



AP Macroeconomics

Giáo trình luyện thi chuyên sâu

Song ngữ Anh-Việt

8020 ENGLISH

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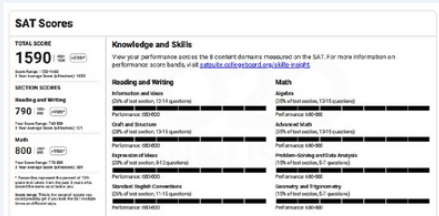
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IELTS 8.0



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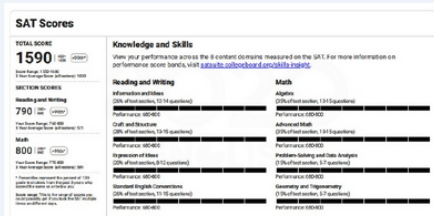
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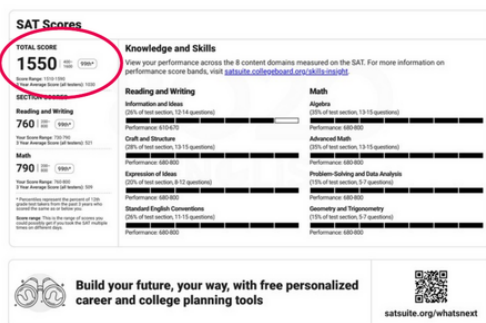
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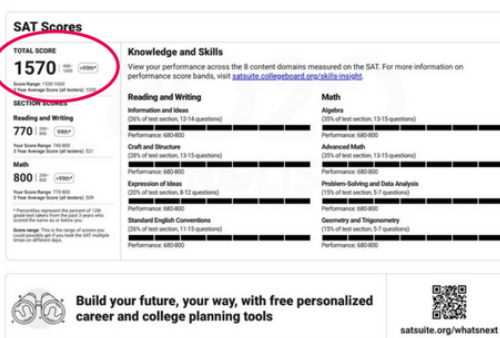


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Bảng vàng học viên



Bé Khanh Đăng

SAT Bứt phá + Nâng cao Cam kết 140++ => Kết quả 1510



Bé Phan Nguyễn Thảo Nguyễn

SAT Nâng cao



Bé Lê Tâm Anh

SAT Bứt phá + Nâng cao Cam kết 140++ => Bứt phá kết quả 1530

KHÁNH ĐĂNG – SAT 1510

“SAT Bứt phá + Nâng cao cam kết 140++ → 1510”

THẢO NGUYỄN – SAT 1520

“SAT Nâng cao → 1520”

TÂM ANH – SAT 1530

“SAT Bứt phá + Nâng cao cam kết 140++ → 1530”

Bảng vàng SAT – Học viên đạt 1510 · 1520 · 1530

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AP Calculus AB: 5



AP Calculus BC: 5



AP Chemistry: 5

Bảng điểm AP thật của học viên – nhiều môn đạt điểm 4 & 5

Điểm AP thật – Calculus AB/BC 5/5 · Biology & Chemistry 4–5 (College Board)

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Basic Economic Concepts

Mục tiêu Unit: Khan hiếm, chi phí cơ hội và phân tích biên; đường giới hạn khả năng sản xuất (PPC) và tăng trưởng kinh tế; lợi thế tuyệt đối & lợi thế so sánh; cung-cầu, cân bằng thị trường và kiểm soát giá; mô hình vòng chu chuyển kinh tế và ba mục tiêu kinh tế vĩ mô; thặng dư tiêu dùng, thặng dư sản xuất, tổn thất phúc lợi, trợ cấp và hạn ngạch nhập khẩu.

1.1 Scarcity, Resources, and the Three Fundamental Questions

Economics is the study of how individuals and societies choose to allocate **scarce resources** among competing, virtually unlimited wants. **Scarcity** – the condition that resources are limited relative to desires – is the starting point of every economic model in this book.

Khái niệm cốt lõi

Productive resources fall into four categories, each earning a characteristic payment when it is sold in a **factor (resource) market**:

- **Land** (natural resources) → earns **rent**.
- **Labor** (human effort, physical and mental) → earns **wages**.
- **(Physical) capital** – tools, machinery, factories, infrastructure, *not* money or financial assets → earns **interest**.
- **Entrepreneurship** – the willingness to combine the other three resources, innovate, and bear risk → earns **profit**.

Because resources are scarce, every society – regardless of its economic system – must answer three fundamental questions: *What* goods and services to produce, *How* to produce them (which resource combinations/techniques), and *For whom* to produce them (how output is distributed).

GIẢI THÍCH TIẾNG VIỆT

VN

Khan hiếm nghĩa là nguồn lực sản xuất luôn có giới hạn trong khi nhu cầu con người gần như vô hạn. Bốn loại nguồn lực và khoản thu nhập tương ứng: đất đai → tiền thuê (rent); lao động → tiền lương (wages); vốn vật chất (máy móc, nhà xưởng – KHÔNG phải tiền) → tiền lãi (interest); năng lực kinh doanh → lợi nhuận (profit). Mọi nền kinh tế đều phải trả lời ba câu hỏi: Sản xuất cái gì, như thế nào, và cho ai.

(!) Lỗi thường gặp: On the AP exam, “capital” almost always means **physical/capital goods** (machines, buildings) used to produce other goods – not money. Money is a *financial* asset that facilitates exchange; it is not itself a productive resource.

1.2 Economic Systems

Khái niệm cốt lõi

Societies organize their answers to the three fundamental questions through an **economic system**:

- A **traditional economy** relies on custom and history to decide production and distribution.
- A **command (centrally planned) economy** has a central authority make production and allocation decisions. This can pursue equity goals directly, but tends to suffer from poor information, weak incentives, and slower innovation.
- A **market economy** relies on decentralized price signals, private property, and voluntary exchange (Adam Smith's "invisible hand"). Prices coordinate the independent decisions of many buyers and sellers, usually generating efficient outcomes, but can produce inequality and fails to account for externalities on its own.
- Virtually every real-world economy is a **mixed economy**: markets allocate most resources, while government intervenes through taxation, regulation, and public provision of some goods.

GIẢI THÍCH TIẾNG VIỆT

VN

Kinh tế truyền thống dựa vào phong tục; kinh tế kế hoạch hoá tập trung (command) do nhà nước quyết định sản xuất/phân phối – có thể hướng tới công bằng nhưng thường thiếu thông tin và động lực; kinh tế thị trường dựa vào tín hiệu giá cả và sở hữu tư nhân – thường hiệu quả nhưng có thể gây bất bình đẳng và không tự xử lý được ngoại tác. Hầu hết các nền kinh tế thực tế là **kinh tế hỗn hợp**.

1.3 Opportunity Cost and Marginal Analysis

Khái niệm cốt lõi

The **opportunity cost** of any choice is the value of the *next-best alternative* that must be given up to make that choice. Opportunity cost includes both **explicit costs** (direct monetary payments) and **implicit costs** (the value of forgone alternatives, such as forgone wages or forgone interest on funds tied up in a venture). A **sunk cost** – one already incurred and unrecoverable – should *not* affect a forward-looking decision, because it is unaffected by any current choice. Rational decision-makers think *at the margin*: they compare the **marginal benefit (MB)** of one additional unit of an activity to its **marginal cost (MC)**.

Marginal decision rule: increase an activity whenever $MB > MC$; stop increasing once $MB = MC$. Increasing the activity when $MB < MC$ reduces net benefit.

GIẢI THÍCH TIẾNG VIỆT

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Chi phí cơ hội của một lựa chọn là giá trị của phương án tốt nhất tiếp theo bị bỏ qua, bao gồm cả chi phí hiện (explicit) và chi phí ẩn (implicit, ví dụ tiền lương/lãi suất bị bỏ lỡ). Chi phí chìm (sunk cost) đã bỏ ra và không thể thu hồi thì KHÔNG nên ảnh hưởng đến quyết định trong tương lai. Quy tắc biên: tiếp tục hoạt động khi lợi ích biên (MB) còn lớn hơn chi phí biên (MC); dừng lại khi $MB = MC$.

Ví dụ mẫu · Worked example — Marginal Analysis

A student can earn \$18/hour tutoring or spend the hour studying, which she estimates raises her expected future earnings by an amount whose present value is \$25 for the first hour, \$20 for the second hour, \$15 for the third hour, and \$10 for the fourth hour (diminishing marginal benefit). How many hours should she study rather than tutor, using the marginal decision rule? The marginal cost of each hour of studying is the forgone tutoring wage, a constant \$18 (opportunity cost). Compare MB to this $MC = \$18$: hour 1 ($25 > 18$, study), hour 2 ($20 > 18$, study), hour 3 ($15 < 18$, tutor instead), hour 4 ($10 < 18$, tutor). She should study for exactly **2 hours**, where MB still exceeds MC , and tutor thereafter.

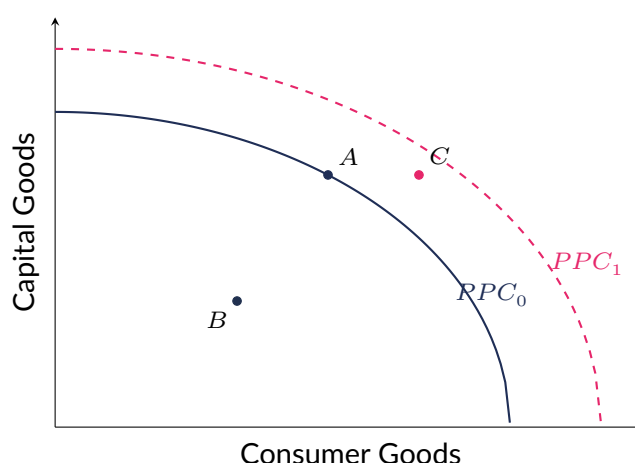
1.4 The Production Possibilities Curve: Efficiency and Increasing Opportunity Cost

The **production possibilities curve (PPC)** shows the maximum combinations of two goods an economy can produce given fixed resources, fixed technology, and full, efficient utilization of those resources.

Khái niệm cốt lõi

- Points *on* the PPC are **productively efficient** – no more of one good can be produced without producing less of the other.
- Points *inside* the PPC are **attainable but inefficient** – resources are unemployed or misallocated.
- Points *outside* the PPC are currently **unattainable** with existing resources and technology.

The PPC is typically **bowed outward (concave to the origin)** because resources are not perfectly adaptable between the two goods – some resources are much better suited to producing one good than the other. As production of a good increases, progressively less-suited resources must be reallocated to it, so the opportunity cost of each additional unit **rises**. This is the **law of increasing opportunity cost**. A *straight-line* PPC would instead imply a *constant* opportunity cost, i.e. resources are equally well suited to both goods – an unrealistic special case.



A: productively efficient (on PPC_0). B: inefficient / unemployed resources (inside). C: unattainable now, but reachable once growth shifts the curve outward to PPC_1 .

GIẢI THÍCH TIẾNG VIỆT

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Mọi điểm **trên** đường PPC là hiệu quả sản xuất tối đa; điểm **bên trong** thể hiện nguồn lực bị thất nghiệp/phân bổ sai; điểm **bên ngoài** là chưa thể đạt được với nguồn lực hiện có. Đường PPC lõm ra ngoài (bowed outward) vì nguồn lực không hoán đổi hoàn hảo giữa hai ngành – đây là **quy luật chi phí cơ hội tăng dần**. Đường PPC là đường thẳng chỉ xảy ra khi nguồn lực hoàn toàn thay thế được cho nhau (trường hợp đặc biệt, ít thực tế).

Ví dụ mẫu · Worked example – Rising Opportunity Cost along a PPC

A country's PPC gives the following attainable, efficient combinations of Good *A* and Good *B*:

$$(A=2, B=18), \quad (A=4, B=14), \quad (A=6, B=8), \quad (A=8, B=0).$$

Find the opportunity cost (in units of *B*) of each additional 2-unit increase in *A*, and confirm the law of increasing opportunity cost.

Segment 1 ($A:2 \rightarrow 4$): $\Delta B = 18 - 14 = 4$, so $OC = 4/2 = 2$ units of *B* per unit of *A*.

Segment 2 ($A:4 \rightarrow 6$): $\Delta B = 14 - 8 = 6$, $OC = 6/2 = 3$ units of *B* per unit of *A*.

Segment 3 ($A:6 \rightarrow 8$): $\Delta B = 8 - 0 = 8$, $OC = 8/2 = 4$ units of *B* per unit of *A*.

The opportunity cost of producing more *A* rises steadily, $2 \rightarrow 3 \rightarrow 4$, confirming the bowed-out, increasing-opportunity-cost shape.

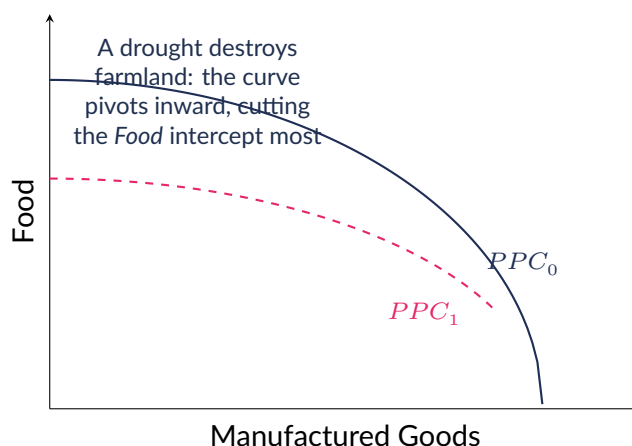
1.5 Economic Growth and Shifts of the PPC

Khái niệm cốt lõi

Economic growth is represented by an **outward shift of the entire PPC** – more can be produced of *both* goods than before. Sources of growth include: an increase in the quantity of resources (population growth, immigration, capital investment, discovery of natural resources), an improvement in the *quality* of resources (education and training raising human capital), and **technological progress** (producing more output from the same inputs).

