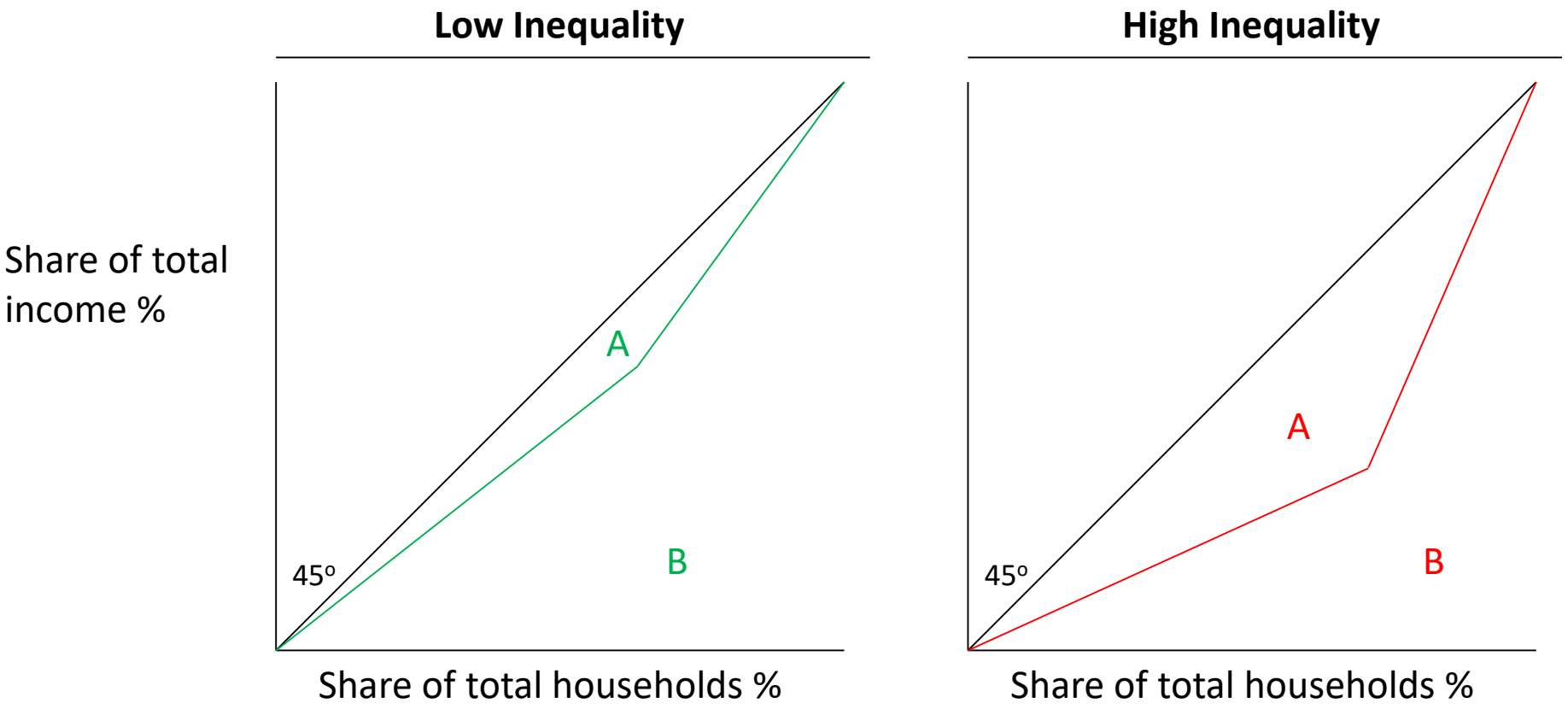
$PAE = C^{d1} + I^P + G + X$

Where:

$C^d = \bar{C} - c\bar{T} + c(1-t)Y$

Government redistribution can also reduce income inequality and boost aggregate demand

Lorenz Curves, low and high inequality



$Gini_L = A/(A+B) < Gini_H = A/(A+B)$

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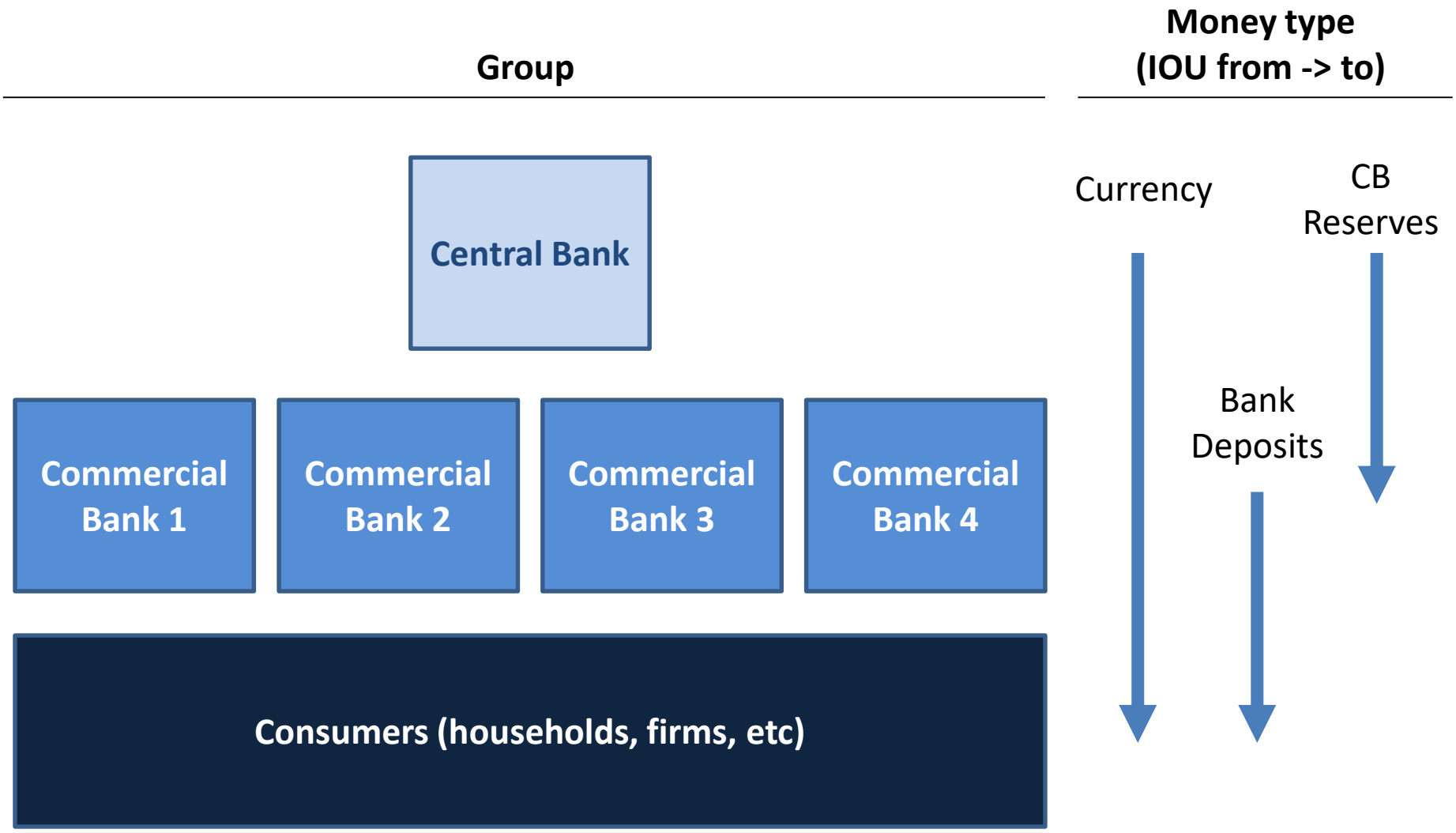
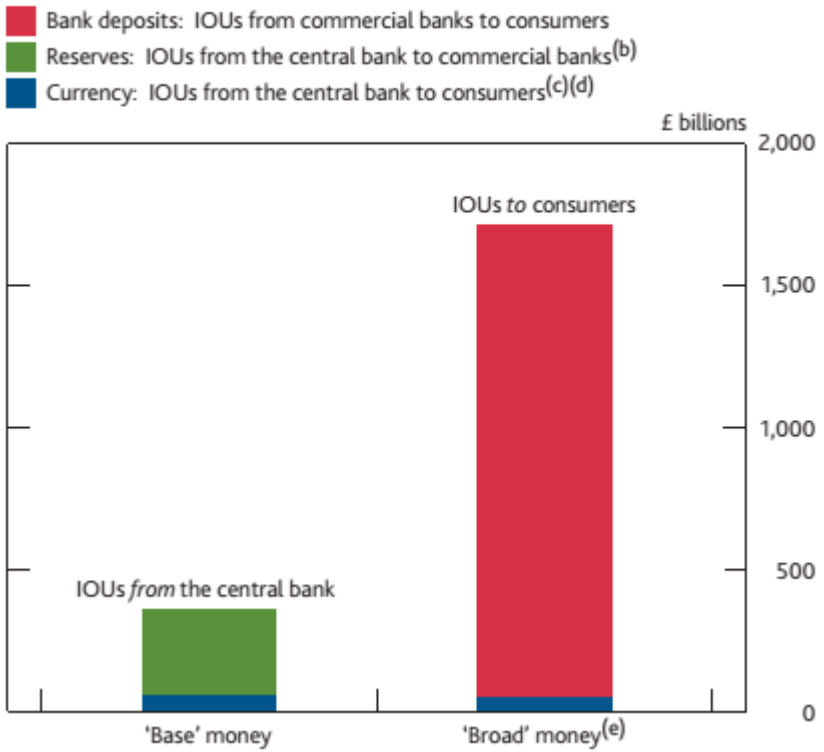
Modern money is a set of IOUs between three groups in the economy: the central bank, commercial banks and consumers.



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]

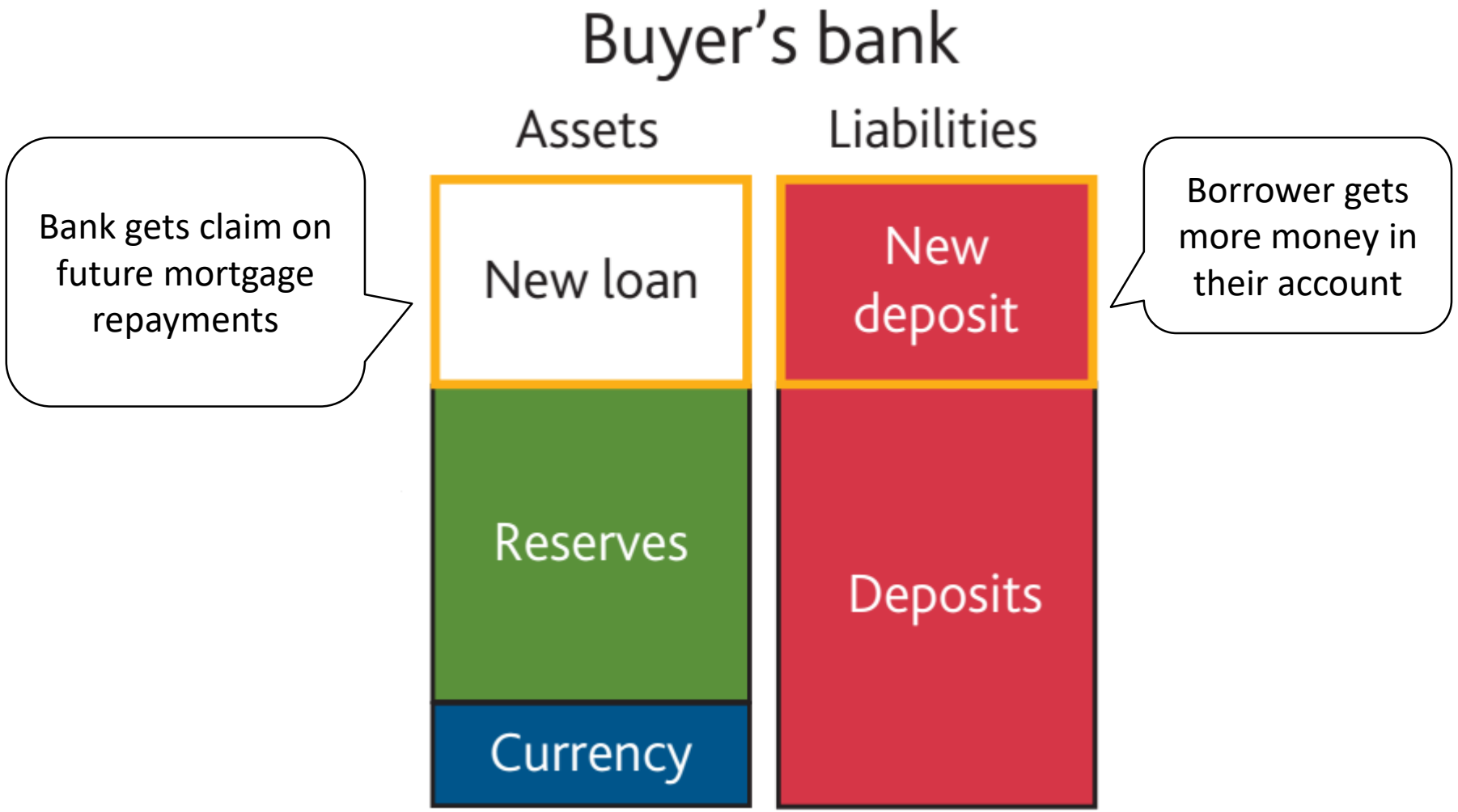


(a) All data are for December 2013.
(b) Reserves balances at the Bank of England held by banks and building societies, non seasonally adjusted. Data are measured as the monthly average of weekly data.
(c) Currency in base money includes notes and coin in circulation outside the Bank of England, including 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.

