



ECON 206 Exam Tutorial

Intermediate Macroeconomics

TODAY

From the labour market to long-run growth

01

Labour and
production

02

Aggregate
supply

03

Goods market
and IS

04

Money market,
LM and AD

05

Policy in AD-AS

06

Open economy

07

Inflation and
unemployment

08

Government debt

09

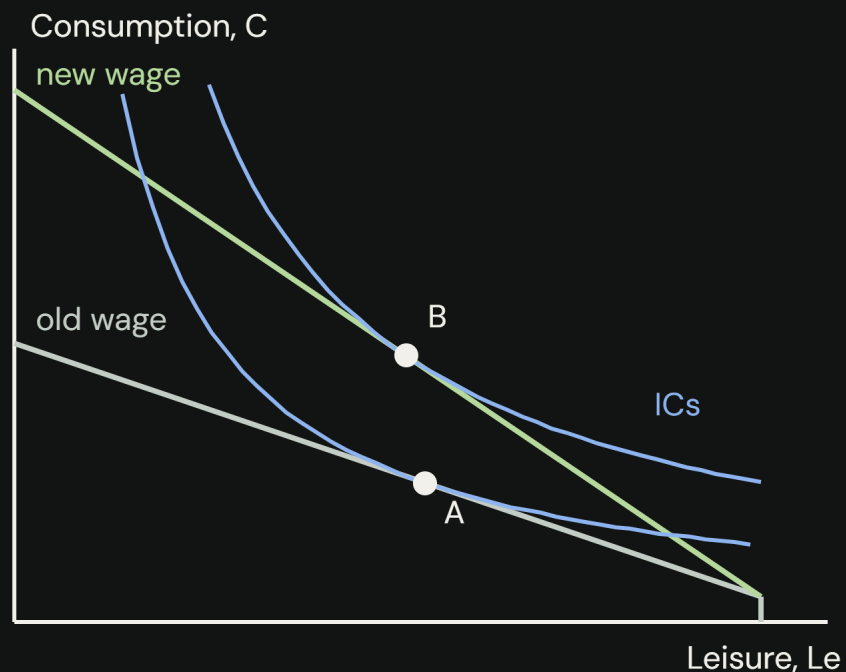
Growth and
Solow

10

Endogenous
growth

Exam: 15 multiple choice (30) · five short answers at 8 marks (40) · two long questions at 15 marks (30)

Walking through a wage rise



THE BUDGET LINE PIVOTS

Leisure now costs more income per hour, so the line gets steeper around the no-work point. The best choice moves from A to B: the **highest IC that just touches the budget line**.

TWO EFFECTS

Substitution: leisure is dearer $\rightarrow$ less leisure, more work. **Income:** richer $\rightarrow$ more of both normal goods $\rightarrow$ more leisure, less work. C rises under both.

WHICH WINS?

Substitution $>$ income: labour supply slopes up (as drawn, $A \rightarrow B$). Income $>$ substitution: it bends backward. If $Le = 0$ the rise has its biggest impact; if hours = 0 it has none.

Have a go

2024 · Q1

The long-run labour supply curve taught in the course is vertical because

- (1) the populations of countries have maximum sustainable limits.
- (2) the income effect from higher wages offsets increases in a country's population.
- (3) the substitution effect from higher wages has been found to fall over long time periods.
- (4) the income effect from higher wages offsets the substitution effect.

2025 · Q12

If the income effect is bigger than the substitution effect, then an increase in the real wage will cause

- (1) the quantity of labour supplied to fall.
- (2) the quantity of labour supplied to rise.
- (3) no change in the quantity of labour supplied as they will cancel out the effect of the wage increase.
- (4) an increase the amount of overtime work to get the extra wages.

Income vs substitution effects

2024 · Q1

(4)

The income effect from higher wages offsets the substitution effect.

Over long periods, higher wages make people richer and they buy more leisure, cancelling the incentive to work more. Hours don't rise, so long-run labour supply is vertical.

2025 · Q12

(1)

The quantity of labour supplied falls.

When the income effect dominates, people take more leisure as wages rise: the labour supply curve bends backward.

Why output can leave its long-run level

Long-run AS (vertical)

The economically sustainable level of output: set by capital, labour force, natural resources, technology and the natural rate of unemployment. Not affected by the price level or expectations.

Short-run AS (upward)

Output responds to $P - P^e$ because some firms can't or don't adjust prices quickly. Its position depends on the expected price level.