A shift can be **parallel/symmetric** if growth benefits both goods proportionally, or **lopsided (pivoted)** if new resources or technology mainly benefit one good's production (e.g., a new irrigation technology shifts the food-production endpoint out much more than the manufacturing endpoint). Losses of resources (a natural disaster, war, capital depreciation without replacement) cause the PPC to shift **inward**, again possibly lopsided toward whichever good relied most heavily on the lost resource.

Do not confuse economic growth (an outward *shift* of the curve) with simply moving from an inefficient point *inside* the curve to a point *on* the curve – the latter recovers existing potential output but is not growth.



A lopsided (pivoted) inward shift: a resource loss concentrated in agriculture shrinks the maximum attainable Food output far more than the maximum attainable Manufactured Goods output.

Ví dụ mẫu · Worked example — Present Sacrifice and Future Growth

Country *X* currently produces at a point with many Consumer Goods and few Capital Goods; Country *Y* produces with fewer Consumer Goods and many Capital Goods, on identical PPCs. Which country's PPC will shift outward faster over the next decade, and why?

Capital goods (machinery, factories, infrastructure) directly expand an economy's future productive capacity, while consumer goods are consumed immediately and do not add to future capacity. Country *Y*, by sacrificing current consumption for more capital goods, accumulates more productive capital and will experience a **faster outward shift** of its PPC (faster future growth) than Country *X*, which is prioritizing present consumption.

(!) Lỗi thường gặp: A movement *along* a fixed PPC (e.g., choosing to produce more capital goods and fewer consumer goods this year) is a **reallocation**, not growth. Only a shift of the *entire curve* is growth.

GIẢI THÍCH TIẾNG VIỆT

VN

Tăng trưởng kinh tế là dịch chuyển **toàn bộ** đường PPC ra ngoài, đến từ: tăng số lượng nguồn lực, tăng chất lượng nguồn lực (giáo dục, vốn nhân lực), và tiến bộ công nghệ. Dịch chuyển có thể đối xứng hoặc lệch về một trục nếu nguồn lực/công nghệ mới chủ yếu có lợi cho một ngành. Hy sinh tiêu dùng hiện tại để sản xuất nhiều hàng hoá vốn hơn sẽ giúp PPC dịch chuyển ra ngoài **NHANH** hơn trong tương lai. Lưu ý: di chuyển từ điểm bên trong ra đường cong **KHÔNG** phải là tăng trưởng.

1.6 Absolute Advantage and Comparative Advantage

Khái niệm cốt lõi

A producer (person, firm, or country) has **absolute advantage** in a good if it can produce *more* of that good using the same quantity of resources (i.e., it is more productive/efficient in absolute terms). A producer has **comparative advantage** in a good if it can produce it at a *lower opportunity cost* than the other producer. Comparative advantage – not absolute advantage – determines which good a producer should specialize in, and it is always possible for two producers to identify a pattern of comparative advantage as long as their opportunity costs differ (even if one producer has absolute advantage in *everything*).

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Lợi thế **tuyệt đối** là sản xuất được NHIỀU hơn với cùng nguồn lực; lợi thế **so sánh** là có chi phí cơ hội THẤP hơn. Lợi thế so sánh – không phải lợi thế tuyệt đối – mới quyết định ai nên chuyên môn hoá sản xuất gì. Ngay cả khi một bên có lợi thế tuyệt đối ở CẢ HAI mặt hàng, chuyên môn hoá theo lợi thế so sánh vẫn luôn có thể thực hiện được (miễn là chi phí cơ hội hai bên khác nhau).

Ví dụ mẫu · Worked example – Identifying Comparative Advantage

Output per worker-day:

	Machines	Rice
United States	10	20
Vietnam	4	16

Determine each country's comparative advantage.

Opportunity cost of 1 Machine: US = $20/10 = 2$ Rice; Vietnam = $16/4 = 4$ Rice. The US has the *lower* OC in Machines $\Rightarrow$ the US has comparative advantage in Machines. Opportunity cost of 1 Rice: US = $10/20 = 0.5$ Machine; Vietnam = $4/16 = 0.25$ Machine $\Rightarrow$ Vietnam has the lower OC and comparative advantage in Rice – even though the US has *absolute* advantage in both goods ($10 > 4$ and $20 > 16$).

Ví dụ mẫu · Worked example – Comparative Advantage with Absolute Advantage in Both Goods

Output per worker-day:

	Coffee	Steel
Brazil	30	10
Argentina	40	20

Argentina is more productive in *both* goods. Which country should specialize in which good? OC of 1 Coffee: Brazil = $10/30 = \frac{1}{3}$ Steel; Argentina = $20/40 = 0.5$ Steel. Brazil's OC is lower $\Rightarrow$ Brazil has comparative advantage in Coffee. OC of 1 Steel: Brazil = $30/10 = 3$ Coffee; Argentina = $40/20 = 2$ Coffee. Argentina's OC is lower $\Rightarrow$ Argentina has comparative advantage in Steel. Despite Argentina's absolute advantage in both goods, both countries still gain by specializing: Brazil in Coffee, Argentina in Steel.

1.7 Specialization, Gains from Trade, and Terms of Trade

Khái niệm cốt lõi

When each producer specializes according to comparative advantage and trades with the other, **total world output rises** and both parties can consume *beyond* their own individual PPC. Trade is mutually beneficial only if the **terms of trade** (the rate at which the two goods are exchanged) lie **strictly between the two producers' opportunity costs** for the traded good – otherwise, one party would prefer to remain self-sufficient.

Ví dụ mẫu · Worked example – Determining a Mutually Beneficial Terms of Trade

Using the Brazil/Argentina data above (OC of 1 Steel: Brazil = 3 Coffee, Argentina = 2 Coffee), find the range of mutually beneficial terms of trade for Steel, and pick one valid rate.

For Brazil (importing Steel) to gain, it must pay *less* than its own OC of 3 Coffee per Steel. For Argentina (exporting Steel) to gain, it must receive *more* than its own OC of 2 Coffee per Steel. So any terms of trade with $2 < \text{Coffee per Steel} < 3$ benefits both – for example, **2.5 Coffee per Steel**.

Ví dụ mẫu · Worked example – Total Output Gains from Specialization

Country *A* can produce 6 Wheat or 3 Cloth per day (or any linear combination); Country *B* can produce 4 Wheat or 4 Cloth per day. Suppose that without trade, each country splits its day evenly between the two goods. Compare total combined output before and after specialization and trade.

OC of Wheat: $A = 3/6 = 0.5$ Cloth; $B = 4/4 = 1$ Cloth $\Rightarrow A$ has comparative advantage in Wheat. OC of Cloth: $A = 6/3 = 2$ Wheat; $B = 4/4 = 1$ Wheat $\Rightarrow B$ has comparative advantage in Cloth.

Before trade (each splits time evenly): *A* produces 3 Wheat +1.5 Cloth; *B* produces 2 Wheat +2 Cloth. Combined: 5 Wheat +3.5 Cloth = 8.5 total units.

After full specialization: *A* produces 6 Wheat +0 Cloth; *B* produces 0 Wheat +4 Cloth. Combined: 6 Wheat +4 Cloth = 10 total units.

Specialization raises combined output by 1.5 units; trading at any rate between 0.5 and 1 Cloth per Wheat (e.g., 0.75) lets both countries consume more of *both* goods than they could alone.

(!) Lỗi thường gặp: Absolute advantage compares total *output*; comparative advantage compares *opportunity cost*. Never conclude that a country “has no reason to trade” just because it is more productive at everything – comparative advantage guarantees gains from trade as long as opportunity costs differ.

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Khi chuyên môn hoá theo lợi thế so sánh, tổng sản lượng thế giới tăng lên và cả hai bên có thể tiêu dùng **vượt** đường PPC của riêng mình. Tỷ lệ trao đổi (terms of trade) phải nằm **giữa** hai mức chi phí cơ hội thì thương mại mới có lợi cho cả hai bên.

1.8 Demand**1.8.1 The Law of Demand and the Demand Curve****Khái niệm cốt lõi**

The **law of demand** states that, all else equal, price and quantity demanded move in **opposite directions**: as price rises, quantity demanded falls, and vice versa – giving the demand curve its downward slope. Two effects explain this: the **substitution effect** (a higher price makes a good relatively more expensive than substitutes, so consumers switch away from it) and the **income effect** (a higher price reduces the real purchasing power of a given income, so consumers buy less overall).

1.8.2 Determinants (Shifters) of Demand

Khái niệm cốt lõi

A change in the good's own price causes a **movement along** a fixed demand curve. A change in any **non-price determinant** causes the *entire curve to shift*:

- **Income**: for a **normal good**, higher income shifts demand *right*; for an **inferior good**, higher income shifts demand *left*.
- **Prices of related goods**: a higher price of a **substitute** shifts demand for this good *right*; a higher price of a **complement** shifts demand for this good *left*.
- **Tastes/preferences**: more favorable tastes shift demand *right*.
- **Expectations**: expecting higher future prices or income shifts current demand *right*.
- **Number of buyers**: more buyers shifts demand *right*.

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Quy luật cầu: giá và lượng cầu tỷ lệ nghịch (hiệu ứng thay thế + hiệu ứng thu nhập). Thay đổi giá của CHÍNH hàng hoá đó → di chuyển dọc theo đường cầu; thay đổi các yếu tố KHÁC (thu nhập, giá hàng liên quan, thị hiếu, kỳ vọng, số người mua) → dịch chuyển toàn bộ đường cầu. Hàng hoá thông thường: thu nhập tăng → cầu tăng; hàng hoá thứ cấp: thu nhập tăng → cầu giảm.

1.9 Supply

1.9.1 The Law of Supply and the Supply Curve

Khái niệm cốt lõi

The **law of supply** states that, all else equal, price and quantity supplied move in the **same direction** – giving the supply curve its upward slope, since a higher price makes production more profitable at the margin.

1.9.2 Determinants (Shifters) of Supply

Khái niệm cốt lõi

A change in the good's own price causes **movement along** a fixed supply curve. Non-price determinants **shift** the entire supply curve:

- **Input/resource prices**: cheaper inputs shift supply *right*; more expensive inputs shift supply *left*.
- **Technology**: improved technology shifts supply *right*.
- **Prices of other goods the firm could produce**: a higher price for an alternative good shifts *this* good's supply *left* (opportunity cost of production rises).
- **Expectations**: expecting higher future prices can shift current supply *left* (sellers hold back now).
- **Number of sellers**: more sellers shifts supply *right*.
- **Taxes and subsidies**: a per-unit tax on sellers shifts supply *left* (acts like a higher cost); a subsidy shifts supply *right*.

GIẢI THÍCH TIẾNG VIỆT

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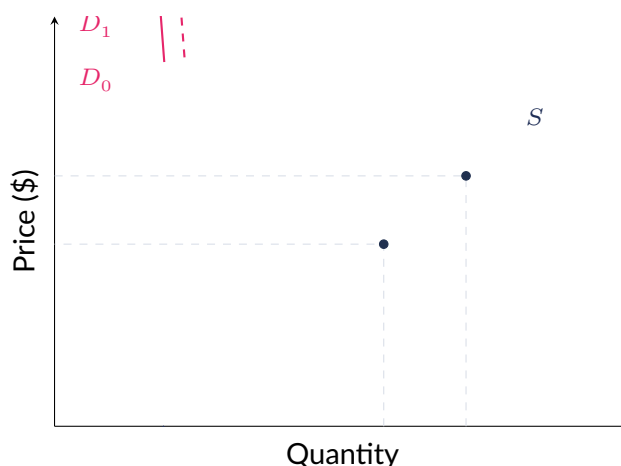
Quy luật cung: giá và lượng cung tỷ lệ thuận. Thay đổi giá của chính hàng hoá → di chuyển dọc theo đường cung; thay đổi giá đầu vào, công nghệ, kỳ vọng, số người bán, thuế/trợ cấp → dịch chuyển toàn bộ đường cung. Thuế đánh vào người bán làm cung dịch trái (giống chi phí tăng); trợ cấp làm cung dịch phải.

1.10 Market Equilibrium and Changes in Equilibrium

Khái niệm cốt lõi

Market equilibrium occurs where quantity demanded equals quantity supplied ($Q_d = Q_s$), determining the equilibrium price P^* and quantity Q^* . At any price above P^* , quantity supplied exceeds quantity demanded (a **surplus**), pushing price down; at any price below P^* , quantity demanded exceeds quantity supplied (a **shortage**), pushing price up. This adjustment process drives the market toward equilibrium.

When only demand shifts, price and quantity move in the *same* direction. When only supply shifts, price and quantity move in *opposite* directions. When both curves shift simultaneously, the effect on one variable (price or quantity) is certain while the effect on the other is **indeterminate** without knowing the relative size of the shifts.