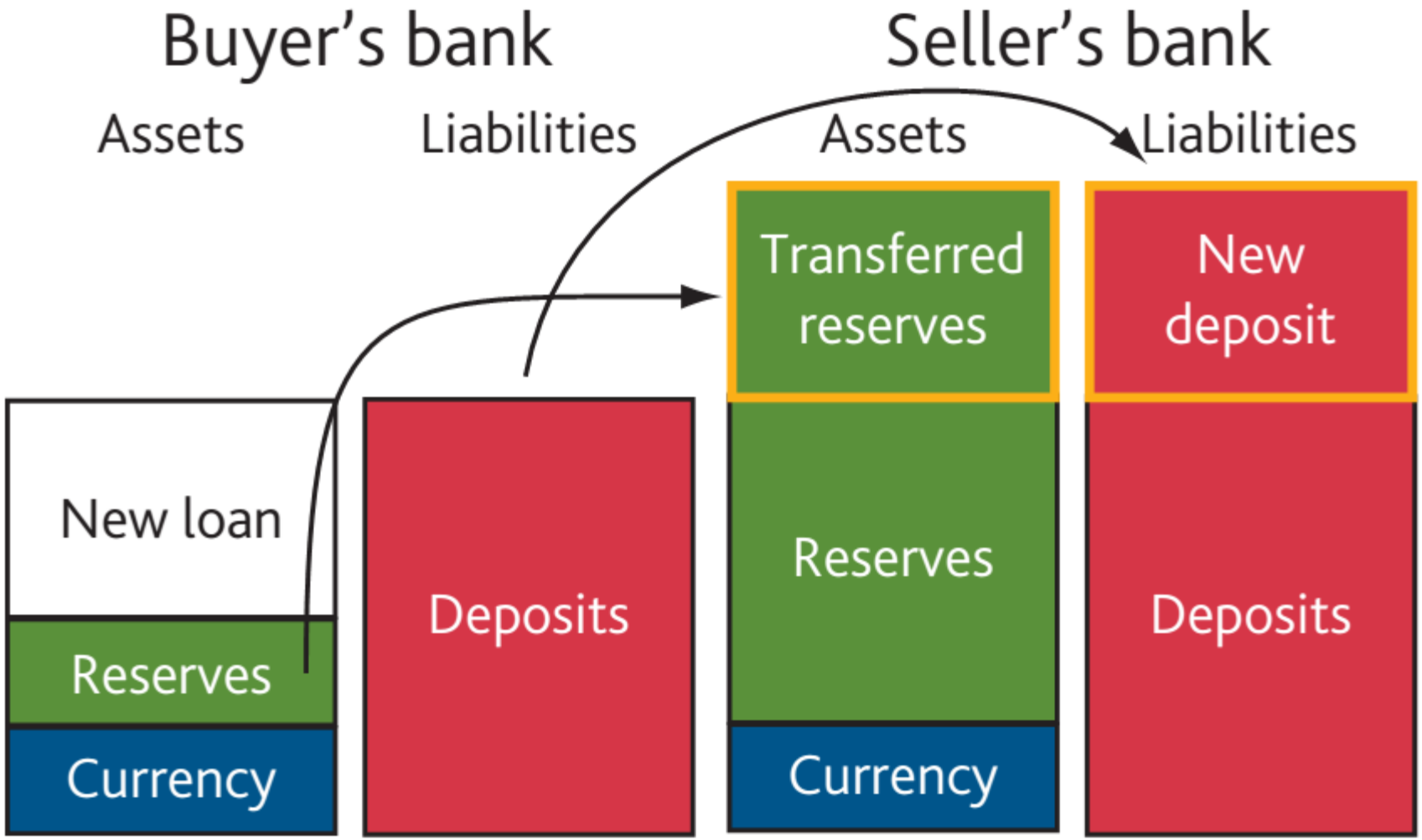
Source: McLeay, Radia and Thomas (2014), "Money in the modern economy: an introduction"

How is money created?

Answer: From thin air when banks make a new loan. This in turn 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



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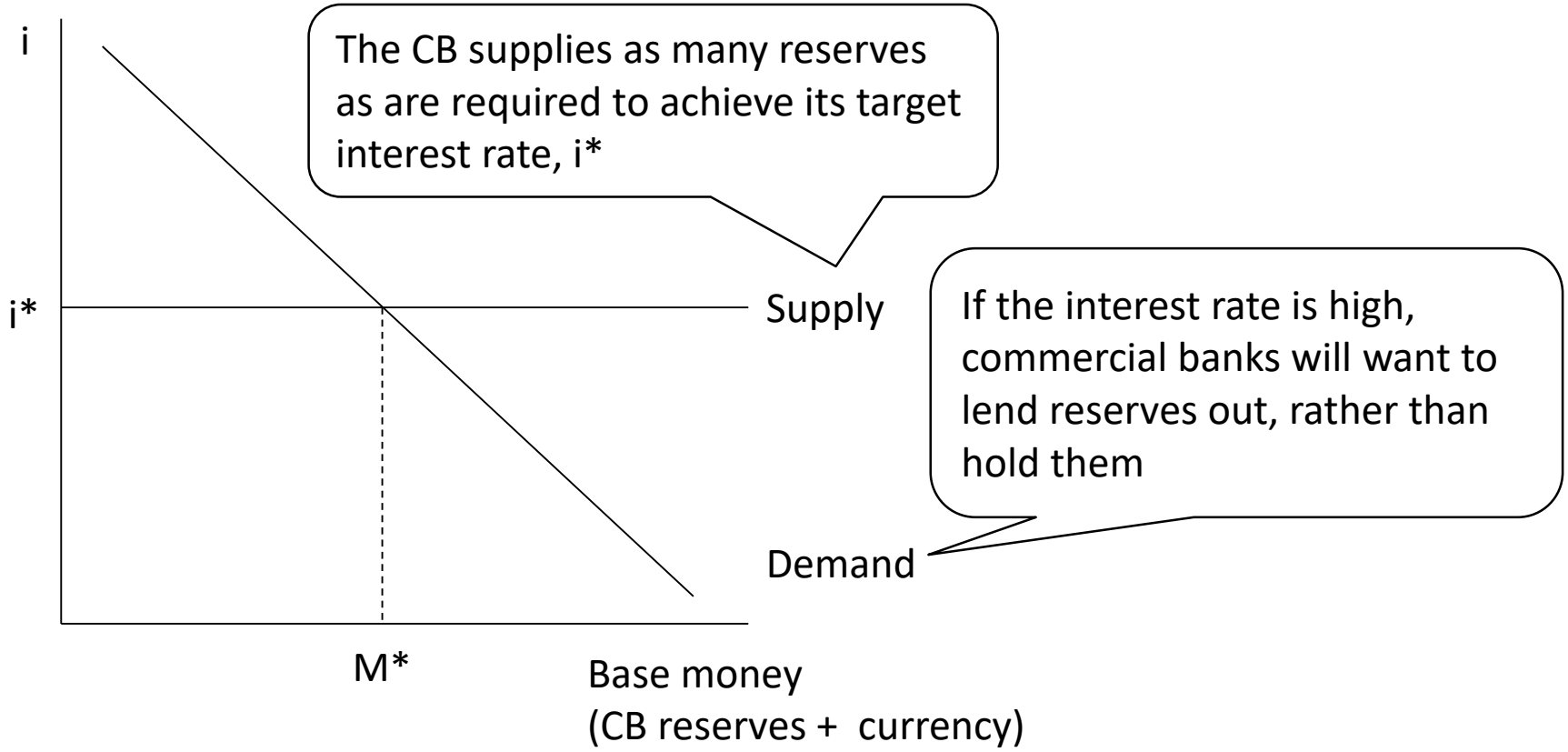
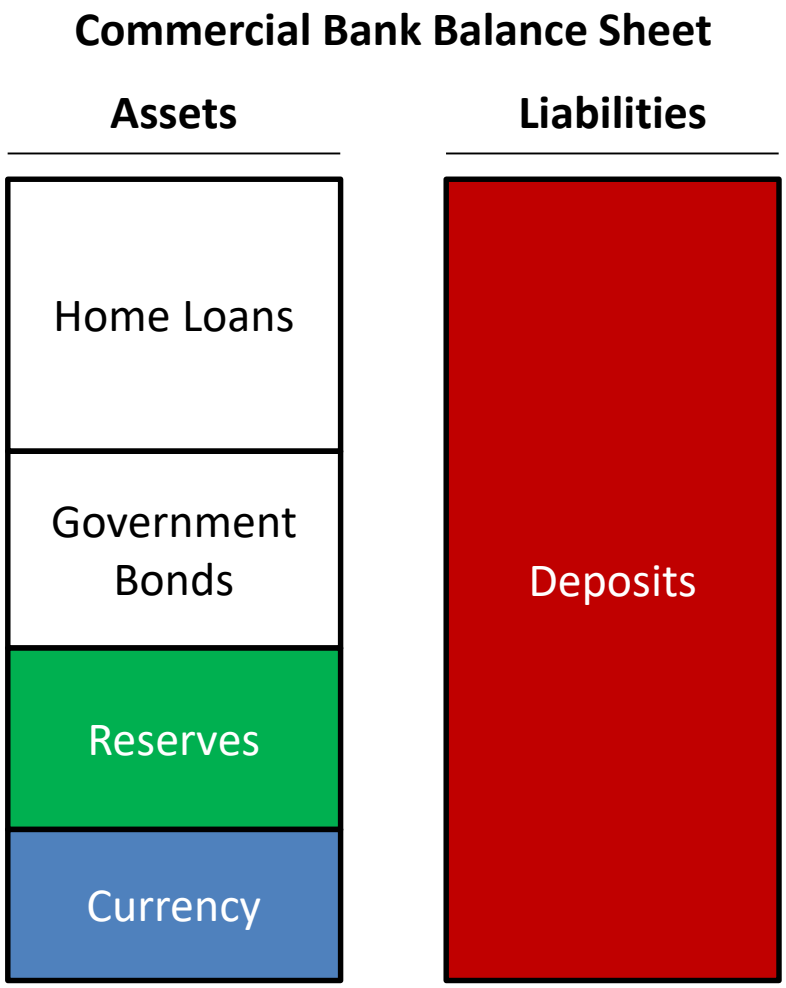
How are interest rates set?