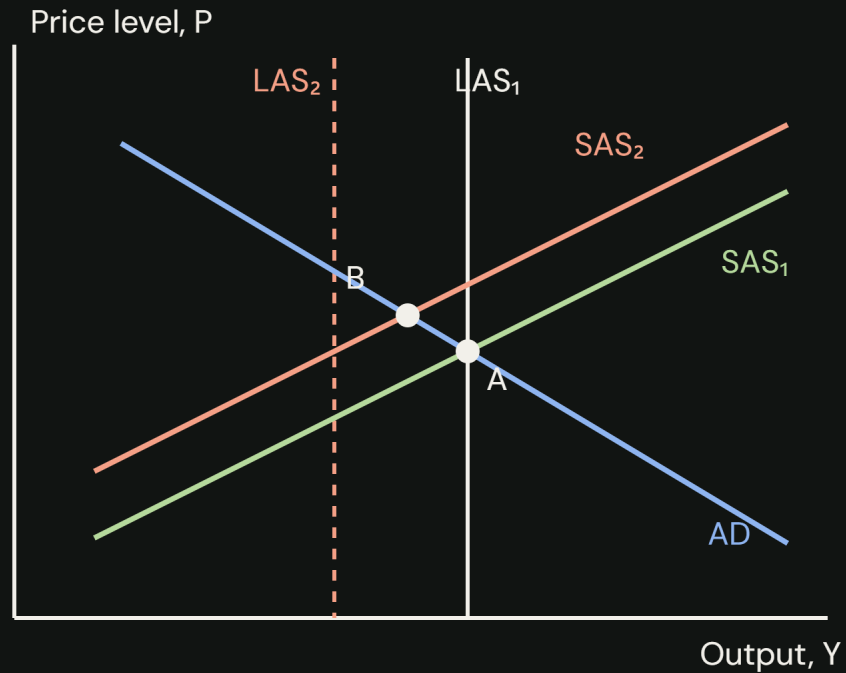
STICKY PRICES

Long-term contracts · menu costs · customers prefer stable prices
· efficiency wages · unions

IMPERFECT INFORMATION

Firms mistake a general price rise for a rise in their relative price and produce more, until they realise.

Supply disruption = negative technology shock



TECHNOLOGY COVERS

Methods and techniques · tools and equipment · organisation and management · the technological environment (science and regulation). A disruption hits all four.

LONG RUN

All inputs become less productive and fewer are employed: MPK falls below its cost, so firms cut capital until the last unit breaks even. LAS shifts left.

SHORT RUN

SR output is limited by LR capacity, so SAS shifts left by the same amount. With AD unchanged: **P rises, Y falls** (A → B).

Have a go

What effect do people's and business' expectations of the price level have on the short-run and long-run aggregate supply curves?

Use a relevant diagram in your answer.

Expectations move SAS, not LAS

LAS: no effect

Set by productive capacity — capital, labour force, natural rate of unemployment, technology.

SAS: shifts up when P^e rises

Firms set prices from the expected price level to reach a target relative price, and judge their relative price against it. A higher P^e means a higher cost structure at every output level.

Result

At any output, a higher price level. Long-run output unchanged.



GOODS MARKET

Equilibrium: no unplanned inventory change

$$Y^{exp} = C(Y, T, r) + I(r) + G \text{ equilibrium: } Y^{exp} = Y$$

The adjustment story

Spending falls $\rightarrow Y^{exp} < Y \rightarrow$ unplanned inventory build-up $\rightarrow$ firms cut production $\rightarrow$ incomes to factors of production fall $\rightarrow C$ falls (multiplier) $\rightarrow$ new equilibrium at lower Y .