$Q_d = 200 - 4P$, $Q_s = 40 + 4P$: equilibrium at $P^* = \$20$, $Q^* = 120$. An increase in demand ($D_0 \rightarrow D_1$) raises both equilibrium price and quantity.

Ví dụ mẫu · Worked example – Solving for Equilibrium Algebraically

$Q_d = 200 - 4P$ and $Q_s = 40 + 4P$ (quantities in thousands of units, P in dollars). Find the equilibrium price and quantity.

Set $Q_d = Q_s$: $200 - 4P = 40 + 4P \Rightarrow 160 = 8P \Rightarrow P^* = \20 . Then $Q^* = 200 - 4(20) = 200 - 80 = 120$ (check: $Q_s = 40 + 4(20) = 40 + 80 = 120$ ✓).

Ví dụ mẫu · Worked example – An Excise Tax Shifts Supply

Using $Q_d = 200 - 4P$ and $Q_s = 40 + 4P$ from above, the government imposes a \$4-per-unit excise tax collected from sellers. Find the new equilibrium, the price consumers pay, the price sellers keep, and how the \$4 burden splits between them.

A per-unit tax on sellers raises their effective cost, so supply becomes $Q'_s = 40 + 4(P - 4) =$

$24 + 4P$, where P is now the price consumers pay. Set $Q_d = Q'_s$: $200 - 4P = 24 + 4P \Rightarrow 176 = 8P \Rightarrow P_{\text{consumer}} = \22 . Quantity: $Q' = 200 - 4(22) = 112$. Price sellers keep: $P_{\text{seller}} = 22 - 4 = \18 (check: $Q_s = 40 + 4(18) = 112 \checkmark$). Consumer burden = $22 - 20 = \$2$; seller burden = $20 - 18 = \$2$: because demand and supply have equal slopes (equal responsiveness) here, the \$4 tax burden splits **evenly**, \$2 each. Total tax revenue = $\$4 \times 112 = \448 thousand.

(!) Lỗi thường gặp: An excise tax always **reduces** the equilibrium quantity traded (here $120 \rightarrow 112$) and raises the price buyers pay while lowering the price sellers receive – the vertical gap between the two is exactly the tax. The side of the market with the *steeper* (less responsive) curve bears a *larger* share of the tax burden; only when both curves have equal slope does the burden split evenly.

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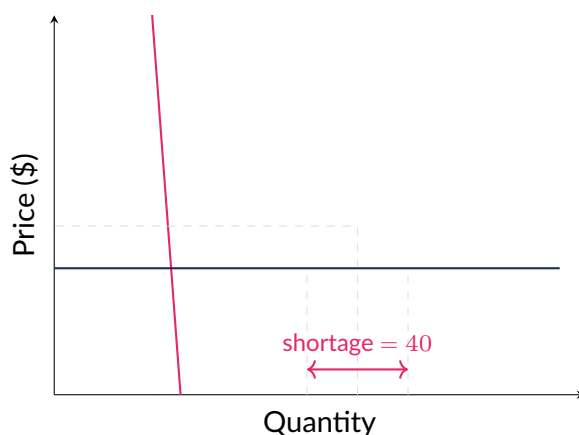
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Cân bằng thị trường: $Q_d = Q_s$. Giá cao hơn cân bằng $\rightarrow$ dư thừa $\rightarrow$ giá giảm; giá thấp hơn cân bằng $\rightarrow$ thiếu hụt $\rightarrow$ giá tăng. Nếu chỉ cầu dịch chuyển: giá và lượng biến động CÙNG chiều; nếu chỉ cung dịch chuyển: giá và lượng biến động NGƯỢC chiều; nếu cả hai dịch chuyển: một biến số chắc chắn, biến số còn lại KHÔNG XÁC ĐỊNH nếu thiếu thông tin về độ lớn dịch chuyển. Thuế theo đơn vị đánh vào người bán làm cung dịch trái, giá người mua trả tăng, giá người bán nhận giảm, sản lượng cân bằng giảm.

1.11 Price Controls: Ceilings and Floors

Khái niệm cốt lõi

A **price ceiling** is a legal *maximum* price. It only affects the market (is **binding**) if set *below* the equilibrium price, in which case it creates a persistent **shortage** ($Q_d > Q_s$ at the ceiling price), forcing non-price rationing (queues, waiting lists, favoritism) and often fueling black markets. A **price floor** is a legal *minimum* price. It only binds if set *above* the equilibrium price, creating a persistent **surplus** ($Q_s > Q_d$ at the floor price) – e.g., a minimum wage above the equilibrium wage causes a surplus of labor (structural unemployment); an agricultural price support above equilibrium causes unsold surplus output. A ceiling set *above*, or a floor set *below*, equilibrium is **non-binding** and has no effect on the market outcome. Binding price controls also generally reduce the total quantity traded below the efficient equilibrium quantity, creating a loss of total market value (deadweight loss).



A binding price ceiling at \$15 (below $P^* = \$20$): $Q_d = 140$, $Q_s = 100$, a shortage of 40 units.

Ví dụ mẫu · Worked example – Quantifying a Shortage from a Price Ceiling

Using $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ (equilibrium $P^* = \$20$), the government imposes a binding price ceiling at $P = \$15$. Find the shortage.

At $P = 15$: $Q_d = 200 - 4(15) = 140$; $Q_s = 40 + 4(15) = 100$. Shortage = $Q_d - Q_s = 140 - 100 = 40$ units.

Ví dụ mẫu · Worked example – Quantifying a Surplus from a Price Floor

Using the same $Q_d = 200 - 4P$, $Q_s = 40 + 4P$, the government imposes a binding price floor at $P = \$25$. Find the surplus.

At $P = 25$: $Q_d = 200 - 4(25) = 100$; $Q_s = 40 + 4(25) = 140$. Surplus = $Q_s - Q_d = 140 - 100 = 40$ units.

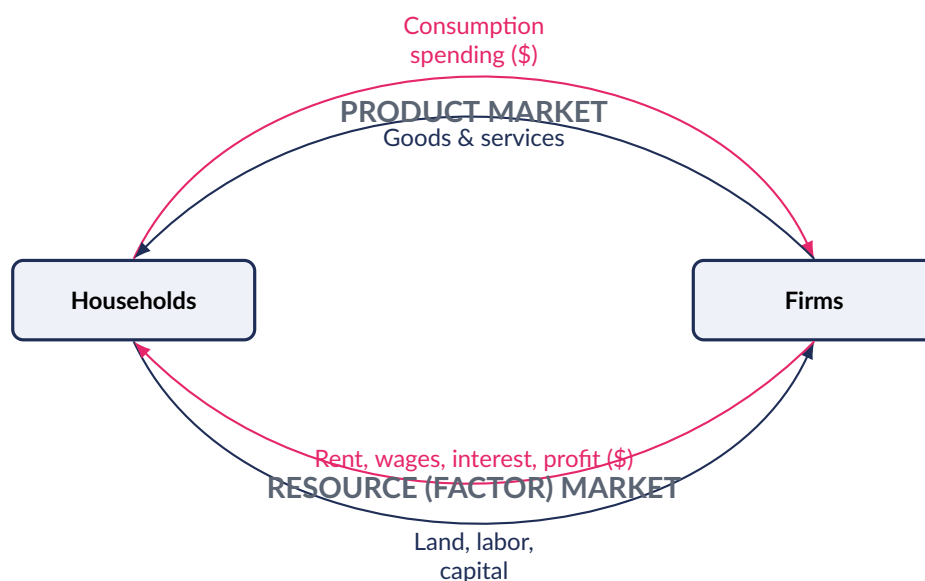
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Giá trần (dưới giá cân bằng) gây **thiếu hụt**; giá sàn (trên giá cân bằng) gây **dư thừa**. Nếu mức giá quy định nằm phía “sai” (giá trần trên cân bằng, giá sàn dưới cân bằng) thì KHÔNG có hiệu lực. Kiểm soát giá ràng buộc thường làm giảm tổng lượng giao dịch so với mức hiệu quả.

1.12 The Circular Flow Model and the Three Macroeconomic Goals**Khái niệm cốt lõi**

The **circular flow model** shows how households and firms interact through two sets of markets. In the **product (goods-and-services) market**, firms sell output to households, who pay for it – a *real flow* of goods/services from firms to households and a *money flow* of consumption spending from households to firms. In the **resource (factor) market**, households supply land, labor, capital, and entrepreneurship to firms, who pay rent, wages, interest, and profit in return – a *real flow* of resources from households to firms and a *money flow* of factor income from firms to households. (A fuller model adds government, the financial sector, and the foreign sector, which introduce leakages from and injections into this flow – covered in later units.)



The circular flow model: real flows of goods/resources move opposite to the money flows of spending/income.

Macroeconomics tracks a country's progress toward three broad goals, which organize the rest of this book: **sustainable economic growth**, **full employment** (low, stable unemployment), and **price stability** (low, stable inflation). Unit 2 defines and measures each goal; later units study the policy tools used to pursue them.

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Mô hình vòng chu chuyển kinh tế: hộ gia đình và doanh nghiệp trao đổi qua thị trường sản phẩm (dòng hàng hoá ngược chiều dòng tiền chi tiêu) và thị trường nguồn lực (dòng nguồn lực ngược chiều dòng thu nhập). Ba mục tiêu kinh tế vĩ mô lớn: tăng trưởng bền vững, toàn dụng lao động, và ổn định giá cả – là chủ đề xuyên suốt các Unit tiếp theo.

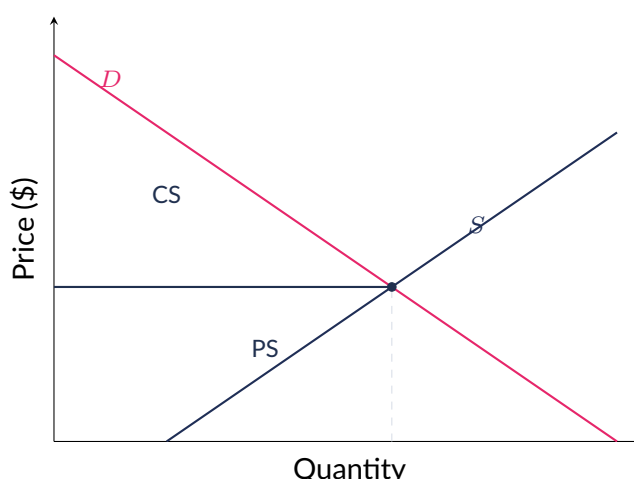
1.13 Market Efficiency: Consumer Surplus, Producer Surplus, and Deadweight Loss

Khái niệm cốt lõi

Consumer surplus (CS) is the difference between what consumers are willing to pay for each unit (given by the height of the demand curve) and what they actually pay (the market price), summed over every unit purchased. Graphically, CS is the area **under the demand curve, above the price line, from $Q = 0$ to Q^*** .

Producer surplus (PS) is the difference between the price producers receive and their marginal cost of production (given by the height of the supply curve), summed over every unit sold. Graphically, PS is the area **above the supply curve, below the price line, from $Q = 0$ to Q^*** .

Total surplus ($CS + PS$) measures the total net benefit a market generates. A market is **allocatively efficient** when total surplus is **maximized** – which occurs exactly at the competitive equilibrium, where $Q_d = Q_s$. Any quantity other than Q^* (too little or too much) produces *less* total surplus than the equilibrium quantity.



Consumer surplus (CS) is the region between the demand curve and P^* up to Q^* ; producer surplus (PS) is the region between P^* and the supply curve up to Q^* .

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Thặng dư tiêu dùng (CS) là phần diện tích nằm dưới đường cầu, trên mức giá cân bằng, tính đến Q^* – chênh lệch giữa mức giá người mua SẴN SÀNG trả và mức giá họ THỰC SỰ trả. Thặng dư sản xuất (PS) là phần diện tích nằm trên đường cung, dưới mức giá cân bằng, tính đến Q^* – chênh lệch giữa mức giá người bán nhận được và chi phí biên của họ. Tổng thặng dư ($CS + PS$) đạt giá trị lớn nhất tại điểm cân bằng cạnh tranh – đây chính là định nghĩa của hiệu

quả phân bổ (allocative efficiency).

Ví dụ mẫu · Worked example – Computing Consumer and Producer Surplus

Using $Q_d = 200 - 4P$ and $Q_s = 40 + 4P$ from the equilibrium example above ($P^* = \$20$, $Q^* = 120$), find consumer surplus, producer surplus, and total surplus.

Demand's vertical intercept (price when $Q = 0$): from $Q_d = 200 - 4P$, solve $0 = 200 - 4P \Rightarrow P = \50 .

Supply's vertical intercept (price when $Q = 0$): from $Q_s = 40 + 4P$, solve $0 = 40 + 4P \Rightarrow P = -\10 . (This is negative – always verify algebraically rather than assuming a positive number; see the note below.)

$CS = \frac{1}{2} \times Q^* \times (P_{\text{demand intercept}} - P^*) = \frac{1}{2} \times 120 \times (50 - 20) = \frac{1}{2} \times 120 \times 30 = \mathbf{1,800}$ (thousand dollars).

$PS = \frac{1}{2} \times Q^* \times (P^* - P_{\text{supply intercept}}) = \frac{1}{2} \times 120 \times (20 - (-10)) = \frac{1}{2} \times 120 \times 30 = \mathbf{1,800}$ (thousand dollars).