The Central Bank sets the cash rate by announcing what it will be, and then buying/selling government bonds from banks to make it happen



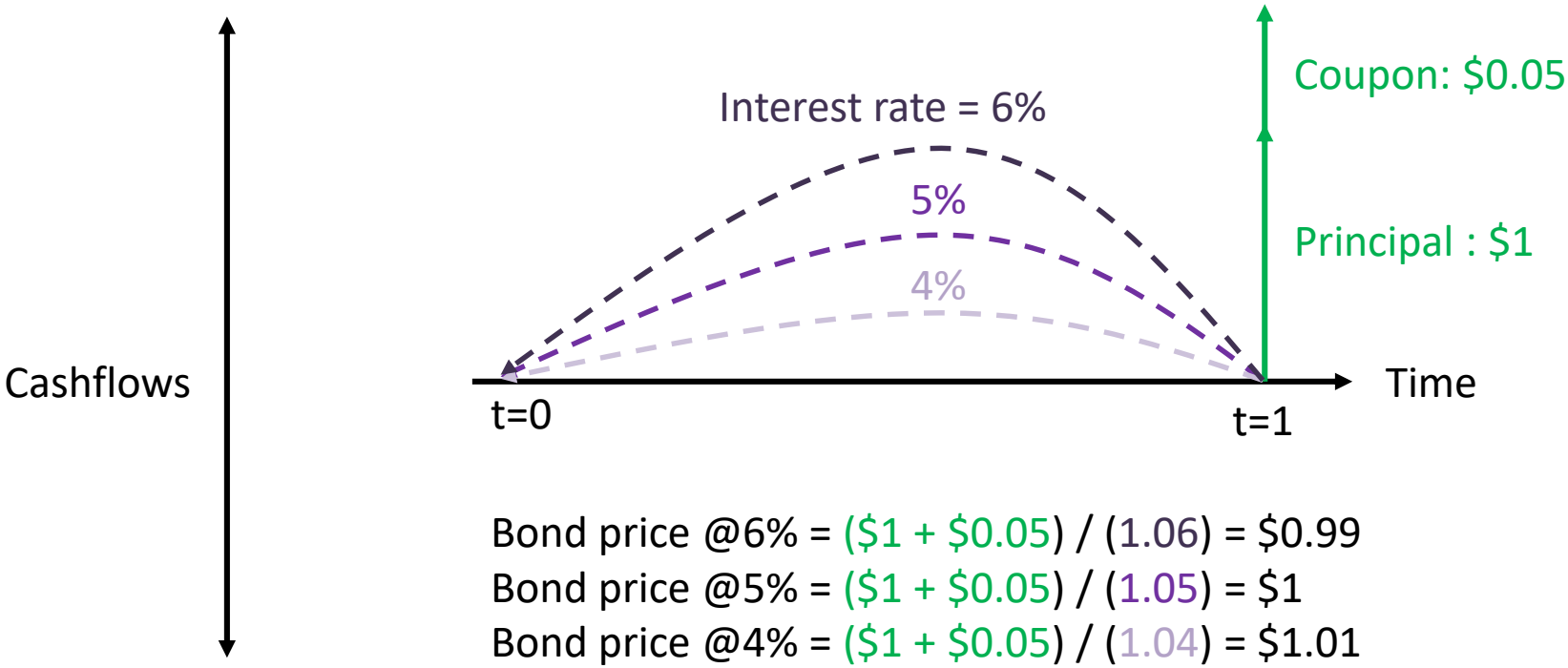
NOTE: This is different from Fig 8.3 and 8.4 in the BOF textbook, which assumes that the supply of reserves is vertical. In practice though, the Central Bank does not set the quantity of reserves. Instead, it provides as many reserves as needed to achieve its interest rate target. A horizontal supply curve is more consistent with this.

The central bank exchanges reserves for government bonds when setting monetary policy, because interest rates change the price of bonds



The price of a bond varies inversely with the interest rate

The Lender

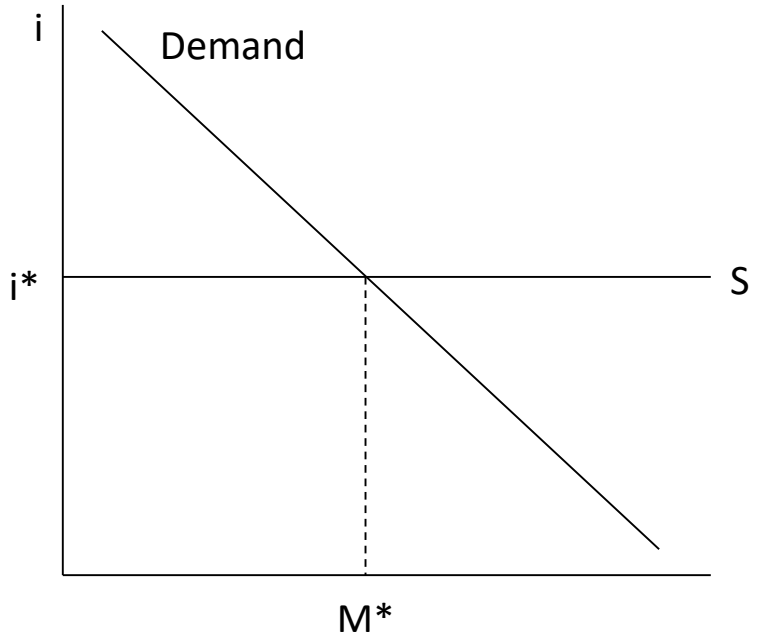


Bond price @6% = ($1 + $0.05) / (1.06) = $0.99
Bond price @5% = ($1 + $0.05) / (1.05) = $1
Bond price @4% = ($1 + $0.05) / (1.04) = $1.01

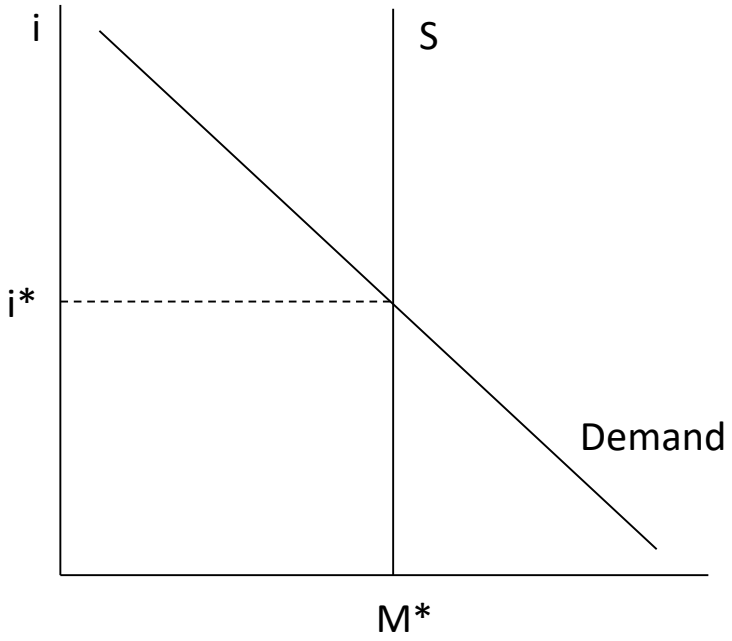
The Government

Quantitative easing is conducted by buying a set quantity of government bonds, rather than any quantity at a set price (like conventional policy)

Conventional monetary policy

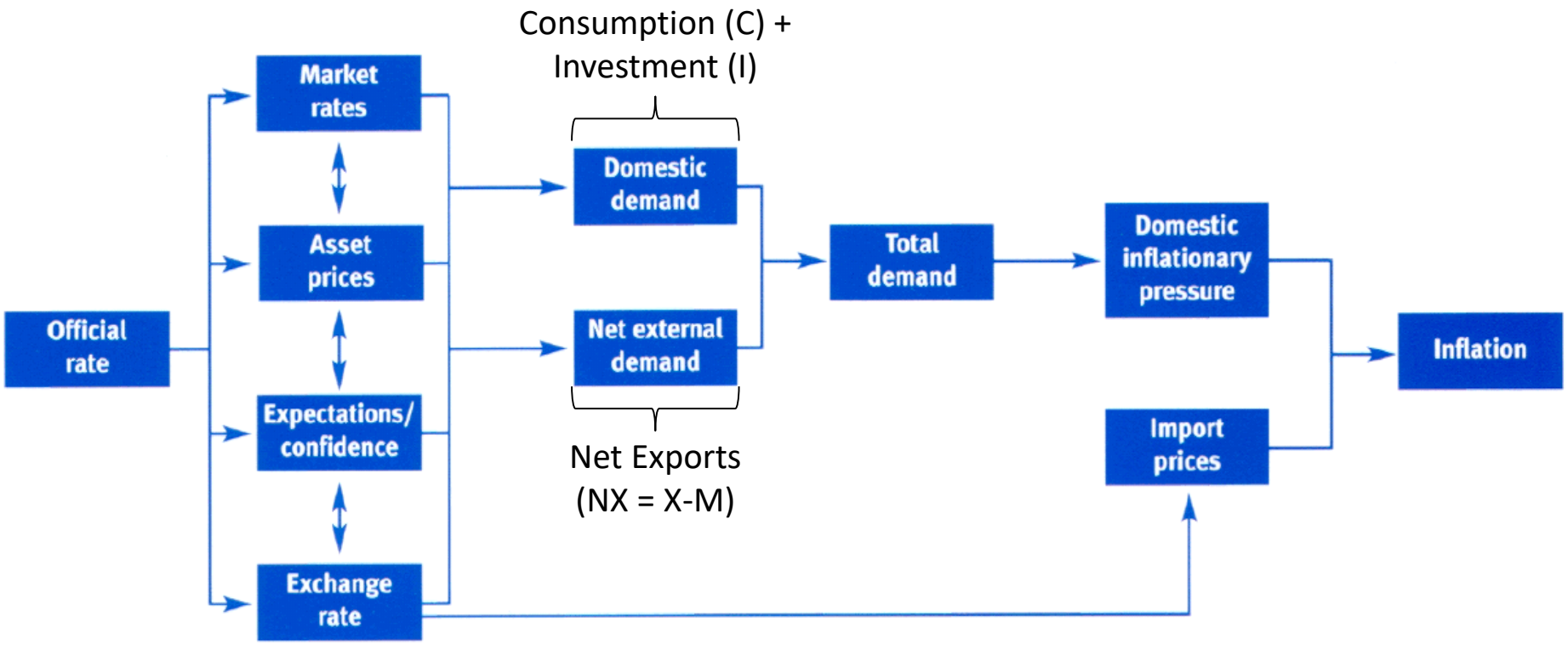


Quantitative easing



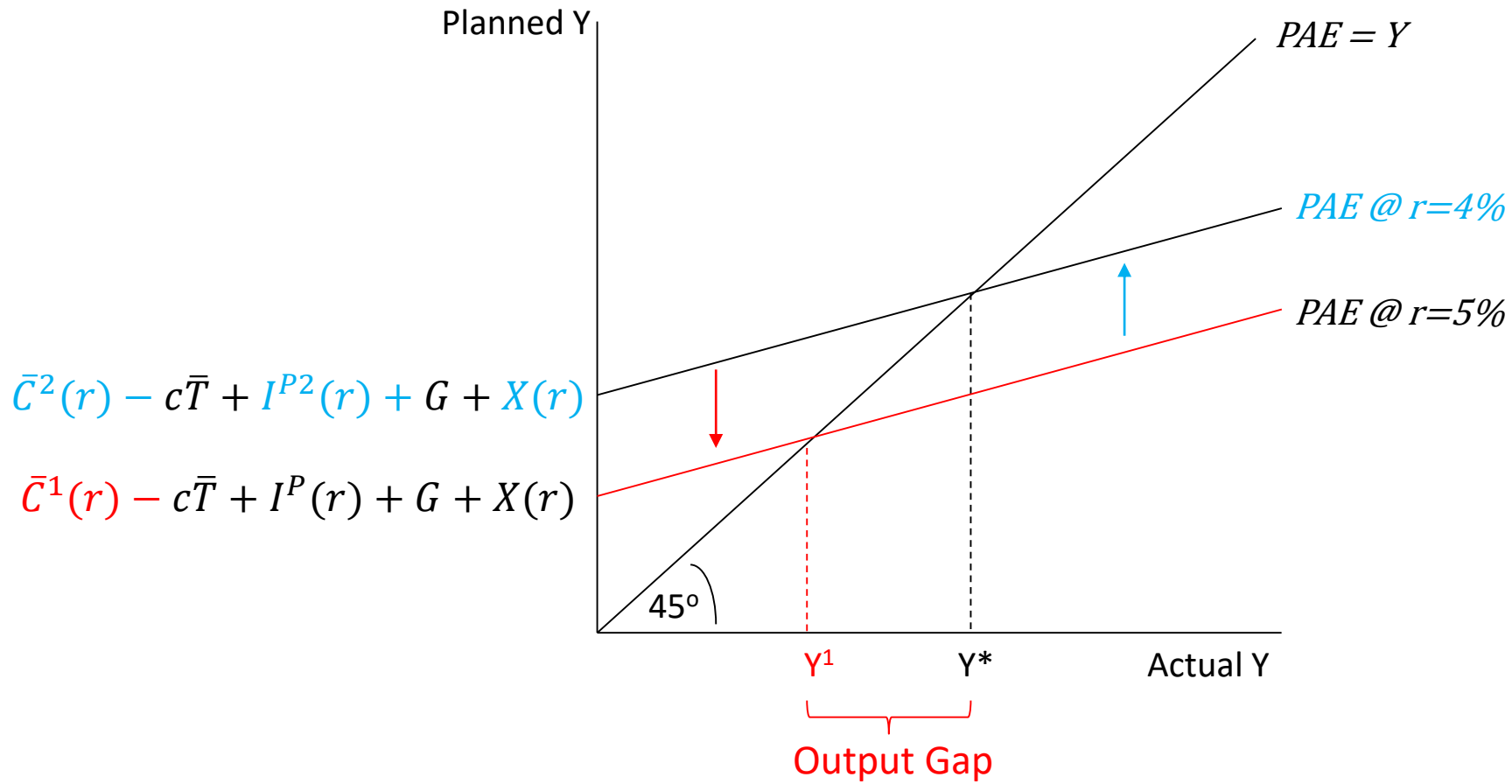
When the Central Bank changes interest rates it affects the economy through a variety of "transmission channels"

Transmission channels of monetary policy



Source: Bank of England

Together the four channels can correct a fall in aggregate demand, and be used to manage recessions



This is "Monetary Stimulus" during a recession.