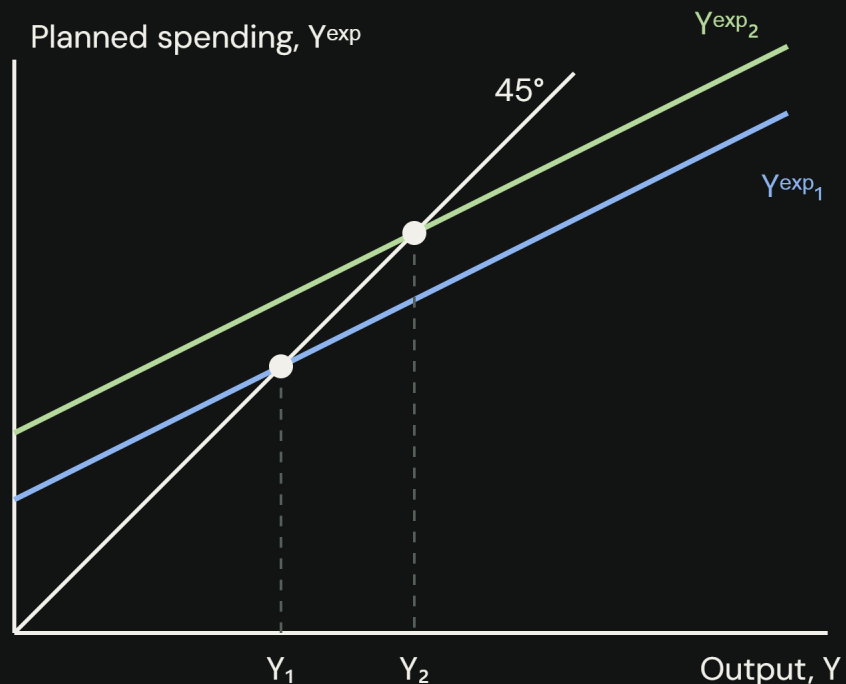
The IS curve

Combinations of the interest rate and income where the goods market clears. Lower $r \rightarrow$ more C and $I \rightarrow$ higher Y , so IS slopes down.

Shifts: G , T , and anything changing C or I not caused by r or Y .

Moves along: a change in r .

The multiplier, step by step



- 1 Future looks good:** expected MPK rises, so firms invest more now — not because of r .
- 2 Spending line shifts up:** $Y^{\text{exp}} > Y$ at the old output.
- 3 Inventories run down** unexpectedly, so firms raise production.
- 4 Incomes rise** for the factors of production, so they consume more.
- 5 Round after round:** each rise in income raises C by $\text{MPC} \times \Delta Y$, until $Y^{\text{exp}} = Y$ again.

SIZE

Multiplier = $1 \div (1 - \text{MPC})$. Here $\text{MPC} = 0.5$, so a 50 rise in spending raises Y by **100**. A higher MPC means a bigger multiplier.

Have a go

2025 · SECTION B Q3 · 8 MARKS

What is the multiplier effect in the goods market and what does it depend on? Explain your answers.

2024 · MC Q8

Assume the marginal propensity to consume is 0.75 and the government reduces aggregate taxes by \$100 million. Then, in the IS–LM model, the IS curve will

- (1) shift to the right by \$75 million.
- (2) shift to the right by \$300 million.
- (3) shift to the right by \$133.33 million.
- (4) not change position due to the Phillips Curve effect.

The multiplier depends on the MPC

MODEL ANSWER (8 MARKS)

An initial change in demand for goods raises incomes, which raises demand for consumption goods, which raises incomes again, and so on.

Higher income raises the present value of lifetime income, so consumption rises. The size of that response — the **marginal propensity to consume** — sets the multiplier: a higher MPC means a bigger multiplier.

MC Q8 · ANSWER (2)

Spending multiplier = $1/(1 - 0.75) = 4$

Tax multiplier = $0.75/(1 - 0.75) = 3$

IS shift = 3×100

IS shifts right by \$300m

A tax cut first raises spending by only $\text{MPC} \times \Delta T$, so it moves IS less than a \$100m rise in G (\$400m).

MONEY MARKET

Money supply meets two kinds of money demand

Supply

Central bank's monetary base (+), banks' reserve ratio (-), people's currency drain (-). Fixed for a given policy.

Medium of exchange

More income or a higher price level → more transactions → more money demanded.

Liquid asset

Safe and liquid but pays no interest. Higher r raises the opportunity cost → less money demanded.

THE LM CURVE

Combinations of income and the interest rate where money supply = money demand as a liquid asset + as a medium of exchange. Slopes up: higher Y needs higher r to clear the market.

Shifts: money supply (monetary base, currency drain), the price level. **Moves along:** a change in income.

A cut in government spending, market by market

1 · GOODS MARKET

$Y_{\text{exp}} < Y \rightarrow$ unplanned inventory build-up $\rightarrow$ production and incomes fall $\rightarrow$ C falls (multiplier).
At the same r , Y is lower: **IS shifts left.**

2 · MONEY MARKET

Lower $Y \rightarrow$ less money demanded as a medium of exchange $\rightarrow$ excess money supply $\rightarrow$ r falls until $M^d = M^s$.
Movement along LM.

3 · SHORT RUN AD-AS

AD shifts left. Flexible firms cut prices; sticky-price and poorly informed firms cut output. $P \downarrow$, $Y \downarrow$: a negative output gap.