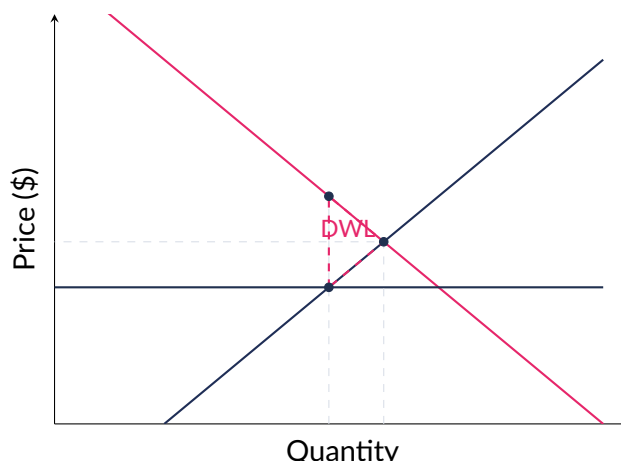
Total surplus = $CS + PS = 1,800 + 1,800 = \mathbf{3,600}$ (thousand dollars). Because demand and supply here have equal-magnitude slopes, the two triangles happen to be equal in this example – this is a coincidence of these particular numbers, not a general rule.

(!) Lỗi thường gặp: Always solve for a curve's vertical (price) intercept algebraically – never assume it is a “nice” positive number. Here $Q_s = 40 + 4P$ gives a vertical intercept of $P = -\$10$, not $+\$10$. This does not mean any unit ever actually sells for a negative price; it simply means the straight-line supply equation, extended down to $Q = 0$, mathematically passes below the price axis. The full producer-surplus triangle used above is measured using this extended (negative) intercept, so part of the “PS” region lies below the visible $P = 0$ line on a standard graph – only the portion at or above $P = 0$ can actually be drawn.

1.13.1 Deadweight Loss from a Binding Price Ceiling

Khái niệm cốt lõi

When a binding price control (or any restriction) prevents the market from reaching Q^* , the units between the smaller, restricted quantity and Q^* are never produced or consumed at all. The lost total surplus on exactly those missing units is **deadweight loss (DWL)** – a pure loss to society, captured by neither consumers nor producers. Graphically, DWL is the triangle bounded by the demand curve, the supply curve, and the vertical line at the actual (restricted) quantity traded.



With a binding ceiling at \$15, only 100 units trade. The dashed triangle – bounded by the demand curve, the supply curve, and $Q_{\text{traded}} = 100$ – is the deadweight loss from the 20 units (100 → 120) that go unproduced.

Ví dụ mẫu · Worked example – Computing Deadweight Loss from a Price Ceiling

Using $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ ($P^* = \$20$, $Q^* = 120$) and the binding price ceiling at $P = \$15$ from the earlier example ($Q_d = 140$, $Q_s = 100$, shortage = 40), find the deadweight loss.

Step 1 – actual quantity traded. At a binding ceiling, sellers will not supply more than $Q_s = 100$, so only $\min(Q_d, Q_s) = 100$ units actually change hands – 20 fewer than the efficient $Q^* = 120$.

Step 2 – the value gap at the traded quantity. At $Q = 100$: consumers' willingness to pay is the demand price, $P = (200 - 100)/4 = \$25$; producers' marginal cost is the supply price, $P = (100 - 40)/4 = \$15$ (equal to the ceiling, as expected). The gap between these is $25 - 15 = \$10$ per unit.

Step 3 – the triangle. $DWL = \frac{1}{2} \times (Q^* - Q_{\text{traded}}) \times (\text{value gap}) = \frac{1}{2} \times (120 - 100) \times 10 = \frac{1}{2} \times 20 \times 10 = \mathbf{100}$ (thousand dollars).

(!) Lỗi thường gặp: Deadweight loss is *not* the surplus that simply moves between consumers and producers on the 100 units still bought and sold under the ceiling – that surplus is merely **redistributed** (typically toward consumers who successfully buy at the lower price), not destroyed. DWL comes *only* from the units between $Q_{\text{traded}} = 100$ and the efficient $Q^* = 120$ that are never produced or consumed at all.

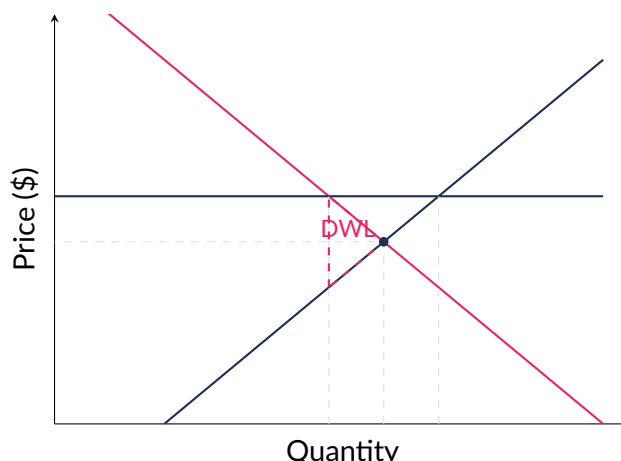
Ví dụ mẫu · Worked example – Deadweight Loss from a Binding Price Floor

Using $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ ($P^* = \$20$, $Q^* = 120$) and the binding price floor at $P = \$25$ from the earlier example ($Q_d = 100$, $Q_s = 140$, surplus = 40), find the deadweight loss.

Step 1 – actual quantity traded. Buyers will not purchase more than $Q_d = 100$ at the floor price, so only $\min(Q_d, Q_s) = 100$ units actually change hands, exactly as under the ceiling – 20 fewer than $Q^* = 120$.

Step 2 – the value gap at the traded quantity. At $Q = 100$: the demand price is $P = (200 - 100)/4 = \$25$ (equal to the floor, as expected); the supply price (true marginal cost) is $P = (100 - 40)/4 = \$15$. Gap = $25 - 15 = \$10$ per unit.

Step 3 – the triangle. $DWL = \frac{1}{2} \times (120 - 100) \times 10 = \frac{1}{2} \times 20 \times 10 = \mathbf{100}$ (thousand dollars) – identical to the ceiling's DWL, since both policies restrict trade to the same 100 units.



A binding floor at \$25: buyers purchase only $Q_d = 100$ even though sellers offer $Q_s = 140$. The same 20-unit gap ($100 \rightarrow 120$) produces the same \$100 thousand deadweight loss as the ceiling case.

The \$25 price floor restricts actual quantity traded to $\min(Q_d, Q_s) = \min(100, 140) = 100$ units – the same quantity traded as under the \$15 ceiling above. Because both policies happen to leave the same 20 units ($100 \rightarrow 120$) unproduced, both create the identical $DWL = \$100$ thousand here: deadweight loss depends on how far the *actual* quantity traded falls short of Q^* , not on whether the restriction takes the form of a ceiling or a floor.

Ví dụ mẫu · Worked example – Full Welfare Accounting Under an Excise Tax

Recall the \$4-per-unit excise tax on $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ from the earlier section: $P_{\text{consumer}} = \$22$, $P_{\text{seller}} = \$18$, $Q' = 112$, tax revenue = \$448 thousand. Verify that consumer surplus, producer surplus, tax revenue, and deadweight loss together exactly account for the original total surplus of \$3,600 thousand.

Because $Q' = 112$ is a genuine new equilibrium (where Q_d equals the new Q'_s at P_{consumer}), CS and PS here are simple triangles, just like the original calculation:

$$CS_{\text{tax}} = \frac{1}{2} \times 112 \times (50 - 22) = \frac{1}{2} \times 112 \times 28 = \mathbf{1,568}.$$

$$PS_{\text{tax}} = \frac{1}{2} \times 112 \times (18 - (-10)) = \frac{1}{2} \times 112 \times 28 = \mathbf{1,568}.$$

DWL : at $Q = 112$, demand price = $50 - 112/4 = 22$, supply price = $112/4 - 10 = 18$, gap = 4; $DWL = \frac{1}{2} \times (120 - 112) \times 4 = \frac{1}{2} \times 8 \times 4 = \mathbf{16}$.

Check: $CS_{\text{tax}} + PS_{\text{tax}} + \text{tax revenue} + DWL = 1,568 + 1,568 + 448 + 16 = \mathbf{3,600}$ – exactly the original total surplus. The tax neither creates nor destroys value except for the \$16 thousand lost as deadweight loss; every other dollar of original surplus is simply **redistributed** into smaller CS, smaller PS, and new government revenue.

GIẢI THÍCH TIẾNG VIỆT

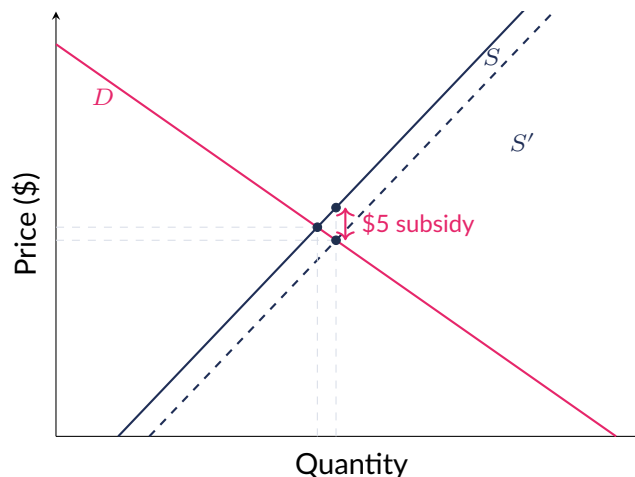
VN

Tổn thất phúc lợi xã hội (deadweight loss – DWL) xảy ra khi một chính sách (như giá trần hoặc giá sàn) ngăn thị trường đạt Q^* : các đơn vị hàng hoá nằm giữa lượng giao dịch thực tế và Q^* không được sản xuất/tiêu dùng, làm mất một phần tổng thặng dư mà KHÔNG bên nào nhận được. Đây khác với việc thặng dư chỉ chuyển từ người bán sang người mua (hoặc ngược lại) trên các đơn vị vẫn còn giao dịch – phần đó không phải là DWL.

1.14 Subsidies and Import Quotas: Further Applications of Supply and Demand

Khái niệm cốt lõi

A **per-unit subsidy** paid to sellers is the mirror image of a per-unit tax: it lowers sellers' effective cost of production at every quantity, which **shifts the supply curve right** (equivalently, a "negative tax"). The result is a **lower price paid by consumers**, a **higher effective price received by sellers** (their received price = the price consumers pay + the subsidy), and a quantity traded **above** the free-market efficient quantity Q^* . Because the subsidized quantity exceeds Q^* , a subsidy introduces its own deadweight loss on the units between Q^* and the new, larger quantity – even though the original, unsubsidized market was already efficient.



A \$5-per-unit subsidy to sellers shifts supply right/down from S to S' : the price consumers pay falls from \$32 to \$30, while sellers effectively receive \$35, and quantity rises from 84 to 90.

Ví dụ mẫu · Worked example – A Per-Unit Subsidy to Sellers

$Q_d = 180 - 3P$ and $Q_s = 20 + 2P$ (equilibrium $P^* = \$32$, $Q^* = 84$; check: $180 - 3(32) = 180 - 96 = 84$, $20 + 2(32) = 20 + 64 = 84$ ✓). The government pays sellers a \$5-per-unit subsidy. Find the new price consumers pay, the new equilibrium quantity, the effective price sellers receive, and the total cost of the subsidy to the government.

Step 1 – shift supply. A subsidy lowers sellers' effective cost, so at every price P that consumers pay, sellers behave as if they are receiving $P + 5$. Substituting into the original supply equation: $Q'_s = 20 + 2(P + 5) = 20 + 2P + 10 = 30 + 2P$.

Step 2 – solve the new equilibrium. Set $Q_d = Q'_s$: $180 - 3P = 30 + 2P \Rightarrow 150 = 5P \Rightarrow P_{\text{consumer}} = \30 .

Step 3 – new quantity. $Q' = 180 - 3(30) = 180 - 90 = 90$ (check: $Q'_s = 30 + 2(30) = 30 + 60 = 90$ ✓).

Step 4 – price sellers receive. $P_{\text{seller}} = P_{\text{consumer}} + 5 = 30 + 5 = \35 (check against the original supply curve: $Q_s = 20 + 2(35) = 20 + 70 = 90$ ✓, matching $Q' = 90$).

Step 5 – total subsidy cost. Cost = $\$5 \times Q' = 5 \times 90 = \450 (thousand dollars).

Consumers gain $32 - 30 = \$2$ per unit; sellers gain $35 - 32 = \$3$ per unit; together the $\$2 + \$3 = \$5$ gap matches the subsidy exactly. The subsidy raises quantity traded from the efficient 84 to 90 – 6 units beyond the efficient level.

Step 6 – deadweight loss from over-production. The market was already efficient at $Q^* = 84$ before the subsidy. The extra $90 - 84 = 6$ units are worth less to consumers than they cost to produce: at $Q = 90$, consumers value the good at $P_d(90) = (180 - 90)/3 = \30 , while it truly

costs (original supply curve) $P_s(90) = (90 - 20)/2 = \35 to produce. $DWL = \frac{1}{2} \times (90 - 84) \times (35 - 30) = \frac{1}{2} \times 6 \times 5 = \15 (thousand dollars) – a genuine loss even though the subsidy raised quantity traded.