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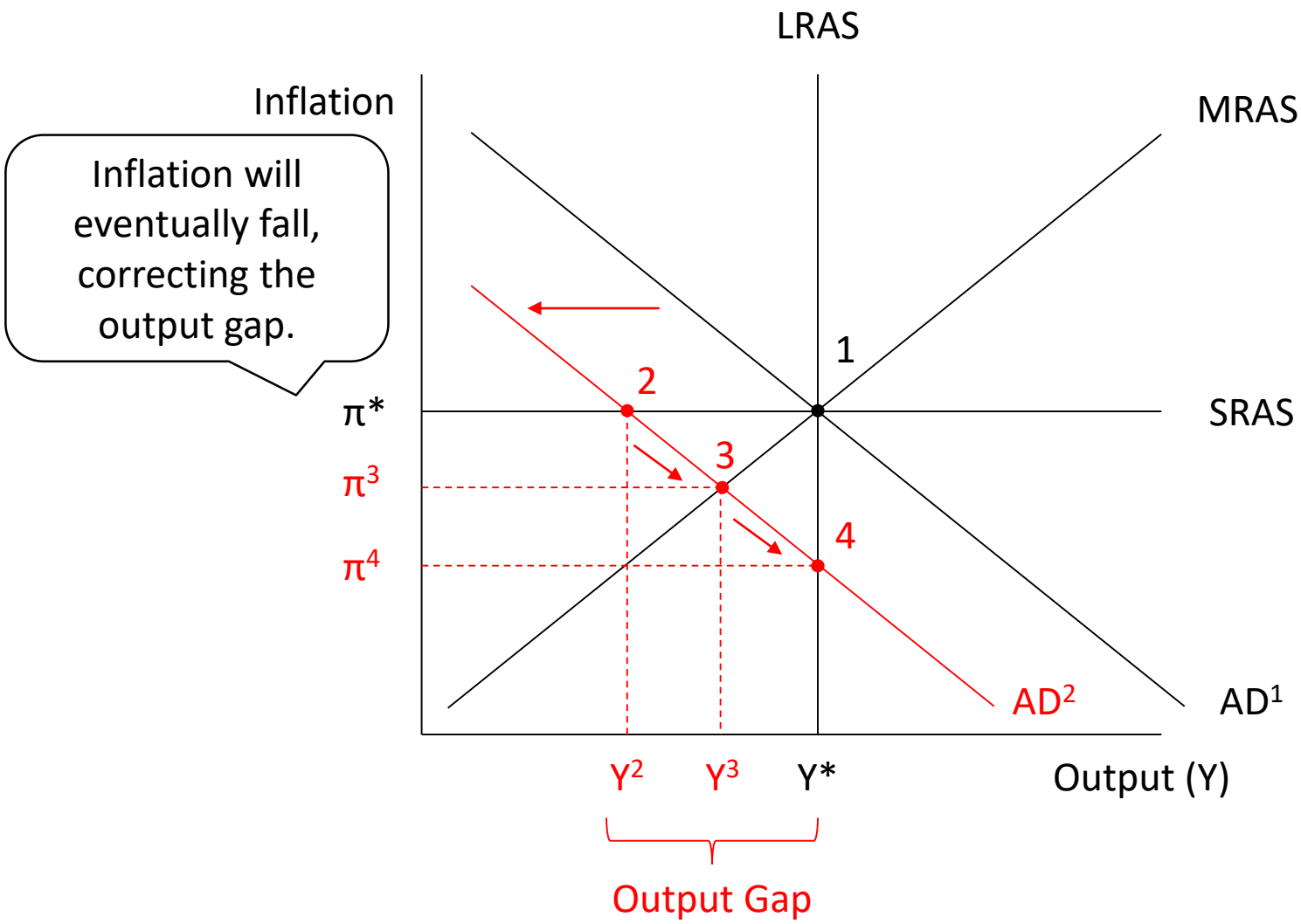
What happens if people stop wanting to go on holiday in Australia?

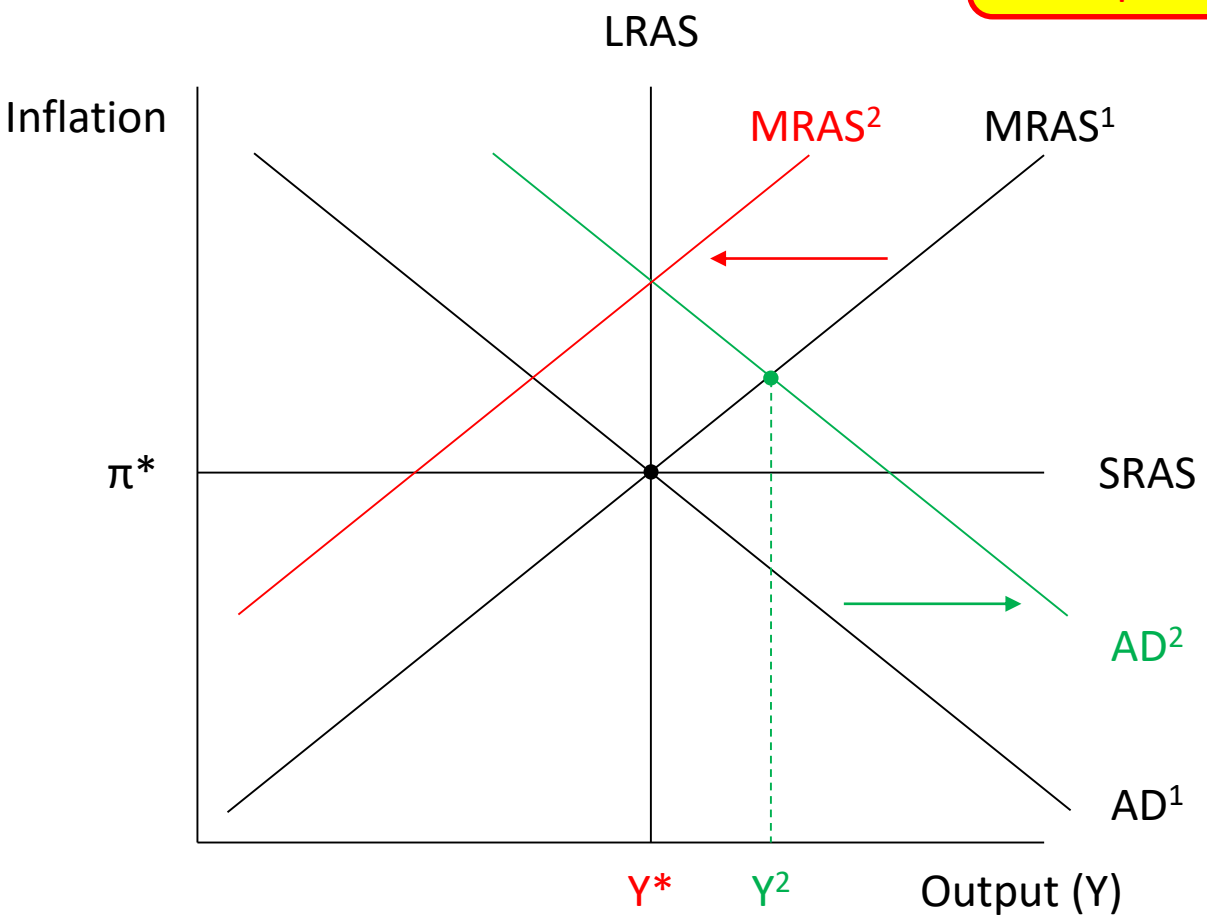
A fall in aggregate demand (PAE from the Keynesian Cross) will create an output gap, which will cause inflation to fall



What happens if there is another mining boom?

If output is above potential, inflation expectations will rise, and MRAS will self correct

LEFT OR RIGHT!
Not up or down!!



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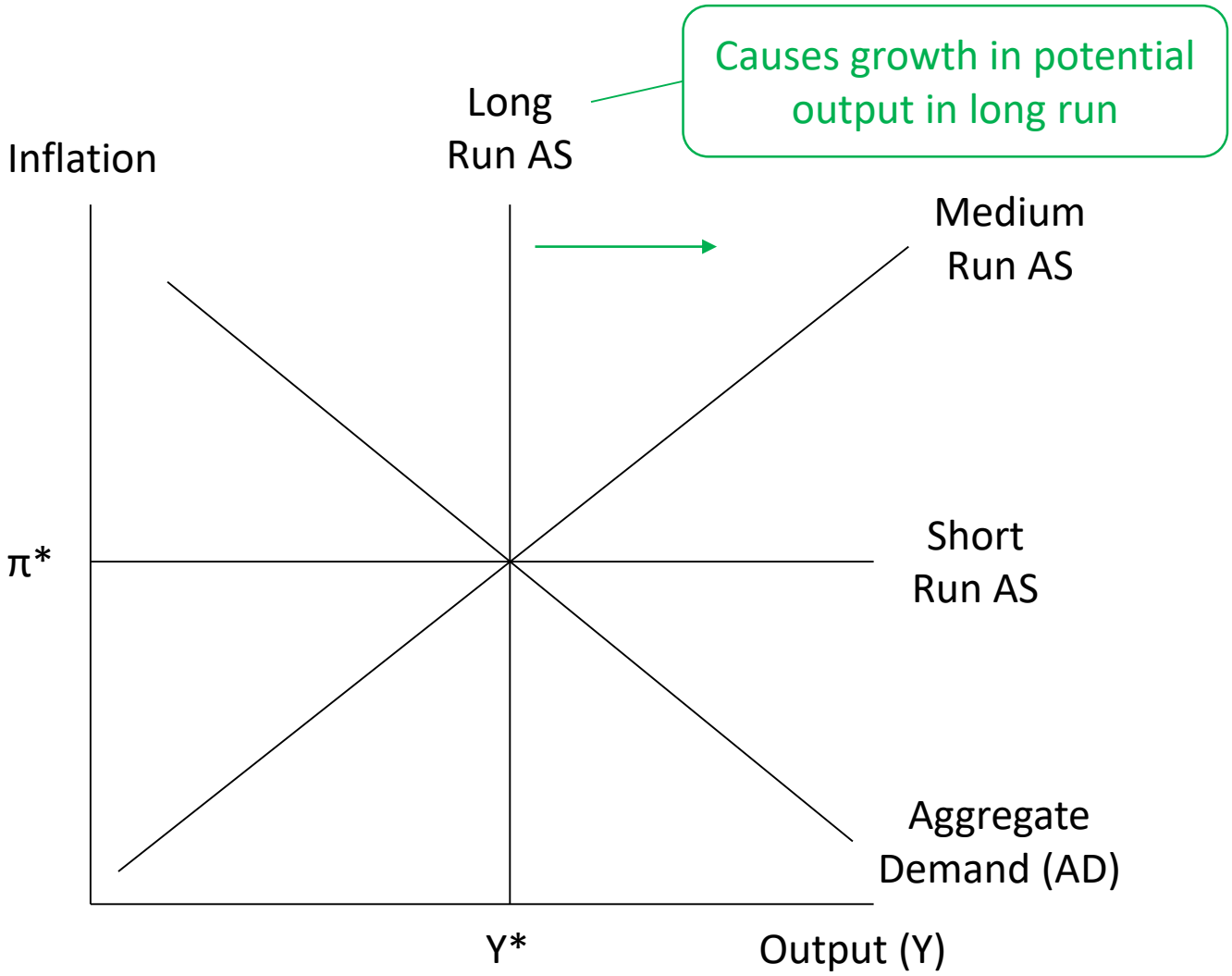
Why do economies grow?