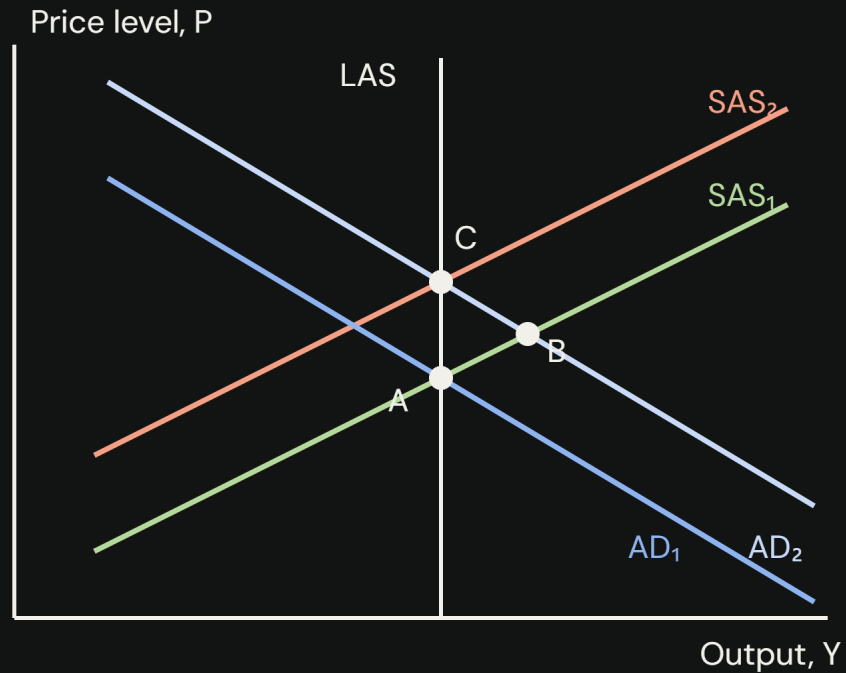
4 · LONG RUN

Firms adjust: P and P^e fall, costs fall, **SAS shifts down** until Y is back at LAS. Lower P also shifts LM down.

THE RULE THE LECTURER MARKS ON

The **initial** change is a **shift** (the curve whose market is hit first). The **secondary** effects are **movements along** the other curves. Say which market you are in at each step.

Expansionary monetary policy: short run vs long run



SHORT RUN · A → B

OCR cut or $M^s \uparrow \rightarrow$ excess money $\rightarrow r \downarrow$ (LM shifts right) $\rightarrow I \uparrow, C \uparrow$ (along IS) $\rightarrow$ **AD shifts right**. Flexible firms raise prices; sticky and poorly informed firms raise output. $Y \uparrow, P \uparrow, u \downarrow$ (Okun).

LONG RUN · B → C

Firms learn and can now change prices: **P^e rises, SAS shifts left** until output is back at LAS and u at its natural rate — with a higher price level.

SO

The RBNZ can lower unemployment **only temporarily**, at a permanent cost of higher inflation. And it is hard to time: u lags output, GDP is slow and revised, and expectations adjust fast if people see it coming.

Have a go: Trump's fiscal stimulus

The Trump Administration is pursuing a booming economy through fiscal stimulus: a US\$1.8 trillion annual budget deficit from a large increase in government spending and a larger decrease in tax revenue. It promised to lower the cost of living.

- (c) How would the expansionary fiscal policy affect the US price level? Does it result in a lower cost of living? Explain using the AD–AS diagram. (5)
- (d) Would the expansionary fiscal policy have any longer-term effects, other than having to repay the debt? (2)

Stimulus raises the cost of living

(C) PRICE LEVEL · 5

$G \uparrow, T \downarrow \rightarrow$ IS and AD shift right. Some firms raise prices with higher demand; firms with sticky prices or poor information raise output — a movement along SAS. Short run: $P \uparrow$ and $Y \uparrow$. Long run: firms raise P^e , SAS shifts up, output returns to LAS at an even higher P .

No — the cost of living rises

(D) LONGER-TERM EFFECTS · 2

Crowding out: higher Y raises money demand $\rightarrow r \uparrow \rightarrow$ user cost of capital $\uparrow \rightarrow I \downarrow$, net investment $< 0 \rightarrow$ less future capital. LAS and SAS shift left: lower long-run output and a higher price level.

Unless G is productive public capital, whose higher MPK could offset the fall in private K .

Three markets, one equilibrium

GOODS (IS)

Higher e makes exports dearer and imports cheaper $\rightarrow NX \downarrow \rightarrow Y^{ad} \downarrow$. A change in e caused by r is a movement along IS.

MONEY (LM)

Unchanged from the closed economy: the exchange rate doesn't enter money demand.

FINANCIAL (IP)

Interest parity: no arbitrage between domestic and foreign bonds. Higher domestic $r \rightarrow$ more demand for NZD $\rightarrow e \uparrow$.