Subsidy benefits split according to the *same* incidence rule as a tax burden: the side of the market with the **steeper** (less responsive) curve captures the **larger** share. Here demand's inverse slope has magnitude $1/3 \approx 0.33$ while supply's has magnitude 0.5 – supply is steeper, so sellers capture the larger share of the subsidy (\$3 per unit) while consumers capture the smaller share (\$2 per unit), exactly as found in Step 5.

Ví dụ mẫu · Worked example – Full Welfare Accounting Under a Subsidy

Using the same market ($Q_d = 180 - 3P$, $Q_s = 20 + 2P$, $P^* = \$32$, $Q^* = 84$) and \$5-per-unit subsidy from above ($P_{\text{consumer}} = \$30$, $P_{\text{seller}} = \$35$, $Q' = 90$, subsidy cost = \$450 thousand, $DWL = \$15$ thousand), verify how the original surplus, the subsidy spending, and the deadweight loss relate.

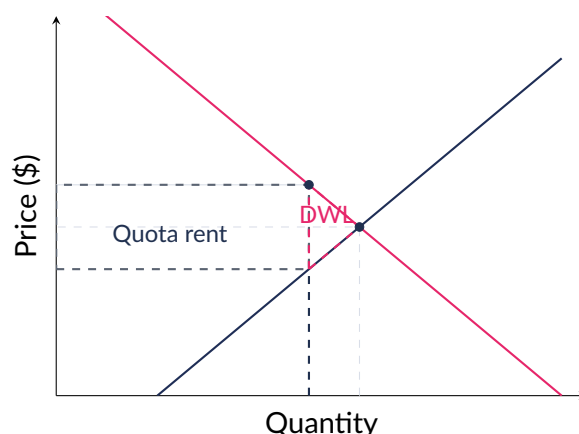
Original surplus (before the subsidy). Demand intercept = 60; supply intercept = -10. $CS_0 = \frac{1}{2} \times 84 \times (60 - 32) = \frac{1}{2} \times 84 \times 28 = \mathbf{1,176}$. $PS_0 = \frac{1}{2} \times 84 \times (32 - (-10)) = \frac{1}{2} \times 84 \times 42 = \mathbf{1,764}$. Total = 1,176 + 1,764 = **2,940**.

New surplus (after the subsidy). Since $Q' = 90$ is a genuine new equilibrium, both CS and PS are simple triangles: $CS_1 = \frac{1}{2} \times 90 \times (60 - 30) = \frac{1}{2} \times 90 \times 30 = \mathbf{1,350}$. $PS_1 = \frac{1}{2} \times 90 \times (35 - (-10)) = \frac{1}{2} \times 90 \times 45 = \mathbf{2,025}$. Sum = 1,350 + 2,025 = **3,375**.

The identity. $CS_1 + PS_1$ should equal the original total surplus *plus* the government's subsidy spending *minus* the deadweight loss: $2,940 + 450 - 15 = \mathbf{3,375}$ ✓. The subsidy channels \$450 thousand of taxpayer money into the private market, but \$15 thousand of that spending is wasted as deadweight loss on the 6 over-produced units rather than becoming usable surplus.

Khái niệm cốt lõi

An **import quota** (or any binding **quantity restriction**) sets a legal maximum on the quantity that may be sold, imported, or produced. If that limit is set **below** the free-trade/equilibrium quantity, it is **binding**: sellers may not legally supply more than the quota, so the market-clearing price is pulled up to whatever price makes quantity *demanded* equal that restricted quantity. The mechanics closely resemble a **price floor** – both raise price and reduce quantity traded below equilibrium – but a quota is imposed as a direct limit on *quantity*, rather than as a rule about the legal minimum *price*.



A binding quota limiting quantity to 100 (below $Q^* = 120$) forces price up to \$25 – identical to the \$25 price floor studied earlier, since both restrict trade to the same 100 units. The dashed rectangle is the \$1,000 (thousand) quota rent; the dashed triangle is the \$100 (thousand) deadweight loss.

Ví dụ mẫu · Worked example – A Binding Import Quota

Using $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ ($P^* = \$20$, $Q^* = 120$), the government imposes an import quota limiting total quantity sold to 100 units. Find the new market price.

Since only 100 units may legally be sold, price rises until quantity *demanded* falls to exactly 100: $200 - 4P = 100 \Rightarrow 4P = 100 \Rightarrow P = \25 . This is exactly the price that resulted from the \$25 price floor studied earlier in this chapter – a quota of 100 units and a price floor of \$25 produce an identical price/quantity outcome here, because both mechanisms restrict the market to the same 100 units; only the *tool* used to impose the restriction differs (a direct quantity limit versus a minimum legal price).

Quota rent. At the restricted quantity $Q = 100$, consumers pay \$25, but a seller's true marginal cost of supplying that 100th unit is only $P_s(100) = (100 - 40)/4 = \15 . The $\$25 - \$15 = \$10$ gap per unit is **quota rent** – extra revenue captured on the 100 units still sold, worth $\$10 \times 100 = \$1,000$ (thousand dollars) in total. Depending on how the quota is administered, this rent may go to domestic sellers, to foreign exporters holding import licenses, or to the government (if licenses are auctioned). Quota rent is *not* deadweight loss – it is surplus that is redistributed, not destroyed; the true DWL is still only the triangle from the 20 unsold units ($100 \rightarrow 120$), exactly as computed for the ceiling and floor above (\$100 thousand).

1.14.1 Comparing the Effects of Different Interventions

Policy	Q vs Q^*	Price to consumers	CS	PS	DWL
Free market	$= Q^*$	$= P^*$	Maximum	Maximum	0
Excise tax (on sellers)	$< Q^*$	$> P^*$	Falls	Falls	> 0
Subsidy (to sellers)	$> Q^*$	$< P^*$	Rises	Rises	> 0
Binding price ceiling	$< Q^*$	$< P^*$ (the ceiling)	Ambiguous [†]	Falls	> 0
Binding price floor	$< Q^*$	$> P^*$ (the floor)	Falls	Ambiguous [†]	> 0
Binding import quota	$< Q^*$	$> P^*$	Falls	Rises (+ quota rent)	> 0

[†] Whether CS rises or falls under a binding ceiling (and, symmetrically, PS under a floor) is technically ambiguous in general – it depends on demand and supply elasticities. In the \$15-ceiling example above, the 100 units still bought are worth (per unit) anywhere from $50 - 15 = \$35$ (the 1st unit) down to $(200 - 100)/4 - 15 = 25 - 15 = \10 (the 100th unit) – a **trapezoid**, not a simple triangle, because $Q_{\text{traded}} = 100$ is fixed by the *supply* side, not by where demand itself equals \$15. $CS_{\text{ceiling}} = \frac{1}{2} \times (35 + 10) \times 100 = \frac{1}{2} \times 45 \times 100 = 2,250$ (thousand dollars) – *more* than the original \$1,800, since

the price cut on the 100 units still purchased outweighs the loss of the 20 unbought units. Deadweight loss still occurs regardless, on those 20 missing units.

The simple triangle formula $CS = \frac{1}{2} \times Q \times (\text{intercept} - P)$ only applies when Q is the quantity where the demand curve *itself* equals the price being charged – true at a genuine new equilibrium (as under a tax or a subsidy), but **not** true at a controlled quantity set by a binding ceiling, floor, or quota, where Q_{traded} is fixed by whichever side of the market is shorter. In that case, compute the **trapezoid** using the demand (or supply) price at both $Q = 0$ and $Q = Q_{\text{traded}}$, as above.

GIẢI THÍCH TIẾNG VIỆT

VN

Trợ cấp theo đơn vị trả cho người bán làm cung dịch **sang phải** (giống một mức thuế âm): giá người mua trả GIẢM, giá người bán thực nhận (bằng giá người mua trả cộng trợ cấp) TĂNG, và lượng giao dịch tăng lên TRÊN mức hiệu quả Q^* – do đó trợ cấp cũng có thể tạo ra tổn thất phúc lợi của riêng nó trên các đơn vị vượt quá Q^* . Hạn ngạch nhập khẩu (import quota) đặt giới hạn tối đa về SỐ LƯỢNG được bán; nếu mức hạn ngạch thấp hơn lượng cân bằng tự do, giá thị trường sẽ bị đẩy lên – về tác động lên giá và lượng, hạn ngạch giống giá sàn, nhưng cơ chế áp đặt là giới hạn số lượng, không phải quy định mức giá tối thiểu.

1.15 Working with a PPC Equation: Intercepts and Opportunity Cost

Khái niệm cốt lõi

A production possibilities curve can be given as an explicit equation or as a table of attainable, efficient combinations, rather than just a picture. Two features are read directly from such data:

- The two **axis intercepts** give the **maximum attainable quantity** of each good if *all* resources are devoted to it alone (producing zero of the other good).
- The **opportunity cost** of good X between any two attainable, efficient points is $\left| \frac{\Delta Y}{\Delta X} \right|$ – the amount of Y that must be given up per additional unit of X gained, moving along the curve between those two points.

For a point that is not one of the given data points, compare it to the curve by **linearly interpolating** between the two nearest known points that bracket it, to estimate the maximum attainable amount of one good at the given level of the other.

GIẢI THÍCH TIẾNG VIỆT

VN

Đường PPC có thể được cho dưới dạng phương trình hoặc bảng số liệu. Hai điểm cắt trục (axis intercepts) cho biết lượng tối đa của mỗi hàng hoá nếu dồn toàn bộ nguồn lực vào sản xuất nó. Chi phí cơ hội của X giữa hai điểm hiệu quả là $|\Delta Y / \Delta X|$. Để xét một điểm không nằm trong bảng số liệu đã cho, ta nội suy tuyến tính (linear interpolation) giữa hai điểm gần nhất để ước lượng ranh giới của đường PPC tại đó.

Ví dụ mẫu · Worked example – Reading a PPC from a Data Table

An economy's PPC for Good X (horizontal) and Good Y (vertical) passes through the attainable, efficient points (0, 60), (10, 54), (30, 30), and (50, 0).

Axis intercepts. If all resources go to Y : maximum $Y = 60$ (at $X = 0$). If all resources go to X : maximum $X = 50$ (at $Y = 0$).

Opportunity cost of X , segment by segment (in units of Y per unit of X):

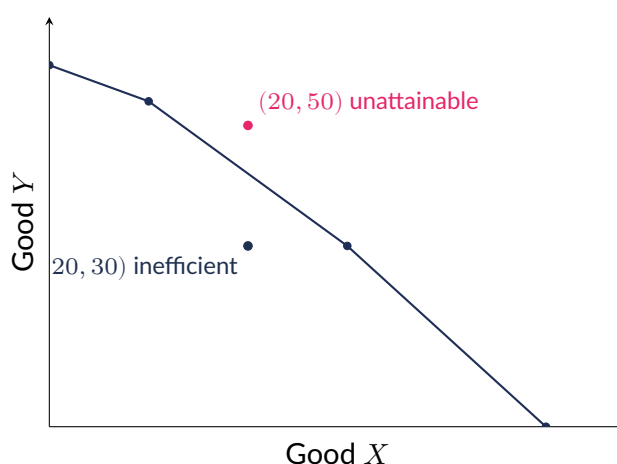
Segment (X range)	ΔX	ΔY	OC of X (units of Y)
$0 \rightarrow 10$	10	-6	0.6
$10 \rightarrow 30$	20	-24	1.2
$30 \rightarrow 50$	20	-30	1.5

Since $0.6 < 1.2 < 1.5$, opportunity cost **rises** as X production expands, confirming the law of increasing opportunity cost (and the bowed-out shape of this PPC).

Classifying the point (20, 50). Since $X = 20$ lies between the given points (10, 54) and (30, 30), interpolate linearly to estimate the maximum Y attainable at $X = 20$: the segment's slope is $\Delta Y / \Delta X = (30 - 54) / (30 - 10) = -24 / 20 = -1.2$ per unit of X , so

$$Y_{\max}(X=20) = 54 + (-1.2)(20 - 10) = 54 - 12 = 42.$$

The point (20, 50) has $Y = 50$, which **exceeds** this maximum attainable $Y = 42$ at $X = 20$. Therefore (20, 50) is currently **unattainable** with this economy's resources and technology.



The PPC through (0, 60), (10, 54), (30, 30), (50, 0) bows outward, so the opportunity cost of X rises along each successive segment. (20, 50) lies outside the curve (unattainable); (20, 30) lies inside (attainable but inefficient).

(!) Lỗi thường gặp: When checking whether a point is attainable, compare it to the **interpolated boundary at the same X -value**, not to the nearest data point's Y -value. A point can have a larger Y than one neighboring data point and still be unattainable, or a smaller Y than a neighboring point and still be inefficient rather than outside the curve – always interpolate at the matching X first.

Ví dụ mẫu · Worked example – An Algebraic (Circular) PPC

A PPC can also be given directly as an equation rather than a table. Suppose an economy's PPC is $X^2 + Y^2 = 100$ (with $X, Y \geq 0$), the same quarter-circle shape used for the PPC graphs earlier in this chapter. Find both intercepts and the opportunity cost of X over the segments $X:0 \rightarrow 6$, $X:6 \rightarrow 8$, and $X:8 \rightarrow 10$.

Intercepts. Setting $Y = 0$: $X^2 = 100 \Rightarrow X = 10$ (maximum X). Setting $X = 0$: $Y^2 = 100 \Rightarrow Y = 10$ (maximum Y).

Points on the curve. $X = 6: Y = \sqrt{100 - 36} = \sqrt{64} = 8$. $X = 8: Y = \sqrt{100 - 64} = \sqrt{36} = 6$.
 $X = 10: Y = \sqrt{100 - 100} = 0$.