Long run economic growth is caused by the LRAS curve shifting to the right



Growth happens by increasing labour, land, capital and technology

Factor of production		Policies
1. Labour		• Baby bonuses/one child policies/Immigration • Healthcare, Higher retirement ages • Women's empowerment
2. Land		• Colonialism/war • Trade
3. Capital		• Saving current production, or borrowing (tradeoffs)
	i. Physical	• Interest rates, public infrastructure, etc.
	ii. Human	• Education and training
4. Technology	i. Inventions	• Public R&D – basic science, tax incentives
	ii. Institutions	• Separation of powers, checks and balances
	iii. Management	• Tax incentives, low tariffs (import competition)

How much should you pay the farmer?

We can represent these factors in a production function, which lets us study useful things like their "marginal product"

Cobb-Douglas Production Function

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

Marginal Product of Labour

$$MP_L = \frac{\partial Y}{\partial L} = (1-\alpha) A_t K_t^{\alpha} L^{1-\alpha-1} = \frac{(1-\alpha) A_t K_t^{\alpha} L^{1-\alpha}}{L_t} = (1-\alpha)\frac{Y_t}{L_t}$$

The wage equals the marginal product of Labour (similar with capital)

$$\Pi_t = PY_t - rK_t - wL_t$$

Maximise profit

$$\frac{\partial \Pi_t}{\partial L_t} = P\frac{\partial Y_t}{\partial L_t} - 0 - w = 0$$

$$MP_L = {}^{w}/_{P}$$

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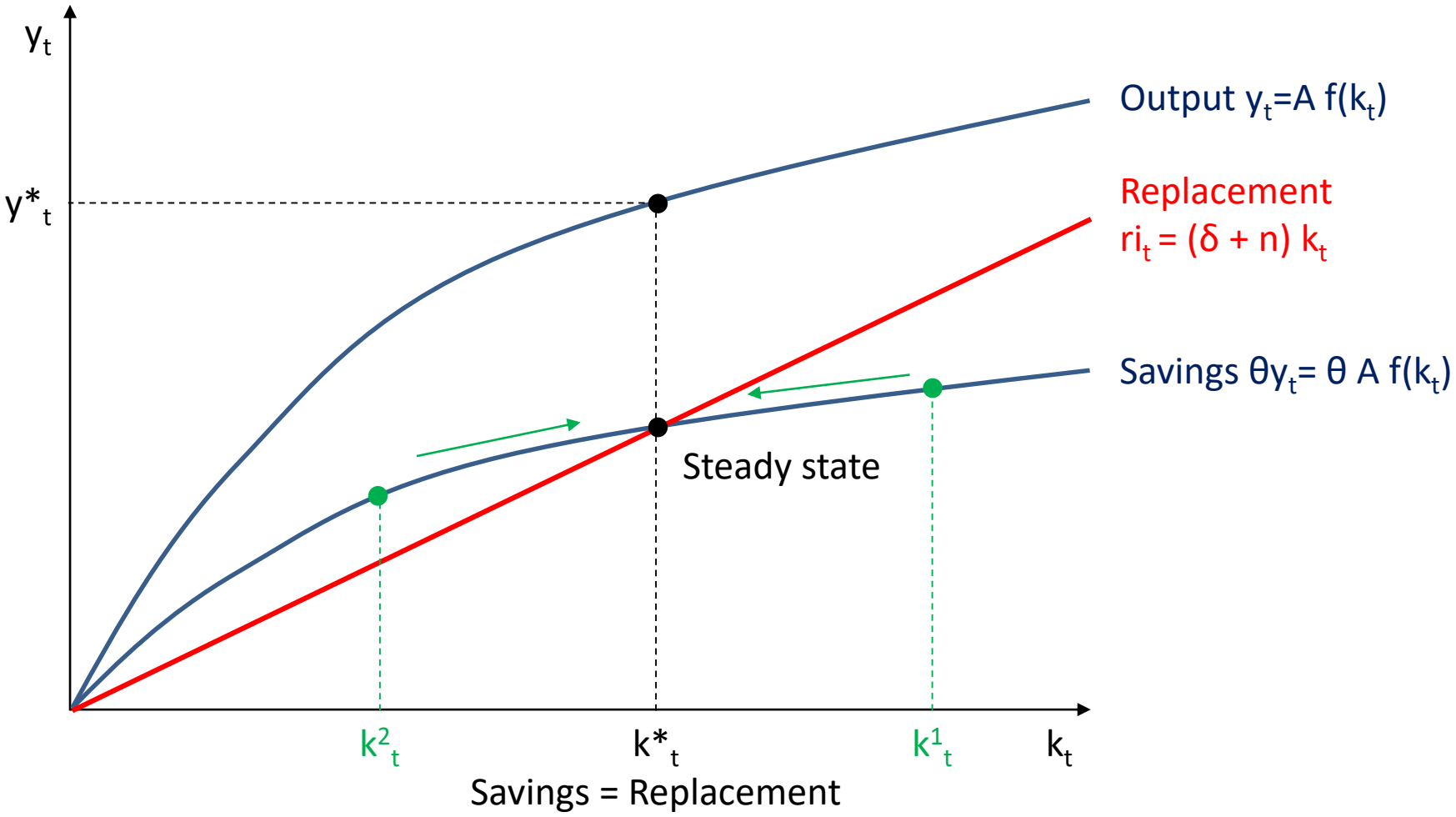
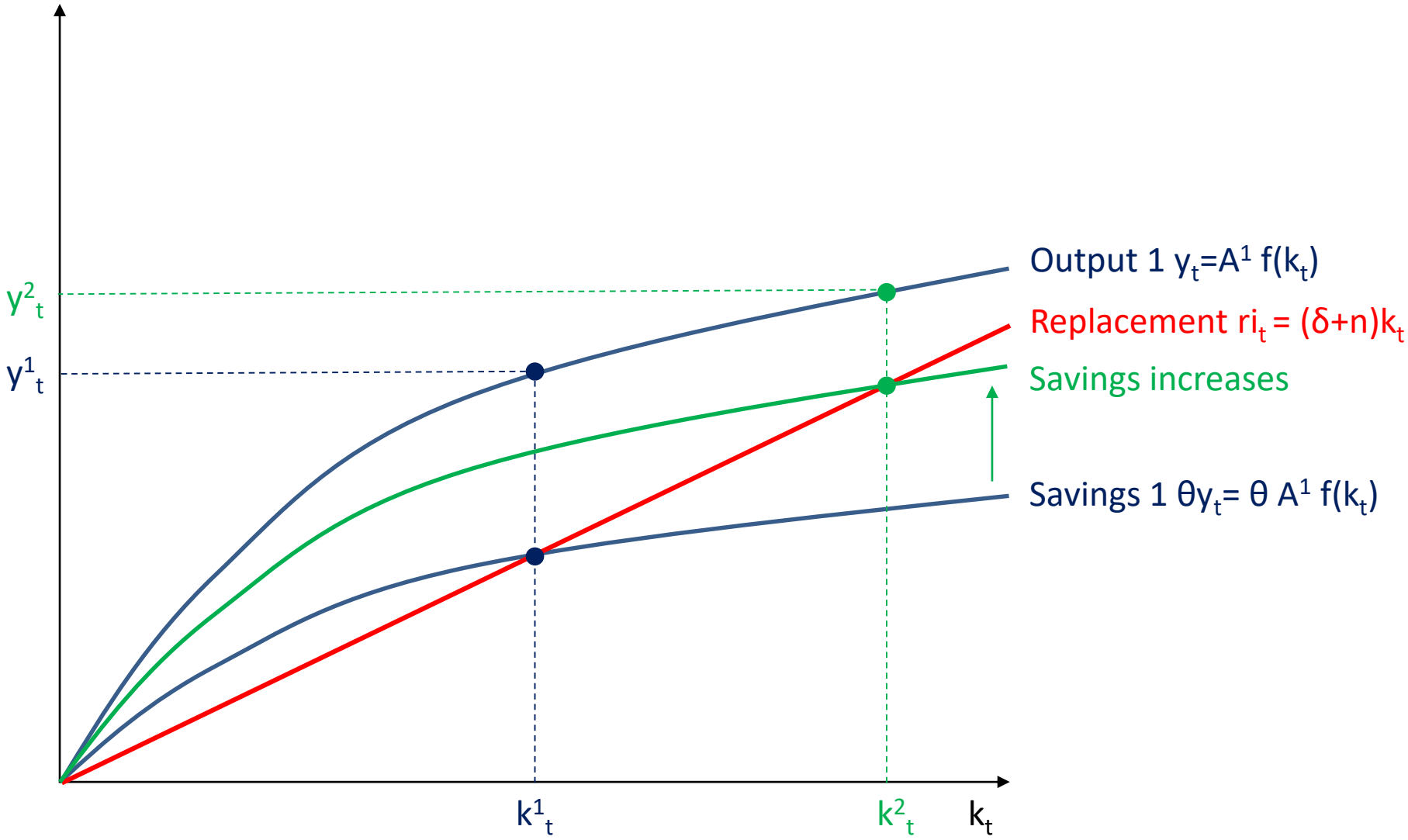
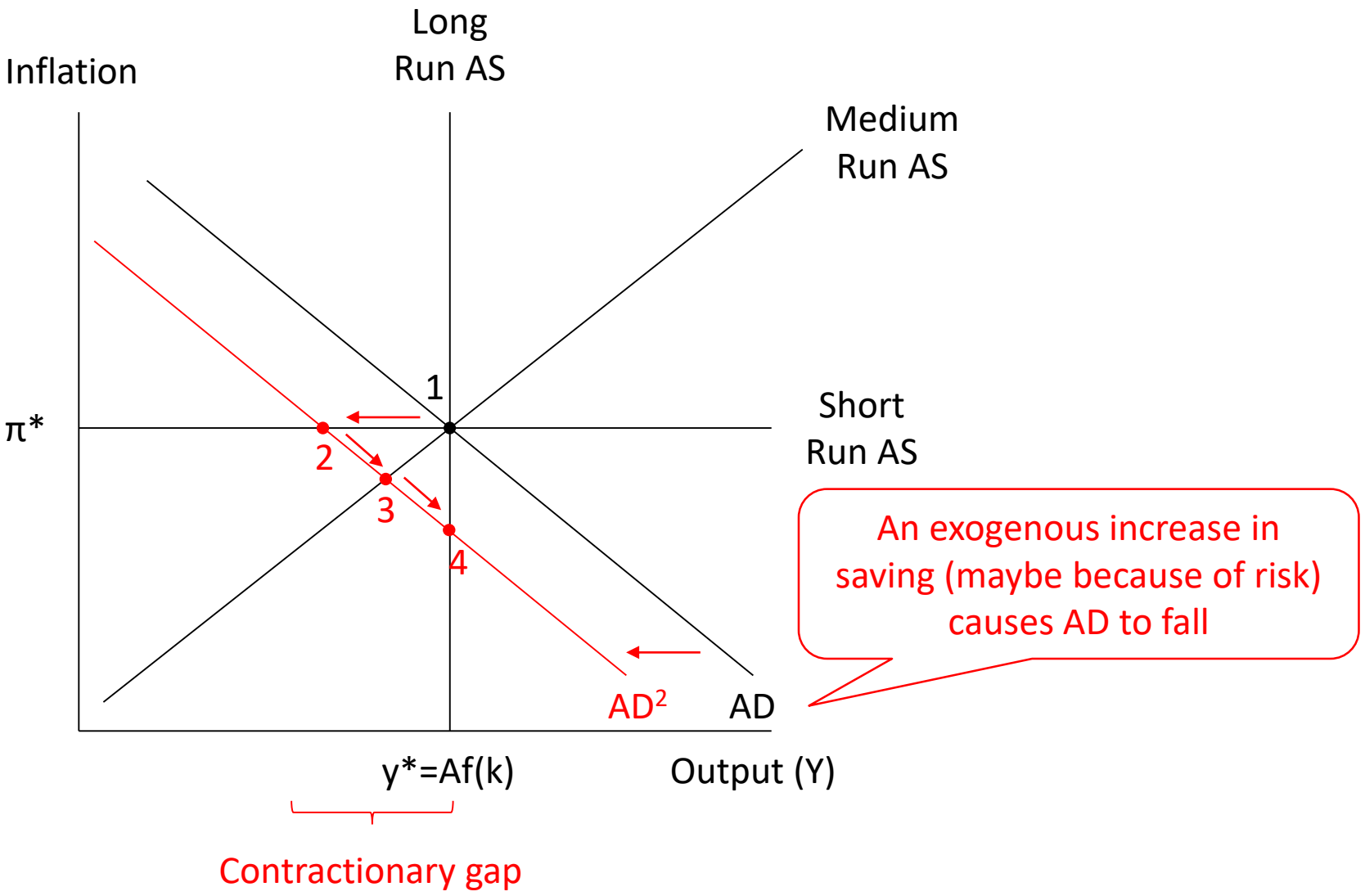
The Solow-Swan diagram illustrates how savings affects GDP. If savings > replacement then the economy grows