WHAT SHIFTS IP

World rate $r^w \uparrow \rightarrow$ foreign bonds more attractive $\rightarrow e \downarrow$ at every r (IP shifts left). Expected future $e \uparrow \rightarrow$ NZ assets more attractive $\rightarrow$ IP shifts right.

BALANCE OF PAYMENTS

$CA + FA = 0$. A current account deficit (imports $>$ exports) is paid for by selling assets to foreigners: a financial account surplus.

The exchange rate regime decides which policy works

Policy	Floating exchange rate	Fixed exchange rate
$M_s \uparrow$	$r \downarrow \rightarrow e \downarrow \rightarrow X \uparrow, M \downarrow \rightarrow Y \uparrow$. Effective. $CA > 0, FA < 0$	e would fall, so the central bank must cut M_s back. Ineffective.
$G \uparrow$	$r \uparrow \rightarrow e \uparrow \rightarrow X \downarrow, M \uparrow \rightarrow NX$ crowded out. $CA < 0, FA > 0$	To stop e rising, the central bank raises M_s ; r stays put. Y rises more.

THE IMPOSSIBLE TRINITY: PICK TWO

Free financial flows

Independent monetary policy

Fixed exchange rate

Have a go: two Trump objectives

The Trump Administration has two macroeconomic objectives: a booming economy, and smaller US trade and current account deficits. It is pursuing the boom through fiscal stimulus — a US\$1.8 trillion annual budget deficit from a large rise in government spending and a larger cut in tax revenue.

(a) Is the expansionary fiscal policy consistent with the goal of reducing the trade and current account deficits?

Explain your answer using the IS–LM–IP diagrams.

A fiscal boom widens the trade deficit

1 · Goods

$G \uparrow, T \downarrow \rightarrow Y^{\text{exp}} > Y \rightarrow$ inventories run down $\rightarrow$ production and incomes rise $\rightarrow C \uparrow$ (multiplier). IS shifts right.

2 · Money

$Y \uparrow \rightarrow M^d \uparrow$ as a medium of exchange, M^s unchanged $\rightarrow r \uparrow$. Movement along LM.

3 · Financial

$r \uparrow \rightarrow$ US bonds more attractive $\rightarrow$ net demand for US\$ rises $\rightarrow e \uparrow$. Movement along IP.

4 · Trade

$e \uparrow \rightarrow$ US exports dearer, imports cheaper $\rightarrow NX \downarrow$. FA moves into surplus as assets are sold to foreigners.

Not consistent: the current account deficit widens

From the output gap to the Phillips curve

Output gap

Actual output minus natural (potential) output. Positive (inflationary) in expansions; negative (recessionary) when the economy stagnates or contracts.

Okun's law

Changes in unemployment are negatively related to growth. Y above natural $\rightarrow u$ below the natural rate.

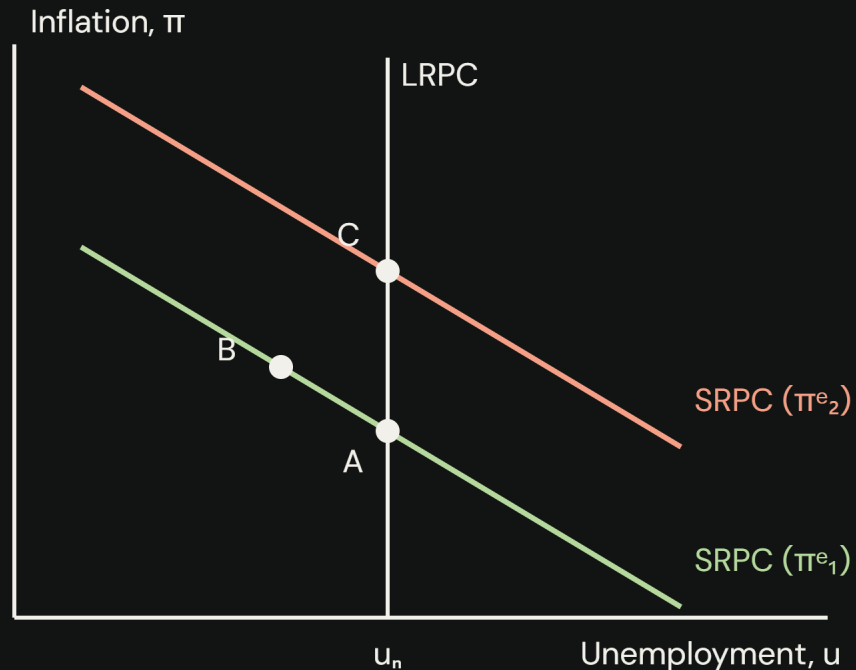
Phillips curve

Unemployment below its natural rate $\leftrightarrow$ inflation above what was expected.

$$\pi = \pi^e - h \times (u - u_n)$$

With adaptive expectations $\pi^e = \text{last year's inflation}$: $\pi - \pi_{-1} = -h \times (u - u_n)$. Lowering inflation requires u above u_n for a while.