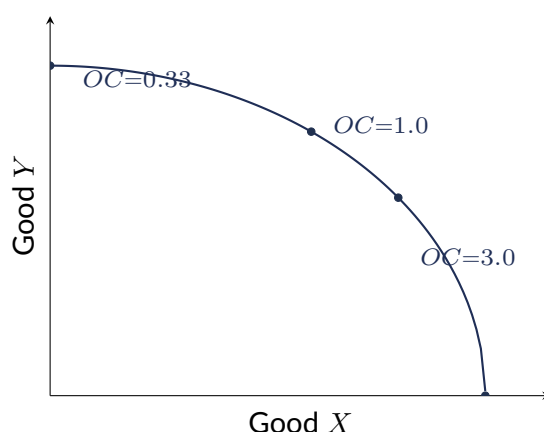
Opportunity cost of X:

$X:0 \rightarrow 6: \Delta X = 6, \Delta Y = 8 - 10 = -2, OC = 2/6 = \mathbf{0.33}$.

$X:6 \rightarrow 8: \Delta X = 2, \Delta Y = 6 - 8 = -2, OC = 2/2 = \mathbf{1.0}$.

$X:8 \rightarrow 10: \Delta X = 2, \Delta Y = 0 - 6 = -6, OC = 6/2 = \mathbf{3.0}$.

Opportunity cost rises sharply, $0.33 \rightarrow 1.0 \rightarrow 3.0$, confirming the same law of increasing opportunity cost seen with the table-based PPC – an algebraic curve is analyzed exactly the same way, just with Y -values computed from the equation instead of read off a table.



The quarter-circle PPC $X^2 + Y^2 = 100$: opportunity cost of X rises from 0.33 near the Y -axis to 3.0 near the X -axis.

The **marginal rate of transformation (MRT)** is the slope of the PPC at a single point – the Y given up for one more unit of X right at that point, rather than averaged over a whole segment. $OC = |\Delta Y / \Delta X|$ computed over a segment is only an **average** MRT across that segment; narrowing the segment gives a closer approximation to the true, point-specific MRT. Because the PPC is bowed outward, MRT itself keeps rising continuously as X increases – the law of increasing opportunity cost holds at every point, not just between the four sample points used above.

Ví dụ mẫu · Worked example – Narrowing the Segment Refines the Estimate

Using $X^2 + Y^2 = 100$ again, compare the opportunity cost of X over the segment $X:8 \rightarrow 10$ (already found to be 3.0) with the narrower segment $X:8 \rightarrow 9$.

At $X = 9: Y = \sqrt{100 - 81} = \sqrt{19} \approx 4.36$. Segment $8 \rightarrow 9: \Delta X = 1, \Delta Y \approx 4.36 - 6 = -1.64$, so $OC \approx 1.64$.

This narrower-segment estimate (1.64) sits between the OC of the segment just before it ($6 \rightarrow 8$, $OC = 1.0$) and the wider $8 \rightarrow 10$ estimate (3.0) – confirming that OC is rising smoothly and continuously along the curve, and that a narrower segment always gives a more precise *local* estimate of the true MRT at $X = 8$ than a wider one does.

Practice Problems

Bài tập luyện tập – Câu 1

A country's PPC shows attainable points: at $A=2$, $B=18$; at $A=4$, $B=14$; at $A=6$, $B=8$. The opportunity cost of the 5th and 6th units of Good A (moving from $A=4$ to $A=6$) is:

- (A) 1 unit of B (C) 3 units of B
(B) 2 units of B (D) 6 units of B

Lời giải chi tiết

$\Delta A = 2$, $\Delta B = 14 - 8 = 6$. OC per unit of $A = 6/2 = 3$ units of B . (C).

Bài tập luyện tập – Câu 2

Country M produces 6 Cars or 30 Bikes per worker-day; Country N produces 5 Cars or 10 Bikes per worker-day. Which statement is correct?

- (A) M has comparative advantage in Cars (C) N has absolute advantage in both goods
(B) N has comparative advantage in Cars (D) No mutually beneficial trade is possible

Lời giải chi tiết

OC of 1 Car: $M = 30/6 = 5$ Bikes; $N = 10/5 = 2$ Bikes. N 's OC is lower, so N has comparative advantage in Cars (and M , with OC of 1 Bike = $6/30 = 0.2$ Car versus N 's 0.5 Car, has comparative advantage in Bikes). (B).

Bài tập luyện tập – Câu 3

A severe drought destroys a large share of a nation's farmland. On a PPC with Food on one axis and Manufactured Goods on the other, this is best represented by:

- (A) A parallel outward shift of the whole PPC (C) A movement along the existing curve
(B) An inward shift, pivoting most sharply toward the Food axis (D) An inward shift, pivoting most sharply toward the Manufactured Goods axis

Lời giải chi tiết

Losing farmland directly reduces the maximum attainable Food output far more than manufacturing capacity, so the PPC contracts inward and pivots most sharply toward the Food axis. (B).

Bài tập luyện tập – Câu 4

Consumer income rises for a normal good at the same time a key input's price falls. Equilibrium quantity will ____, and equilibrium price will ____.

- (A) increase; increase (C) increase; be indeterminate without more information
(B) increase; decrease (D) decrease; increase

Lời giải chi tiết

Higher income shifts demand right; a cheaper input shifts supply right. Both shifts unambiguously raise equilibrium quantity, but one pushes price up while the other pushes price down – the net price effect is indeterminate from the information given. **(C)**.

Bài tập luyện tập – Câu 5

A binding price ceiling set below the equilibrium price in the wheat market will most likely cause:

- | | |
|--------------------------------|---|
| (A) A surplus of wheat | (C) No change in quantity traded |
| (B) A shortage of wheat | (D) The supply curve to shift left |

Lời giải chi tiết

Below equilibrium, quantity demanded exceeds quantity supplied at the controlled price ⇒ shortage. **(B)**.

Bài tập luyện tập – Câu 6

Which of the following best illustrates entrepreneurship, as distinct from labor?

- | | |
|---|---|
| (A) An assembly-line worker installing car doors | (C) A person who mortgages her house to start a risky new firm, combining land, labor, and capital |
| (B) An engineer designing under her manager's exact specifications | (D) A landlord collecting rent on an apartment building |

Lời giải chi tiết

Entrepreneurship means organizing the other resources and bearing risk to start a new venture, exactly what the third option describes. **(C)**.

Bài tập luyện tập – Câu 7

A firm has already spent \$2 million developing a product that market research now shows will not be profitable. Continuing to spend money to finish the product “to avoid wasting” the \$2 million already spent is an example of:

- | | |
|--|---|
| (A) Correct use of opportunity cost reasoning | (C) Comparative advantage |
| (B) The sunk cost fallacy | (D) Marginal benefit exceeding marginal cost |

Lời giải chi tiết

The \$2 million already spent is a sunk cost and irrelevant to the forward-looking decision; letting it influence the decision is the sunk cost fallacy. **(B)**.

Bài tập luyện tập – Câu 8

On a bowed-out PPC with Good X on the horizontal axis, moving from left to right, the opportunity cost of each additional unit of X (in terms of the other good given up):

- (A) Stays constant (C) Increases
(B) Decreases (D) Is zero everywhere

Lời giải chi tiết

The law of increasing opportunity cost: as X increases, resources less suited to X must be reallocated, raising the OC of each successive unit. (C).

Bài tập luyện tập – Câu 9

A centrally planned economy replaces market prices with a state planning board that sets production quotas for every good. Relative to a market economy, this system is generally most challenged by:

- (A) An inability to answer the “what to produce” question at all
- (B) Gathering and using the dispersed information that prices normally communicate
- (C) Complete elimination of scarcity
- (D) Guaranteed technological progress

Lời giải chi tiết

Command economies can technically answer all three questions, but without price signals they struggle to aggregate the dispersed, constantly changing information about costs and preferences that market prices convey. **(B)**.

Bài tập luyện tập – Câu 10

$Q_d = 180 - 3P$ and $Q_s = 20 + 2P$. Find the equilibrium price and quantity.

Lời giải chi tiết

Set equal: $180 - 3P = 20 + 2P \Rightarrow 160 = 5P \Rightarrow P^* = \32 . Then $Q^* = 180 - 3(32) = 180 - 96 = 84$ (check: $Q_s = 20 + 2(32) = 84 \checkmark$).

Bài tập luyện tập – Câu 11

Using $Q_d = 180 - 3P$, $Q_s = 20 + 2P$ from the previous problem, suppose the government sets a price floor at $P = \$40$. Find the size of the resulting surplus.

Lời giải chi tiết

At $P = 40$: $Q_d = 180 - 120 = 60$; $Q_s = 20 + 80 = 100$. Surplus = $100 - 60 = \mathbf{40}$ units. Since \$40 exceeds the equilibrium price of \$32, the floor is binding.

Bài tập luyện tập – Câu 12

Refer again to $Q_d = 180 - 3P$, $Q_s = 20 + 2P$. If instead the government sets a price ceiling at $P = \$28$, is the ceiling binding, and if so, what is the shortage?

Lời giải chi tiết

Since $\$28 < P^* = \32 , the ceiling is binding. At $P = 28$: $Q_d = 180 - 84 = 96$; $Q_s = 20 + 56 = 76$. Shortage = $96 - 76 = 20$ units.

Bài tập luyện tập – Câu 13

A rise in the price of tea (a substitute for coffee) will most directly cause:

- | | |
|--|--|
| (A) A movement up along the coffee demand curve | (C) A leftward shift of the coffee demand curve |
| (B) A rightward shift of the coffee demand curve | (D) A rightward shift of the coffee supply curve |

Lời giải chi tiết

As tea becomes relatively more expensive, some consumers switch to coffee, raising demand for coffee at every price – a rightward shift of the coffee demand curve. **(B)**.

Bài tập luyện tập – Câu 14

A new, cheaper method of manufacturing solar panels is developed. All else equal, in the market for solar panels, this will:

- | | |
|---|--|
| (A) Shift demand right, raising price and quantity | (C) Shift supply left, raising price and lowering quantity |
| (B) Shift supply right, lowering price and raising quantity | (D) Cause a movement down along the existing supply curve only |

Lời giải chi tiết

Improved (cheaper) technology is a supply shifter: supply shifts right, equilibrium price falls and equilibrium quantity rises. **(B)**.

Bài tập luyện tập – Câu 15

In a two-good world, an economy is currently producing at a point strictly inside its PPC. Which statement is correct?

- | | |
|---|--|
| (A) The economy is productively efficient | (C) The economy could produce more of at least one good without giving up any of the other |
| (B) Producing more of one good necessarily requires producing less of the other | (D) The point is unattainable |

Lời giải chi tiết

A point inside the PPC means resources are unemployed or misallocated; moving toward the curve can increase output of at least one good with no sacrifice of the other. **(C)**.

Bài tập luyện tập – Câu 16

Output per worker-hour: Country P can produce 8 Toys or 4 Textiles; Country Q can produce 6 Toys or 2 Textiles. Determine each country's comparative advantage and a valid terms of trade for Textiles (in Toys per Textile).

Lời giải chi tiết

OC of 1 Textile: $P = 8/4 = 2$ Toys; $Q = 6/2 = 3$ Toys. P 's OC is lower $\Rightarrow P$ has comparative advantage in Textiles. OC of 1 Toy: $P = 4/8 = 0.5$ Textile; $Q = 2/6 = 0.33$ Textile. Q 's OC is lower $\Rightarrow Q$ has comparative advantage in Toys. A valid terms of trade for Textiles must lie strictly between the two producers' Textile opportunity costs: between **2 and 3 Toys per Textile** (e.g., 2.5).

Bài tập luyện tập – Câu 17

A government imposes a \$5 per-unit subsidy on domestic wheat producers. In the market for wheat, this will:

- | | |
|--|--|
| (A) Shift demand right | (C) Shift supply left, raising the price consumers pay |
| (B) Shift supply right, lowering the price consumers pay | (D) Have no effect on equilibrium price or quantity |

Lời giải chi tiết

A subsidy lowers producers' effective cost, acting like a decrease in cost that shifts supply right; equilibrium price to consumers falls and quantity rises. **(B)**.

Bài tập luyện tập – Câu 18

Suppose demand for a good decreases (shifts left) while supply simultaneously increases (shifts right). What happens to equilibrium price and quantity?

- | | |
|---|---|
| (A) Price falls; quantity change is indeterminate | (C) Quantity falls; price change is indeterminate |
| (B) Price rises; quantity change is indeterminate | (D) Both price and quantity rise |

Lời giải chi tiết

Both shifts push price down unambiguously (demand falling and supply rising both lower price), but demand falling pushes quantity down while supply rising pushes quantity up – the net quantity effect is indeterminate without more information. **(A)**.

Bài tập luyện tập – Câu 19

A worker decides whether to spend an extra hour training. The marginal benefit (present value of higher future wages) of the first through fourth hours is \$40, \$32, \$24, \$16, and the opportunity cost per hour (forgone wage) is a constant \$28. How many hours should she train?

Lời giải chi tiết

Compare MB to $MC = \$28$ hour by hour: hour 1 ($40 > 28$, train), hour 2 ($32 > 28$, train), hour 3 ($24 < 28$, stop). She should train for exactly **2 hours**.