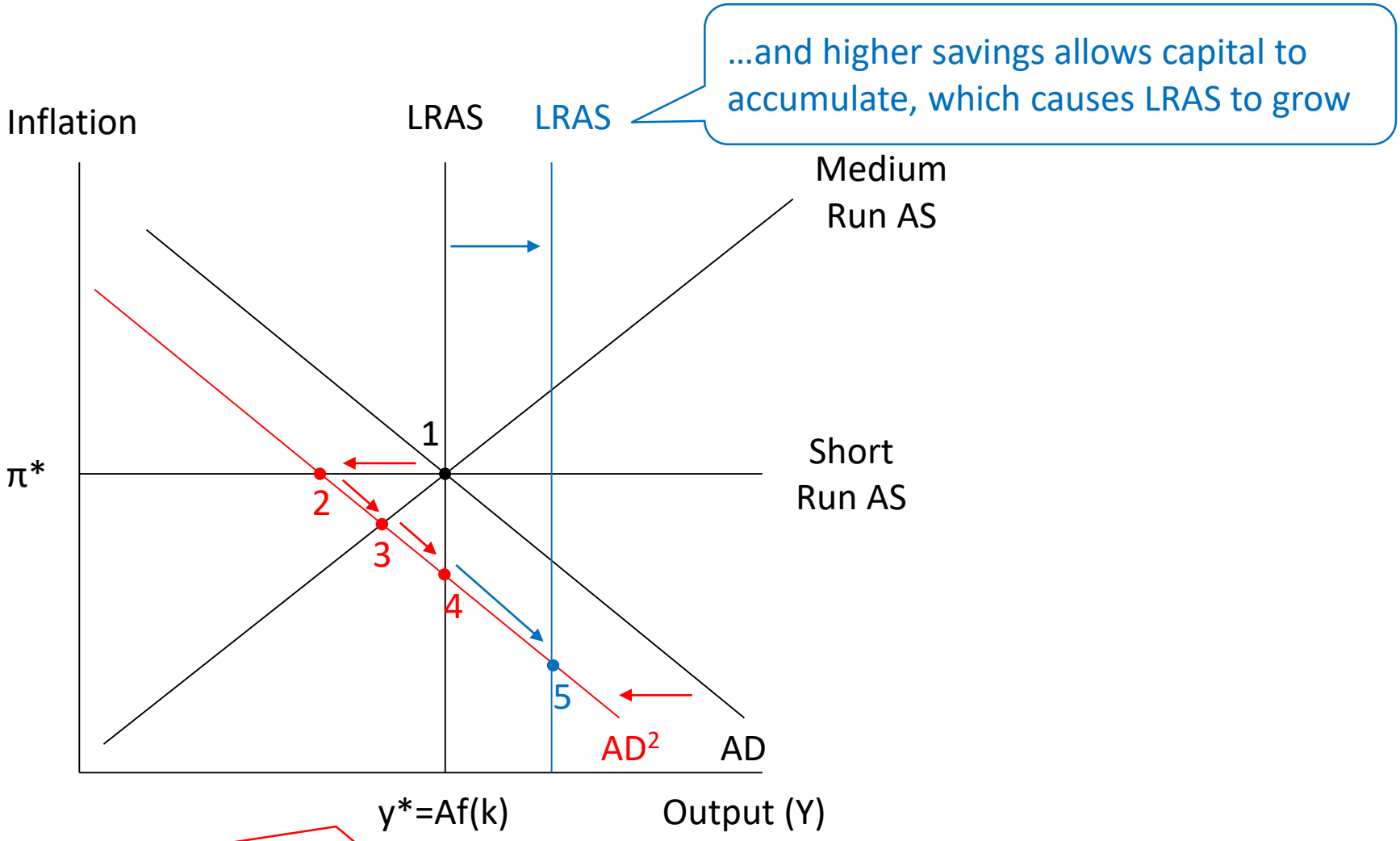
The Solow-Swan model says that high savings increases steady state output. This contradicts the “paradox of thrift”.



The difference is that the Paradox of Thrift refers to the short run, when supply is determined by demand…



The Solow-Swan refers to the long run, when supply is determined by capital, technology, etc



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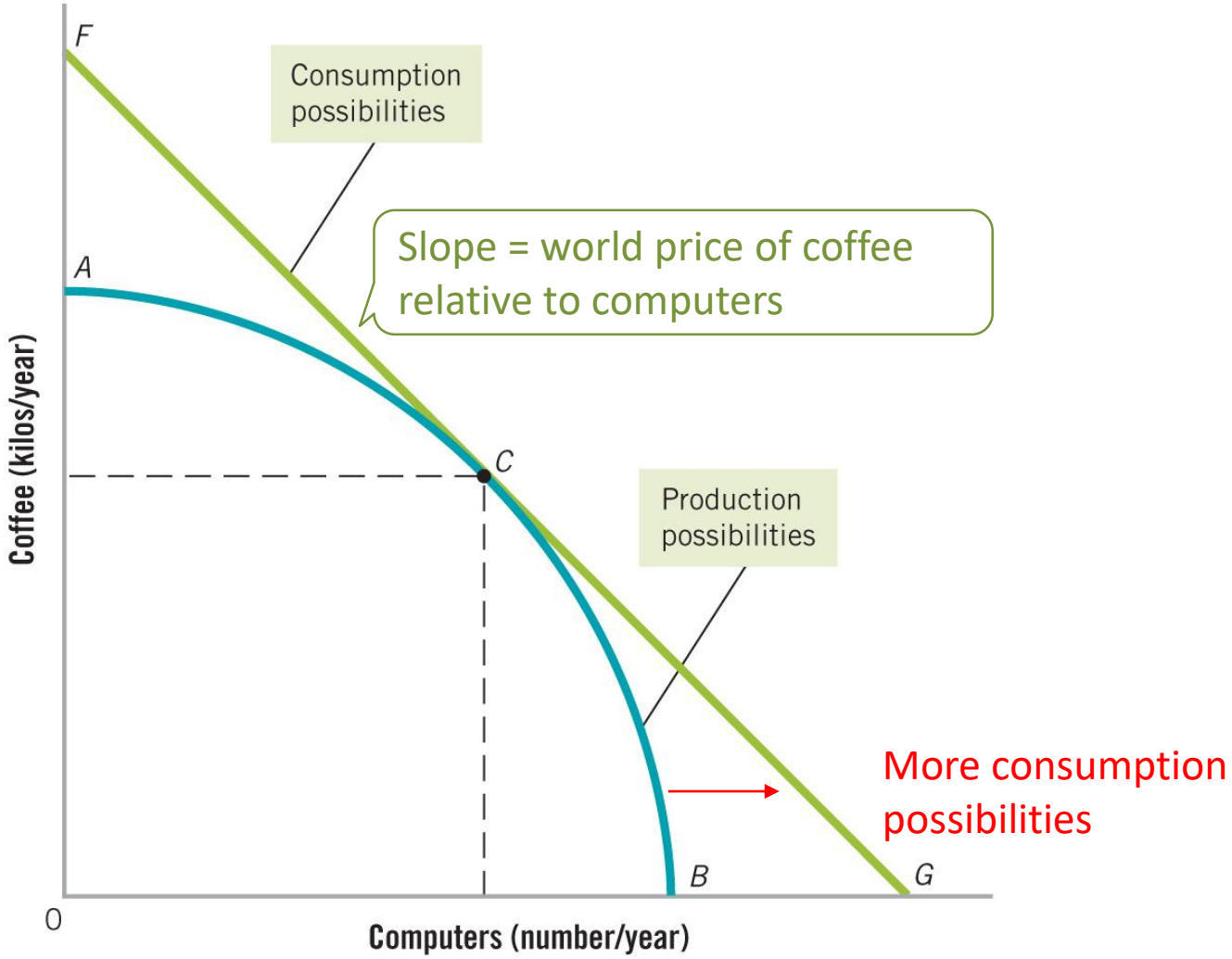
Is free trade good or bad?

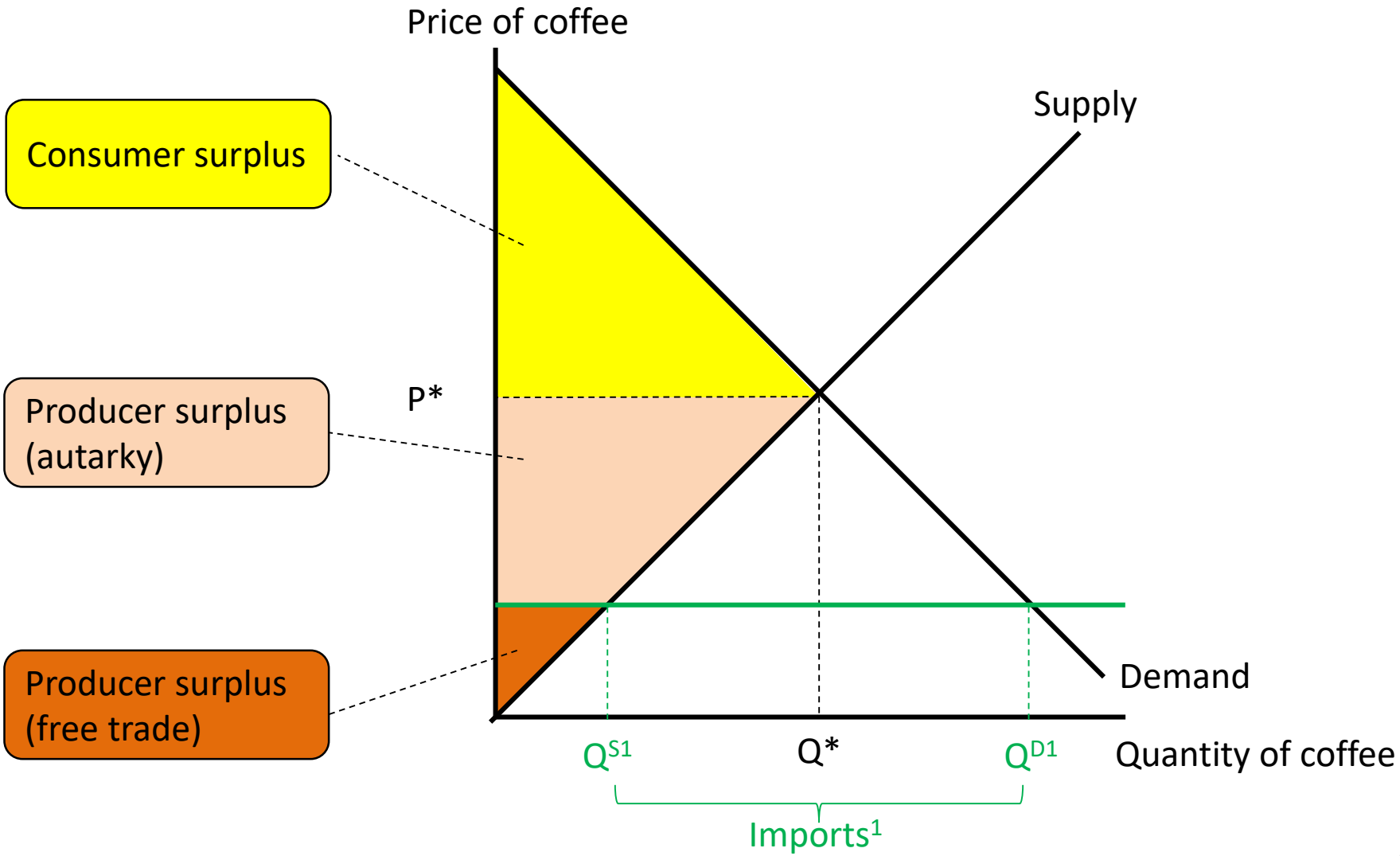
Free trade increases the number of consumption possibilities