Expectations make the long-run Phillips curve vertical



A → B · SHORT RUN

Unexpected expansion: inflation above π^e , so u falls below u_n . A movement **along** the short-run curve.

B → C · LONG RUN

People and firms raise π^e . The short-run curve **shifts up** until u is back at u_n with higher inflation.

READING THE EQUATION

$\pi = \pi^e - h(u - u_n)$. With adaptive expectations, keeping u below u_n means inflation keeps **accelerating**. Bringing inflation down needs u above u_n for a while.

Have a go: the cost of disinflation

You work at the central bank. The Governor thinks inflation is too high and outside the contracted band, and wants it to fall by 5 percentage points — but knows this costs higher unemployment. Bank economists estimate the annual Phillips curve as:

$$\pi_i = \pi_{i-1} - 0.5 \times (u - 0.06)$$

How much would unemployment have to rise to reduce inflation by 5 percentage points?

Ten points of extra unemployment for a year

WORKING

$$\pi_i - \pi_{i-1} = -0.05$$

$$-0.05 = -0.5 \times (u - 0.06)$$

$$u - 0.06 = 0.10$$

$$u = 0.16$$

u = 16% for a year

FOR THE GOVERNOR'S REPORT

Inflation only falls if unemployment is above its natural rate for a time. To cut inflation by 5 points in a year, unemployment must rise to 16% — 10 percentage points above the natural rate of 6%.

Once expectations adjust to the lower inflation rate, unemployment can return to 6%.

Have a go

What are two different policies that can be implemented to reduce the incentive for politicians to increase the money supply? Briefly explain how they act to reduce that incentive.

Make expectations adjust fast

1 Make changes public

The government must announce any monetary policy change before it happens.

2 Make policy transparent

A target that is easy to measure and understand, such as CPI inflation.

3 Independent central bank

The government sets the target; the central bank runs day-to-day policy.

HOW THEY WORK (ANY TWO POLICIES, PLUS THIS)

The public reacts quickly to any change, raising its inflation expectations. SAS shifts up straight away, offsetting the expansion: inflation rises with no gain in output or fall in unemployment. So expanding the money supply no longer pays off politically.

Watch the debt-to-GDP ratio, not the debt

$$B_t/Y_t - B_{t-1}/Y_{t-1} = (r - g) \times B_{t-1}/Y_{t-1} + (G_t - T_t)/Y_t$$

r = real interest rate · g = real growth rate · $G - T$ = primary deficit (negative = surplus)

Term 1: $r - g$

If growth in the tax base beats the interest rate, interest costs shrink relative to GDP.

Term 2: primary balance

Primary deficits add to the ratio; surpluses pay it down.

Default risk

Internal debt (own currency) can be taxed or printed away; external debt can default. High debt → higher rates → downgrades.

Have a go: assess the default risk

You are assessing a country’s government bonds. Your manager wants your assessment of the government’s immediate or long-term risk of defaulting on its debts, and why.

Data	Value
Real output growth	2.5%
Government bond interest rate · inflation	≈ 4% · ≈ 1.5%
GDP last year · this year	\$171.5b · \$182.6b
Existing government debt	\$100.5b
Government primary surplus	\$2.5b

The debt ratio is falling: low risk

WORKING

$$\text{Real } r = 4\% - 1.5\% = 2.5\%$$

$$r - g = 2.5\% - 2.5\% = 0$$

$$\begin{aligned}\Delta(B/Y) &= 0 \times (100.5/171.5) + (-2.5/182.6) \\ &= -0.014\end{aligned}$$

Debt/GDP falls 1.4 points a year

ASSESSMENT

The test of riskiness is sustainability: is debt growing out of control or stable? Here growth in the tax base exactly offsets the real interest cost, and the primary surplus is paying debt down.

Very sustainable: low immediate and long-term default risk — an AAA-type rating.

Have a go

2025 · Q2

If a country's real GDP takes 12 years to double, the annual growth rate must be

- (1) unanswerable without the initial value of real GDP.
- (2) 6 years.
- (3) 6.0 percent.
- (4) 0.17 percent.

2025 · Q4

Capital income \$1.25b, labour income \$4b. Capital grows 1.2%, employment 2.8%, output 3.7%. Technological progress is

- (1) 1.28 percent.
- (2) 9.00 percent.
- (3) -0.30 percent.
- (4) 7.70 percent.