Bài tập luyện tập – Câu 20

Which of the following is classified as physical capital in the economic sense?

- (A) \$10,000 in a savings account (C) A fleet of delivery trucks owned by a logistics firm
(B) 100 shares of company stock (D) A worker's paycheck

Lời giải chi tiết

Physical capital is a produced resource used to make other goods/services – delivery trucks qualify; savings, stock, and paychecks are financial assets/income, not physical capital. **(C)**.

Bài tập luyện tập – Câu 21 – multi-part

An economy produces only Food and Machines. Its PPC passes through (0, 50), (20, 44), (40, 30), and (50, 0) (Food, Machines).

- (a) Find the opportunity cost of the 21st through 40th unit of Food (moving from Food= 20 to Food= 40), in Machines.
(b) Find the opportunity cost of the 1st through 20th unit of Food, in Machines.
(c) Does this PPC display increasing opportunity cost? Explain using your answers to (a) and (b).
(d) The economy is observed producing 30 Food and 20 Machines. What can be said about this point?

Lời giải chi tiết

- (a) $\Delta \text{Food} = 20$, $\Delta \text{Machines} = 44 - 30 = 14$. $\text{OC} = 14/20 = 0.7$ Machines per unit of Food.
(b) $\Delta \text{Food} = 20$, $\Delta \text{Machines} = 50 - 44 = 6$. $\text{OC} = 6/20 = 0.3$ Machines per unit of Food.
(c) Yes: the OC of Food rises from 0.3 (first 20 units) to 0.7 (next 20 units), confirming increasing opportunity cost (bowed-out PPC).
(d) At Food= 30, the PPC (interpolating between (20, 44) and (40, 30)) allows at most Machines = $44 - 0.7(10) = 37$. Since $20 < 37$, the point (30, 20) lies **inside** the PPC – attainable but productively inefficient (resources unemployed or misallocated).

Bài tập luyện tập – Câu 22

Which best describes the difference between a movement along the demand curve and a shift of the demand curve?

- (A) Both are caused only by a change in the good's own price (C) A shift is caused by a change in the good's own price; a movement along is caused by income
(B) A movement along is caused by a change in the good's own price; a shift is caused by a non-price determinant (D) There is no meaningful difference

Lời giải chi tiết

This is the standard distinction tested repeatedly on the AP exam. **(B)**.

Bài tập luyện tập – Câu 23

In the circular flow model, wages paid by firms to households are part of which flow?

- (A) A real flow in the product market (C) A real flow in the resource market
(B) A money flow in the product market (D) A money flow in the resource market

Lời giải chi tiết

Wages are a monetary payment from firms to households for labor, occurring in the resource (factor) market – a money flow. **(D)**.

Bài tập luyện tập – Câu 24

A price floor set *below* the equilibrium price will:

- (A) Create a surplus (C) Have no effect on the market outcome
(B) Create a shortage (D) Cause supply to shift left

Lời giải chi tiết

A price floor only binds if set above equilibrium; one set below equilibrium is non-binding, so the market simply clears at the original equilibrium. **(C)**.

Bài tập luyện tập – Câu 25

$Q_d = 500 - 10P$, $Q_s = -100 + 15P$. Find the equilibrium price and quantity.

Lời giải chi tiết

$500 - 10P = -100 + 15P \Rightarrow 600 = 25P \Rightarrow P^* = \24 . $Q^* = 500 - 10(24) = 500 - 240 = 260$ (check: $Q_s = -100 + 15(24) = -100 + 360 = 260$ ✓).

Bài tập luyện tập – Câu 26

Using $Q_d = 500 - 10P$, $Q_s = -100 + 15P$ ($P^* = \$24$), a \$5 per-unit tax is imposed on sellers. Find the new price consumers pay, the new price sellers keep, and the tax revenue collected. (Round quantity to the nearest whole unit.)

Lời giải chi tiết

New supply (in terms of consumer price P): $Q'_s = -100 + 15(P - 5) = -175 + 15P$. Set equal to demand: $500 - 10P = -175 + 15P \Rightarrow 675 = 25P \Rightarrow P_{\text{consumer}} = \27 . $Q' = 500 - 10(27) = 230$. $P_{\text{seller}} = 27 - 5 = \22 (check: $Q_s = -100 + 15(22) = -100 + 330 = 230$ ✓). Consumer burden = $27 - 24 = \$3$; seller burden = $24 - 22 = \$2$ – demand (slope magnitude 10) is steeper/less responsive than supply (slope 15), so consumers bear the larger share ($3 > 2$). Tax revenue = $5 \times 230 = \$1,150$.

Bài tập luyện tập – Câu 27

A nation invests heavily in universal public education and basic scientific research over two decades, while another nation, starting from an identical PPC, devotes nearly all resources to current consumption. Which best describes the likely outcome after two decades?

- (A) Both PPCs will be identical, since PPC position does not depend on past choices
(B) The first nation's PPC will likely have shifted outward more than the second's
(C) The second nation's PPC will necessarily shift outward more, since consumption raises living standards
(D) Neither PPC can shift, since resources are always fixed

Lời giải chi tiết

Investment in human capital (education) and technology (research) raises future productive capacity, shifting the PPC outward faster than an economy that consumes nearly all of its output today. **(B)**.

Bài tập luyện tập – Câu 28

Which pair of goods is most likely to be complements, such that a fall in the price of the first raises demand for the second?

- (A) Coffee and tea
(B) Butter and margarine
(C) Video game consoles and video games
(D) Bus tickets and taxi rides

Lời giải chi tiết

Consoles and the games played on them are typically used together; a cheaper console raises demand for the complementary games. **(C)**.

Bài tập luyện tập – Câu 29

At the competitive market equilibrium, total surplus (consumer surplus plus producer surplus) is:

- (A) Zero, since consumer and producer surplus exactly cancel
(B) Minimized, since price controls could increase it further
(C) Maximized, and any binding price control reduces it
(D) Undefined without knowing production costs

Lời giải chi tiết

At Q^* , every unit whose marginal benefit (demand) is at least its marginal cost (supply) is produced, and no unit costing more than its benefit is produced; total surplus is maximized here. Moving away from Q^* in either direction (via a binding ceiling, floor, quota, or similar distortion) creates deadweight loss, reducing total surplus. **(C)**.

Bài tập luyện tập – Câu 30 – multi-part, graph required

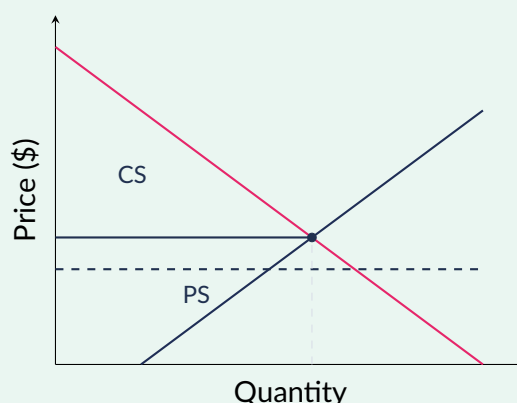
The market for a good is described by $Q_d = 100 - 2P$ and $Q_s = 20 + 2P$.

- Find the equilibrium price and quantity.
- Draw a correctly labeled supply-and-demand graph; shade and label consumer surplus (CS) and producer surplus (PS).
- Compute CS and PS numerically.
- The government now imposes a binding price ceiling at $P = \$15$. Find the quantity actually traded and the resulting deadweight loss.

Lời giải chi tiết

(a) Set $Q_d = Q_s$: $100 - 2P = 20 + 2P \Rightarrow 80 = 4P \Rightarrow P^* = \20 . $Q^* = 100 - 2(20) = 60$ (check: $Q_s = 20 + 2(20) = 60$ ✓).

(b)



(c) Demand intercept at $Q = 0$: $100 - 2P = 0 \Rightarrow P = \50 . Supply intercept at $Q = 0$: $20 + 2P = 0 \Rightarrow P = -\10 .

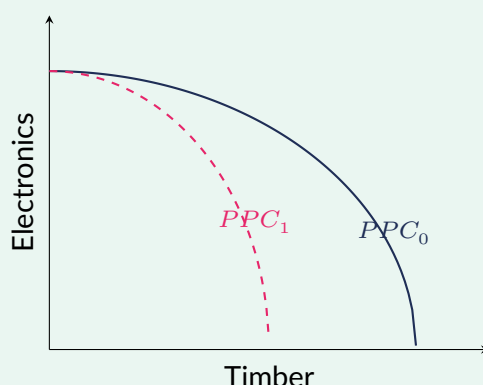
$CS = \frac{1}{2} \times 60 \times (50 - 20) = \frac{1}{2} \times 60 \times 30 = 900$. $PS = \frac{1}{2} \times 60 \times (20 - (-10)) = \frac{1}{2} \times 60 \times 30 = 900$.

(d) At $P = 15$: $Q_d = 100 - 30 = 70$; $Q_s = 20 + 30 = 50$. Actual quantity traded = $\min(70, 50) = 50$. Gap at $Q = 50$: demand price = $(100 - 50)/2 = \$25$; supply price = $(50 - 20)/2 = \$15$ (equal to the ceiling, as expected). Gap = $25 - 15 = \$10$. $DWL = \frac{1}{2} \times (60 - 50) \times 10 = \frac{1}{2} \times 10 \times 10 = 50$.

Bài tập luyện tập – Câu 31 – graph required

A country produces only Timber and Electronics. A severe wildfire destroys a large share of the country's forests, while its electronics factories are undamaged. Draw a correctly labeled PPC (Timber on the horizontal axis, Electronics on the vertical axis) showing the country's PPC before and after the wildfire, and briefly explain the shift.

Lời giải chi tiết



The wildfire destroys forest resources used specifically in timber production, so the PPC pivots inward along the Timber axis (maximum Timber output falls sharply), while the Electronics-axis intercept stays the same, since electronics factories and their inputs are undamaged. This is a lopsided (pivoted), not parallel, inward shift.

Bài tập luyện tập – Câu 32 – multi-part

$$Q_d = 200 - 5P \text{ and } Q_s = 50 + 5P.$$

- Find the equilibrium price and quantity.
- The government offers sellers a \$6-per-unit subsidy. Find the new price consumers pay, the new equilibrium quantity, and the effective price sellers receive.
- Find the total cost of the subsidy to the government.

Lời giải chi tiết

- $200 - 5P = 50 + 5P \Rightarrow 150 = 10P \Rightarrow P^* = \15 . $Q^* = 200 - 5(15) = 125$ (check: $Q_s = 50 + 5(15) = 125$ ✓).
- New supply: $Q'_s = 50 + 5(P + 6) = 50 + 5P + 30 = 80 + 5P$. Set $Q_d = Q'_s$: $200 - 5P = 80 + 5P \Rightarrow 120 = 10P \Rightarrow P_{\text{consumer}} = \12 . $Q' = 200 - 5(12) = 140$ (check: $Q'_s = 80 + 5(12) = 140$ ✓). $P_{\text{seller}} = 12 + 6 = \18 (check against original supply: $50 + 5(18) = 140$ ✓).
- Cost = $\$6 \times 140 = \840 (thousand dollars).

Bài tập luyện tập – Câu 33

A binding import quota set below the free-trade equilibrium quantity will most likely:

- | | |
|---|---|
| (A) Lower the domestic price and reduce quantity traded | (C) Have no effect, since quotas restrict quantity, not price |
| (B) Raise the domestic price and reduce quantity traded | (D) Raise both price and quantity traded above equilibrium |

Lời giải chi tiết

A binding quota restricts quantity below the free-trade level; price is then pulled up along the demand curve to whatever level makes quantity demanded match the restricted quantity – price rises while quantity traded falls, mechanically similar to a price floor. (B).

Bài tập luyện tập – Câu 34 – multi-part

An economy's PPC for Good X (horizontal) and Good Y (vertical) passes through $(0, 80)$, $(20, 68)$, $(40, 40)$, and $(60, 0)$.

- Find the opportunity cost of X (in units of Y) for each of the three segments.
- Does this PPC show increasing opportunity cost? Explain.
- Classify the point $(30, 60)$: attainable/efficient, attainable/inefficient, or unattainable. Show your work.

Lời giải chi tiết

(a) Segment $0 \rightarrow 20$: $\Delta X = 20$, $\Delta Y = 68 - 80 = -12$, $OC = 12/20 = \mathbf{0.6}$. Segment $20 \rightarrow 40$: $\Delta X = 20$, $\Delta Y = 40 - 68 = -28$, $OC = 28/20 = \mathbf{1.4}$. Segment $40 \rightarrow 60$: $\Delta X = 20$, $\Delta Y = 0 - 40 = -40$, $OC = 40/20 = \mathbf{2.0}$.

(b) Yes: OC rises $0.6 \rightarrow 1.4 \rightarrow 2.0$ as X production expands, confirming the law of increasing opportunity cost.

(c) $X = 30$ lies between $(20, 68)$ and $(40, 40)$; interpolated slope = $(40 - 68)/(40 - 20) = -28/20 = -1.4$ per unit of X . $Y_{\max}(X=30) = 68 + (-1.4)(30 - 20) = 68 - 14 = 54$. Since the point has $Y = 60 > 54$, it exceeds the maximum attainable Y at $X = 30$, so $(30, 60)$ is **unattainable**.