Production and Consumption Possibilities Curves, with trade



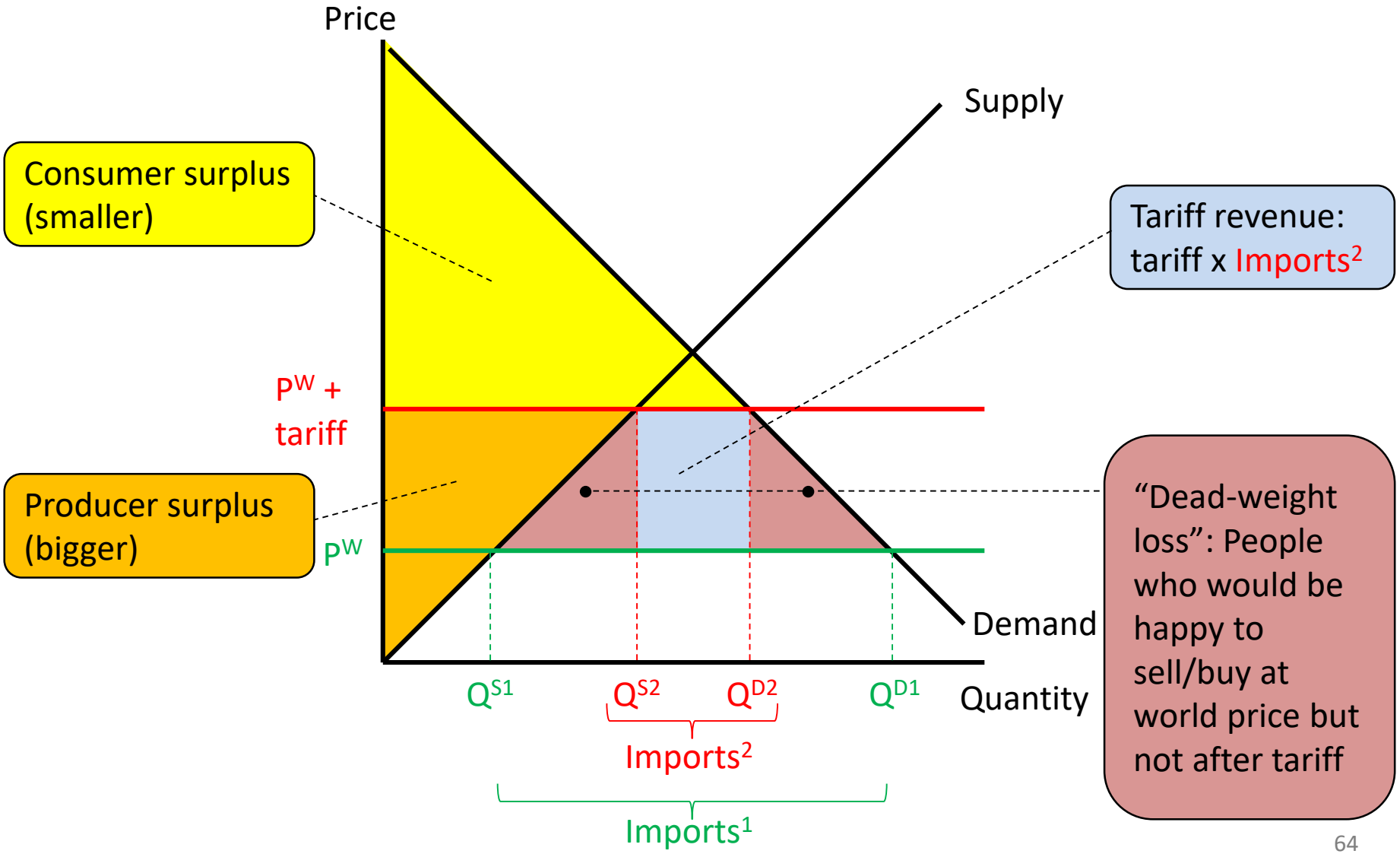
Surplus describes how "happy" people are buying/selling at the market price, relative to their reservation price

Supply and demand for cars in the USA



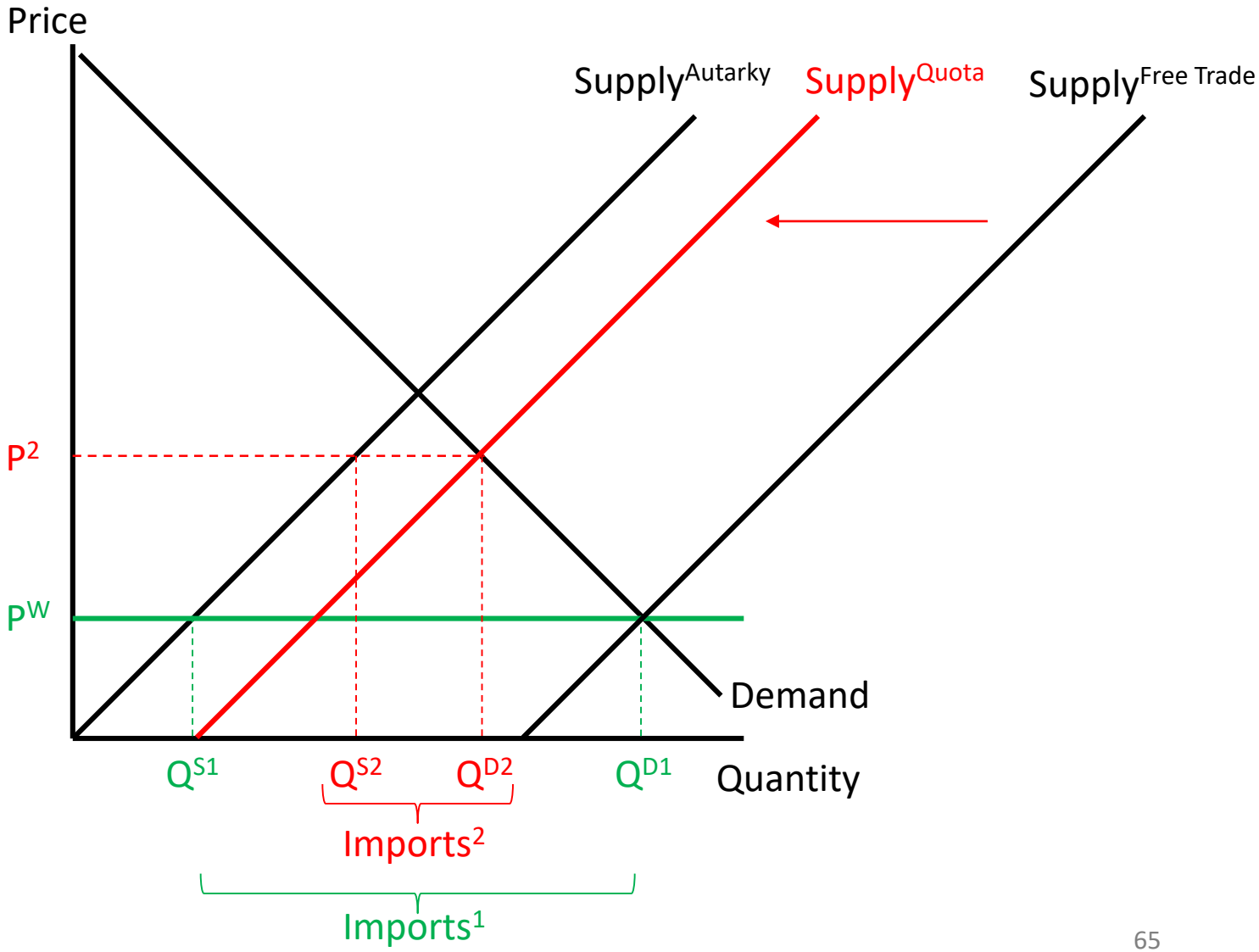
Tariffs reduce consumer surplus, increase producer surplus, raise gov't revenue and create a "deadweight loss"

Supply and demand for cars in the USA



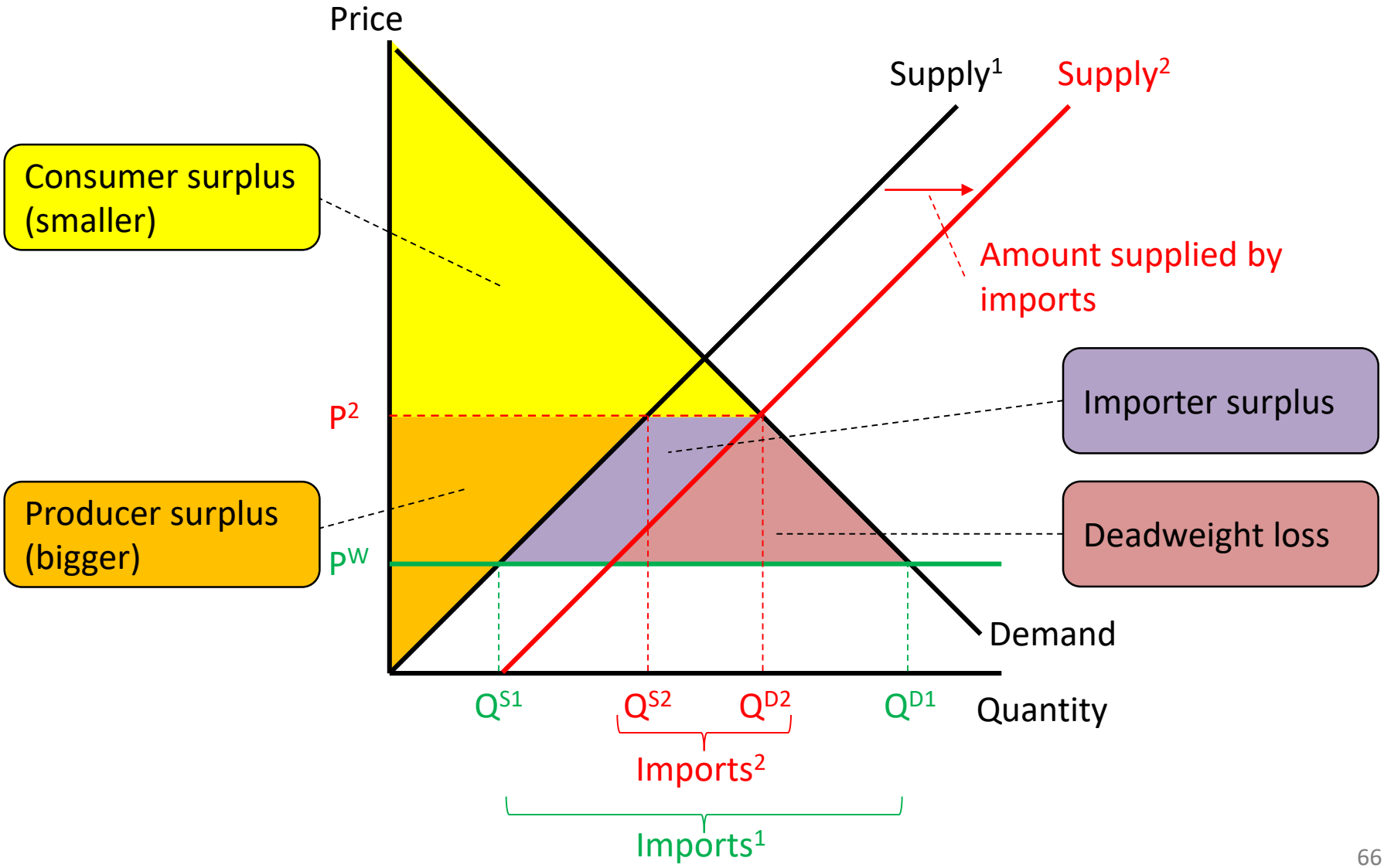
An import quota increases supply relative to autarky, but decreases supply relative to free trade

Supply and demand for grain in China



Quotas also create a deadweight loss

Supply and demand for grain in China



The real exchange rate is the ratio of the domestic price level to the foreign price level converted to domestic dollars.