2024 · Q7

Constant returns; output elasticity of capital 0.25. Output grows 5%, capital 3%, labour 4%. Technology grows

- (1) 1.32 percent.
- (2) 1.25 percent.
- (3) 8.75 percent.
- (4) -2.0 percent.

Technology is what's left over

2025 · Q2

(3) 6.0%

$$g \approx 72 \div 12 = 6\%$$

No starting value needed — doubling time depends only on g . (2) is a trap: wrong units.

2025 · Q4

(1) 1.28%

$$a = 1.25 \div 5.25 = 0.238$$

$$g_A = 3.7 - 0.238(1.2)$$

$$= 3.7 - 0.29 = 2.13$$

$$= 3.7 - 0.29 - 2.13$$

2024 · Q7

(2) 1.25%

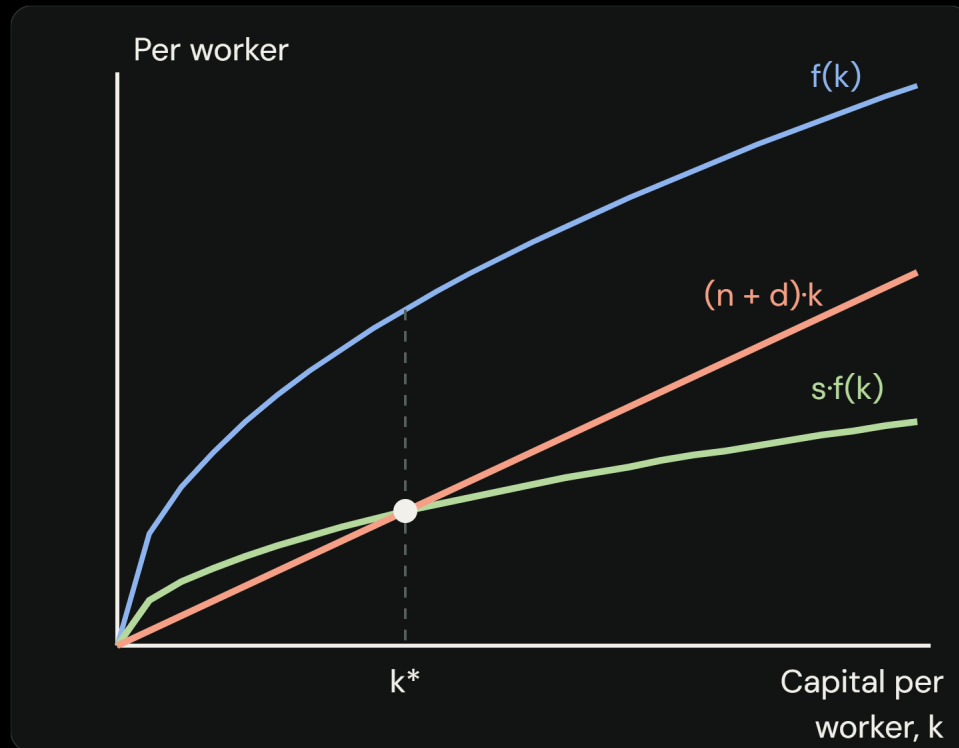
$$g_A = 5 - 0.25(3)$$

$$= 5 - 0.75 = 3$$

$$= 5 - 0.75 - 3$$

SOLOW MODEL

The steady state: saving just covers break-even investment



$$s \cdot f(k^*) = (n + d) \cdot k^*$$

$d \cdot k$ replaces worn-out capital; $n \cdot k$ equips new workers who start with nothing. Together: break-even investment.

Below k^* , saving exceeds break-even, so k and y grow — but by less each year (diminishing MPK). At k^* , per-capita growth stops.

Consumption per worker = $f(k) - s \cdot f(k)$: the gap between the top two curves.

Have a go: a change in saving

Period	Total output	Total consumption
Years 1–4	\$309,595m	\$242,308m
Years 10–13	\$500,000m	\$334,069m

- (a) Calculate the savings rate for each period. Does it increase or decrease? (2)
- (b) How does this affect capital and output per worker? Use a diagram. (6)
- (c) What happens to the growth rate of this economy? (2)
- (d) What is the effect on consumption and people's welfare? (3)
- (e) Is there any situation where a change in saving could for certain affect the growth rate? Hint: technology. (2)

Higher saving: a higher level, not faster growth

(A) SAVINGS RATE

$$(309,595 - 242,308) / 309,595 = 21.7\%$$

$$(500,000 - 334,069) / 500,000 = 33.2\%$$

The savings rate increases.