Real Exchange Rate *Domestic price level*

$$RER = \frac{P}{P^f/e}$$

Foreign price level

Nominal exchange rate (Foreign/Domestic)

When the RER is high, domestic goods are more expensive

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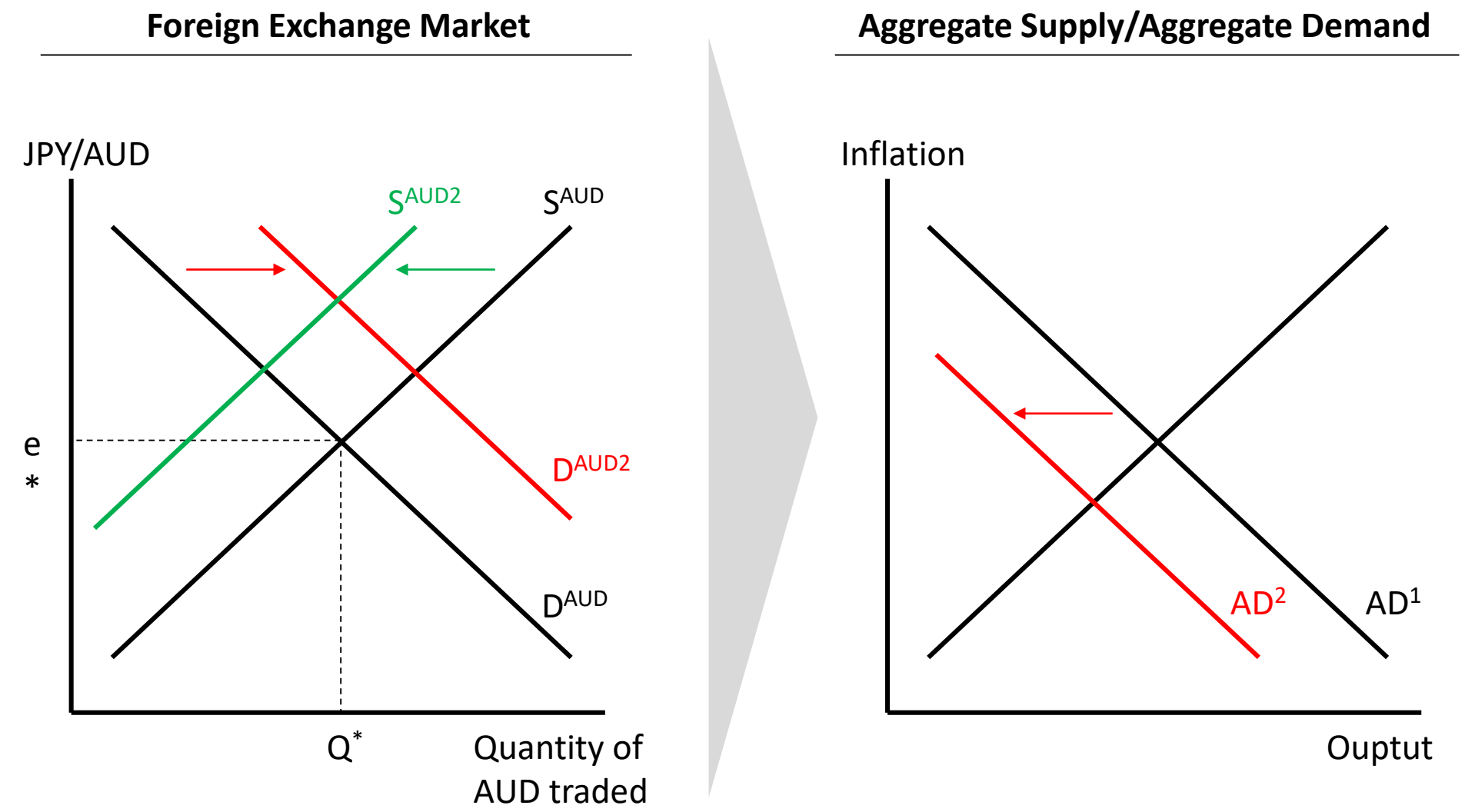
What causes exchange rates to move?

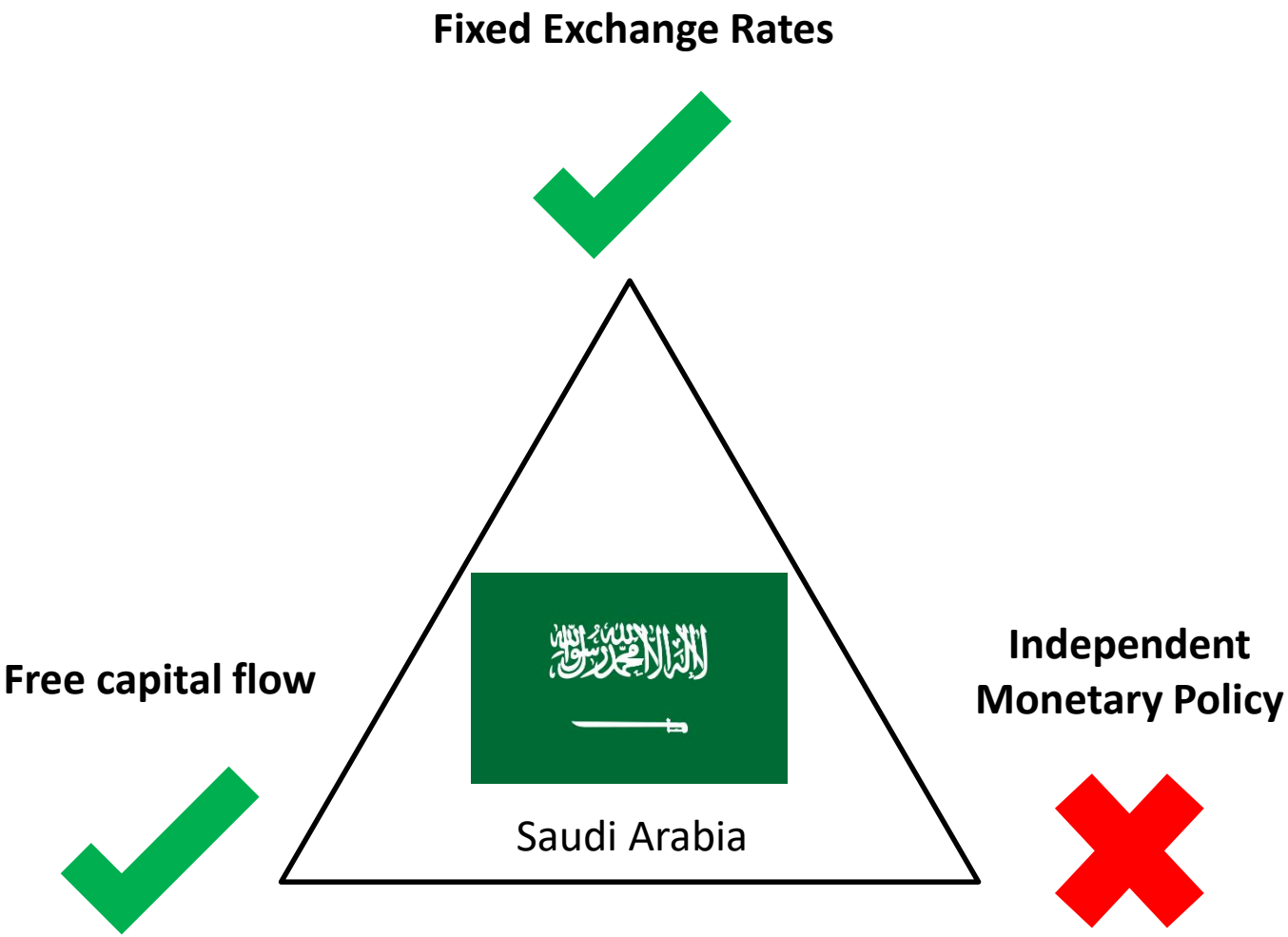
Higher interest rates raise the exchange rate, which reduces exports and increases imports, which therefore reduces AD

Effect of a rise in interest rates on the foreign exchange market, and then aggregate demand



The “impossible trinity”: countries can’t have fixed exchange rates, free capital flow and independent monetary policy at the same time.

The “impossible trinity” (or “Mundell’s trilemma”) in Saudi Arabia



The current account is equal to the capital account (with the opposite sign), unless the central bank intervenes in currency markets

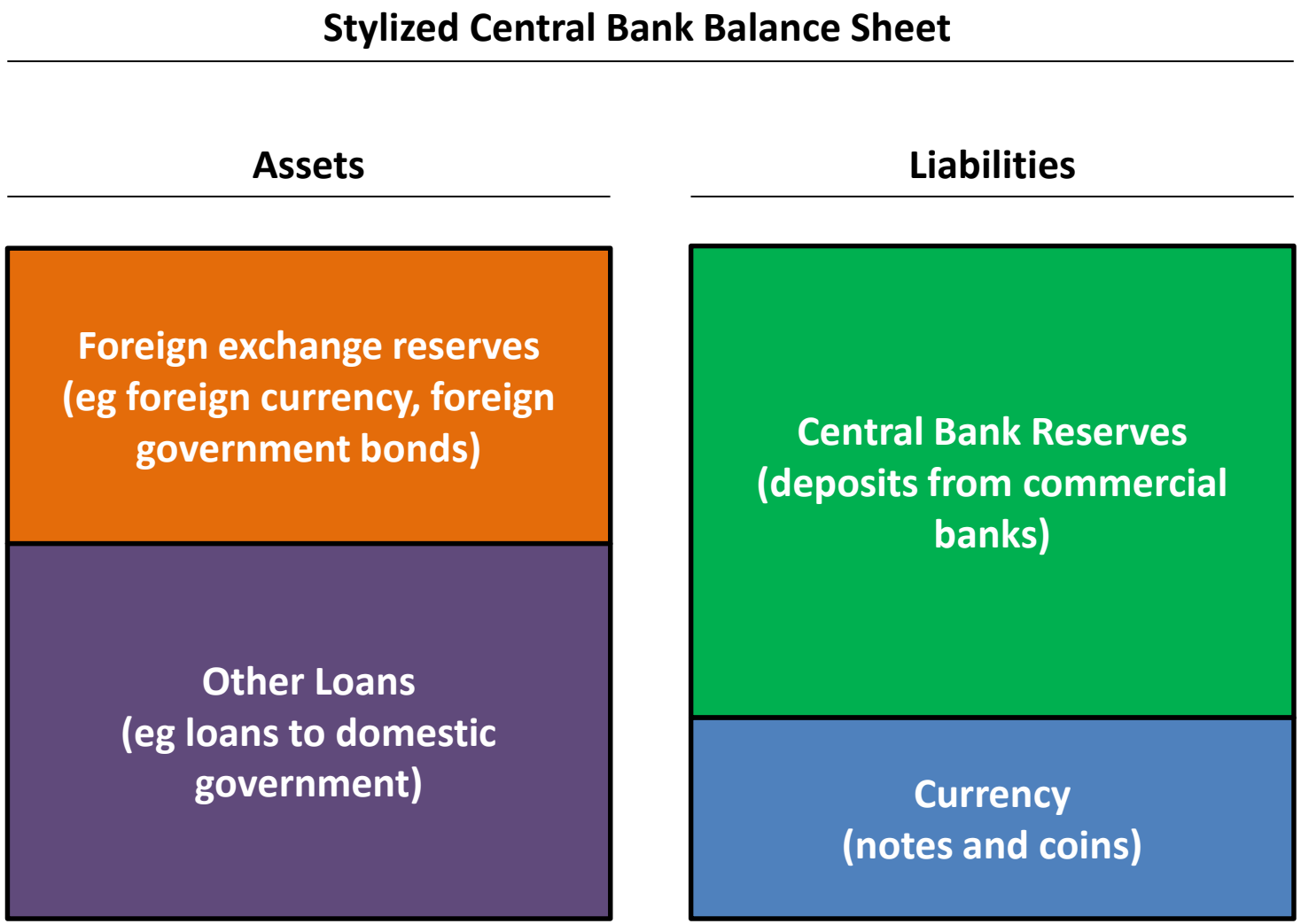
No Currency Intervention

$$CA + KA = 0$$

Currency Intervention

$$CA + KA = \Delta Reserves$$

Currency intervention involves buying/selling foreign exchange reserves. These are different to the "central bank reserves" from Lecture 5



How do the Balance of Payments fit in with the rest of the economy??

The GDP Identity (from Lecture 1)

$$Y = C + I + G + NX$$

In a closed economy (from Lecture 2)

$$Y = C + I + G$$ *Set NX = 0*

$$Y - C - G = I$$ *Assume G doesn't invest*

$$S = I$$ *Define Savings S = Y – C - G*

In a closed economy, all investment must be financed by savings

In an open economy (from Lecture 2)

$$Y = C + I + G + NX$$

$$Y - C - G = I + NX$$ *Assume G doesn't invest*

$$S - NX = I$$ *Define Savings S = Y – C - G*

In an open economy, investment can be financed by savings or "– NX"

In an open economy, investment can be financed by savings or foreign investment, which is recorded in the capital account (KA = - CA = -NX)

Perspective 1:

$$S - NX = I$$

If Australia imports more than it exports (NX < 0), then it is borrowing from the rest of the world, which can be used to finance investment.

Perspective 2:

$$S - I = NX$$
$$-KA = CA$$

If Australia produces stuff that it saves but doesn't invest (including in inventories), then it must send that stuff abroad

A current account surplus (X > M) implies a capital account deficit (S > I; sending money abroad)

OR

Low savings at home means low net exports