(B) CAPITAL AND OUTPUT PER WORKER

$s \cdot f(k)$ shifts up. Saving now exceeds break-even investment, so k rises, raising y , then more saving — by less each year. New steady state: $k_2^* > k_1^*$, higher y .

(C) GROWTH RATE

Jumps up at first, then falls back to zero at the new steady state. Diminishing MPK means output and saving rise at a diminishing rate, while break-even investment rises at a constant rate.

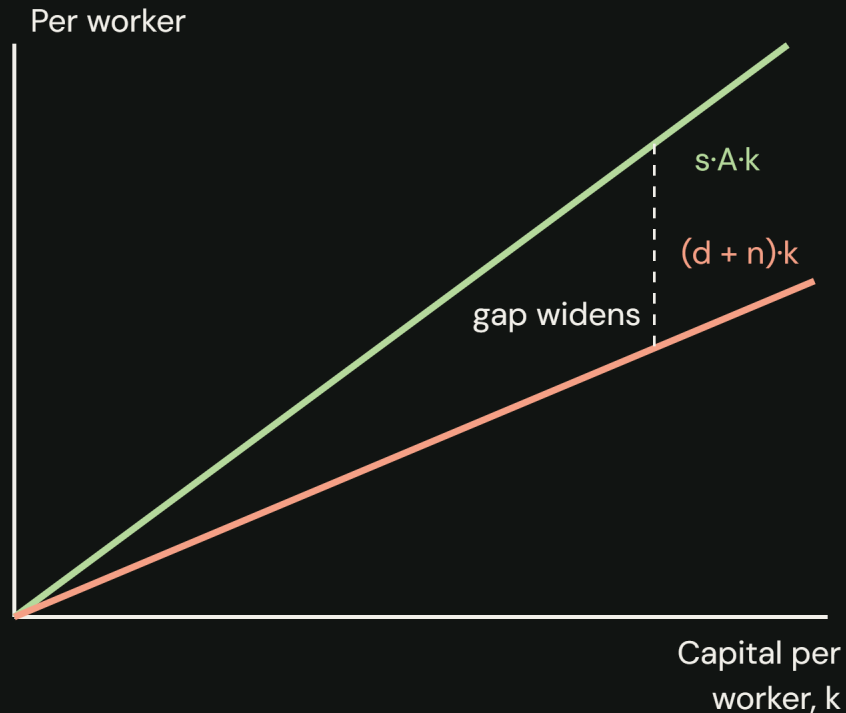
(D) CONSUMPTION AND WELFARE

$c = (1 - s)y$. Higher y raises c , but a bigger share goes to saving. From a low s , c and welfare rise; from a high s , c and welfare can fall.

(E) WHEN SAVING CAN RAISE GROWTH

With capital spillovers (exponent on capital ≥ 1), sustained growth needs $sA > d + n$. Higher s makes that condition more likely to hold: enough capital for a critical mass of spillovers.

With big enough spillovers, growth never stops



INVENTIONS VS INNOVATIONS

Invention: a product or process created for the first time. **Innovation:** a significant improvement to an existing one. Both can be **product** (better goods and services) or **process** (better ways of doing things).

WHERE SPILLOVERS COME FROM

Learning by doing (repetition makes workers and organisations more efficient) · knowledge is a **public good** · knowledge creates new knowledge.

THE CONDITION

With an exponent of at least 1 on k , there are no diminishing returns: growth of $k = sA - (d + n)$. $sA > d + n \rightarrow$ growth continues; $sA = d + n \rightarrow$ no growth.

SHORT ANSWERS · 8 MARKS EACH

Have a go: spillovers

2024 · SECTION B Q1

What do we mean by capital spillovers in relation to economic growth? Briefly explain two ways faster diffusion of inventions and innovations can create bigger capital spillovers.

2025 · SECTION B Q4

Explain what is meant by human capital knowledge spillovers and why they can contribute to positive economic growth.

Ideas that others can build on for free

2024 · B1

Inventions and innovations come from existing knowledge and human capital, and others use them to create more. That externality is the **spillover**, and it drives growth.

Spillovers grow with faster diffusion. Any two of:

- Educated population — can understand and use them
- Complementary infrastructure — e.g. EV chargers
- Adaptable regulation — rules don't block new tech
- Moderate patents — not too costly to use
- Competition — pressure to innovate

2025 · B4

Knowledge and some human capital (e.g. from learning by doing) are **public goods**: others can use them costlessly without using them up.

They raise the productiveness of production at little or no extra cost, and help create more knowledge and human capital.

This positive externality offsets diminishing returns, so under the right conditions ($sA > d + n$) it supports sustained growth.



Questions?

Good luck in the ECON 206 exam