Bài tập luyện tập – Câu 35

A binding price floor set above equilibrium, compared to no intervention, will generally:

- | | |
|--|---|
| (A) Increase total surplus | (C) Decrease total surplus by creating dead-weight loss on the untraded units |
| (B) Leave total surplus unchanged, only re-distributing it | (D) Have an indeterminate effect on total surplus |

Lời giải chi tiết

A binding floor restricts actual quantity traded to $\min(Q_d, Q_s)$, below the efficient Q^* . The units between that reduced quantity and Q^* are never produced or consumed, destroying part of total surplus as deadweight loss. **(C)**.

Bài tập luyện tập – Câu 36 – multi-part

$Q_d = 150 - 2P$ and $Q_s = 30 + 3P$.

- Find the equilibrium price and quantity.
- A quota limits total quantity sold to 90 units. Find the resulting market price. Is this quota binding?

Lời giải chi tiết

(a) $150 - 2P = 30 + 3P \Rightarrow 120 = 5P \Rightarrow P^* = \24 . $Q^* = 150 - 2(24) = 102$ (check: $Q_s = 30 + 3(24) = 102 \checkmark$).

(b) Since $90 < 102$, the quota is binding. Price rises until $Q_d = 90$: $150 - 2P = 90 \Rightarrow 2P = 60 \Rightarrow P = \mathbf{\$30}$.

Bài tập luyện tập – Câu 37 – multi-part

Using $Q_d = 200 - 4P$, $Q_s = 40 + 4P$ ($P^* = \$20$, $Q^* = 120$), the government imposes an import quota limiting quantity to 90 units.

- (a) Find the new domestic price.
- (b) Find the quota rent generated.
- (c) Find the deadweight loss.

Lời giải chi tiết

- (a) Set $Q_d = 90$: $200 - 4P = 90 \Rightarrow 4P = 110 \Rightarrow P = \27.5 .
- (b) Supply price (true marginal cost) at $Q = 90$: $P_s(90) = (90 - 40)/4 = \12.5 . Gap = $27.5 - 12.5 = \$15$ per unit. Quota rent = $15 \times 90 = \$1,350$ (thousand dollars).
- (c) $DWL = \frac{1}{2} \times (120 - 90) \times 15 = \frac{1}{2} \times 30 \times 15 = 225$ (thousand dollars).

Bài tập luyện tập – Câu 38 – multi-part

An economy's PPC is given by $X^2 + Y^2 = 25$ (with $X, Y \geq 0$).

- (a) Find the two axis intercepts.
- (b) Find the opportunity cost of X for the segments $X:0 \rightarrow 3$, $X:3 \rightarrow 4$, and $X:4 \rightarrow 5$.
- (c) Does this PPC show increasing opportunity cost?

Lời giải chi tiết

- (a) Setting $Y = 0$: $X = 5$. Setting $X = 0$: $Y = 5$.
- (b) $X = 3$: $Y = \sqrt{25 - 9} = 4$. $X = 4$: $Y = \sqrt{25 - 16} = 3$. Segment $0 \rightarrow 3$: $\Delta X = 3$, $\Delta Y = 4 - 5 = -1$, $OC = 1/3 = 0.33$. Segment $3 \rightarrow 4$: $\Delta X = 1$, $\Delta Y = 3 - 4 = -1$, $OC = 1/1 = 1.0$. Segment $4 \rightarrow 5$: $\Delta X = 1$, $\Delta Y = 0 - 3 = -3$, $OC = 3/1 = 3.0$.
- (c) Yes: OC rises $0.33 \rightarrow 1.0 \rightarrow 3.0$, confirming the law of increasing opportunity cost.

Bài tập luyện tập – Câu 39

A government-provided per-unit subsidy in a market that was already at its efficient equilibrium will most likely:

- | | |
|--|--|
| (A) Increase total surplus, since more output is always better | (C) Decrease total surplus by causing production beyond the efficient quantity |
| (B) Leave total surplus unchanged | (D) Eliminate deadweight loss entirely |

Lời giải chi tiết

Subsidizing an already-efficient market pushes quantity traded above Q^* ; on those extra units, marginal cost exceeds marginal benefit, creating deadweight loss and reducing total surplus. (C).

Bài tập luyện tập – Câu 40 – multi-part

$Q_d = 120 - 2P$ and $Q_s = 20 + 2P$.

- (a) Find the equilibrium price and quantity, and compute CS and PS at equilibrium.

- (b) The government sets a price floor at $P = \$35$. Find the quantity actually traded and the resulting deadweight loss.

Lời giải chi tiết

(a) $120 - 2P = 20 + 2P \Rightarrow 100 = 4P \Rightarrow P^* = \25 . $Q^* = 120 - 2(25) = 70$ (check: $Q_s = 20 + 2(25) = 70$ ✓). Demand intercept: $120 - 2P = 0 \Rightarrow P = 60$. Supply intercept: $20 + 2P = 0 \Rightarrow P = -10$. $CS = \frac{1}{2} \times 70 \times (60 - 25) = \frac{1}{2} \times 70 \times 35 = \mathbf{1,225}$. $PS = \frac{1}{2} \times 70 \times (25 - (-10)) = \frac{1}{2} \times 70 \times 35 = \mathbf{1,225}$.

(b) At $P = 35$: $Q_d = 120 - 70 = 50$; $Q_s = 20 + 70 = 90$. Actual traded = $\min(50, 90) = \mathbf{50}$. Gap at $Q = 50$: demand price = $(120 - 50)/2 = \$35$ (matches the floor); supply price = $(50 - 20)/2 = \$15$. Gap = $35 - 15 = \$20$. $DWL = \frac{1}{2} \times (70 - 50) \times 20 = \frac{1}{2} \times 20 \times 20 = \mathbf{200}$.

Bài tập luyện tập – Câu 41 – multi-part

Using $Q_d = 100 - 2P$, $Q_s = 20 + 2P$ ($P^* = \$20$, $Q^* = 60$, $CS_0 = 900$, $PS_0 = 900$ from Câu 30), the government imposes a \$6-per-unit tax on sellers.

- Find the new price consumers pay, the new quantity, and the price sellers keep.
- Find consumer surplus, producer surplus, tax revenue, and deadweight loss after the tax.
- Verify that your four answers in (b) sum to the original total surplus of \$1,800.

Lời giải chi tiết

(a) New supply: $Q'_s = 20 + 2(P - 6) = 8 + 2P$. Set $Q_d = Q'_s$: $100 - 2P = 8 + 2P \Rightarrow 92 = 4P \Rightarrow P_{\text{consumer}} = \23 . $Q' = 100 - 2(23) = \mathbf{54}$ (check: $8 + 2(23) = 54$ ✓). $P_{\text{seller}} = 23 - 6 = \mathbf{\$17}$ (check original supply: $20 + 2(17) = 54$ ✓).

(b) $CS = \frac{1}{2} \times 54 \times (50 - 23) = \frac{1}{2} \times 54 \times 27 = \mathbf{729}$. $PS = \frac{1}{2} \times 54 \times (17 - (-10)) = \frac{1}{2} \times 54 \times 27 = \mathbf{729}$. Tax revenue = $6 \times 54 = \mathbf{324}$. Gap at $Q = 54$: demand price = $(100 - 54)/2 = 23$, supply price = $(54 - 20)/2 = 17$, gap = 6; $DWL = \frac{1}{2} \times (60 - 54) \times 6 = \frac{1}{2} \times 6 \times 6 = \mathbf{18}$.

(c) $729 + 729 + 324 + 18 = \mathbf{1,800}$ ✓, exactly the original total surplus ($CS_0 + PS_0 = 900 + 900$) – the tax redistributes surplus into smaller CS, smaller PS, and government revenue, with only \$18 truly destroyed as deadweight loss.

Bài tập luyện tập – Câu 42

A market begins at its efficient competitive equilibrium. For each intervention below, state whether the quantity actually traded rises, falls, or stays the same relative to Q^* , and whether it creates deadweight loss.

- A binding price ceiling.
- A per-unit subsidy paid to sellers.
- A price floor set *below* the equilibrium price.

Lời giải chi tiết

(a) Quantity **falls** below Q^* (restricted by the shorter, supply side); deadweight loss is created on the units between the new, smaller quantity and Q^* .

(b) Quantity **rises** above Q^* (sellers are paid more than their marginal cost for units beyond Q^*); deadweight loss is created on those over-produced units.

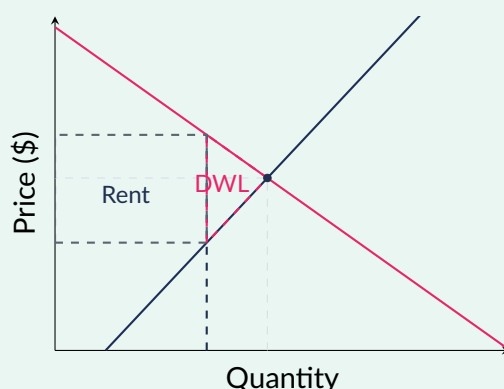
(c) A floor set below equilibrium is **non-binding**: quantity stays exactly at Q^* , and no deadweight loss is created.

Bài tập luyện tập – Câu 43 – graph required

Using $Q_d = 180 - 3P$, $Q_s = 20 + 2P$ ($P^* = \$32$, $Q^* = 84$), the government imposes an import quota limiting quantity to 60 units. Draw a correctly labeled supply-and-demand graph showing the quota, and label the quota-rent and deadweight-loss regions. Then compute the new domestic price, the quota rent, and the deadweight loss.

Lời giải chi tiết

Set $Q_d = 60$: $180 - 3P = 60 \Rightarrow 3P = 120 \Rightarrow P = \40 . Supply price (marginal cost) at $Q = 60$: $(60 - 20)/2 = \$20$. Gap = $40 - 20 = \$20$. Quota rent = $20 \times 60 = 1,200$ (thousand dollars). $DWL = \frac{1}{2} \times (84 - 60) \times 20 = \frac{1}{2} \times 24 \times 20 = 240$ (thousand dollars).



Bài tập luyện tập – Câu 44 – multi-part

Output per worker-day: Country R can produce 12 Chairs or 6 Tables; Country S can produce 8 Chairs or 8 Tables.

- Find each country's comparative advantage.
- Find the range of mutually beneficial terms of trade for Chairs (in Tables per Chair).
- If each country splits its time evenly between the two goods without trade, find combined output. Compare this to combined output after full specialization.

Lời giải chi tiết

(a) OC of 1 Chair: $R = 6/12 = 0.5$ Table; $S = 8/8 = 1$ Table. R 's OC is lower $\Rightarrow R$ has comparative advantage in Chairs. OC of 1 Table: $R = 12/6 = 2$ Chairs; $S = 8/8 = 1$ Chair. S 's OC is lower $\Rightarrow S$ has comparative advantage in Tables.

(b) Terms of trade for Chairs must lie strictly between the two OCs: **0.5 to 1 Table per Chair** (e.g., 0.75).

(c) *Without trade*: R produces 6 Chairs + 3 Tables; S produces 4 Chairs + 4 Tables. Combined: 10 Chairs + 7 Tables = 17 total units. *After full specialization*: R produces 12 Chairs + 0 Tables; S produces 0 Chairs + 8 Tables. Combined: 12 Chairs + 8 Tables = 20 total units – a gain of 3 units from specialization and trade.

Bài tập luyện tập – Câu 45

A market starts at its efficient competitive equilibrium. The government then imposes a per-unit tax on sellers. Which of the following is **NOT** true?

- (A) Quantity traded falls below Q^*
- (B) The government collects positive tax revenue
- (C) Total surplus ($CS + PS + \text{tax revenue}$) exceeds the original total surplus
- (D) Deadweight loss is created on the units between the new quantity and Q^*

Lời giải chi tiết

A tax can only *redistribute* part of the original surplus into smaller CS, smaller PS, and government revenue, while destroying the rest as deadweight loss on the untraded units; $CS + PS + \text{tax revenue}$ can never **exceed** the original total surplus – at best it equals the original total minus the deadweight loss. (C) is the false statement.

Bài tập luyện tập – Câu 46

A subsidy paid to sellers and a per-unit tax collected from sellers both create deadweight loss, but for opposite reasons. Which statement correctly distinguishes the two?

- (A) A tax creates DWL from under-production below Q^* ; a subsidy creates DWL from over-production above Q^*
- (B) Both create DWL from under-production below Q^*
- (C) Both create DWL from over-production above Q^*
- (D) A tax creates DWL from over-production; a subsidy creates DWL from under-production

Lời giải chi tiết

A tax raises the price consumers pay and lowers the price sellers keep, shrinking quantity traded below Q^* – DWL comes from the units between the smaller quantity and Q^* that go unproduced. A subsidy does the reverse, pushing quantity *above* Q^* – DWL comes from the extra units whose cost exceeds their value to consumers. (A).

Economic Indicators and the Business Cycle

Mục tiêu Unit: Vòng chu chuyển kinh tế mở rộng và các cách tính GDP; GDP thực so với GDP danh nghĩa, GDP bình quân đầu người và hạn chế của GDP; thất nghiệp (các loại, cách tính, hạn chế); chỉ số giá tiêu dùng (CPI) và lạm phát; các giai đoạn và chỉ báo của chu kỳ kinh doanh; định luật Okun; rò rỉ và bơm vào trong vòng chu chuyển mở rộng; GDP theo phương pháp thu nhập và phương pháp giá trị gia tăng; lãi suất danh nghĩa so với lãi suất thực và phương trình Fisher.

2.1 Measuring Output: GDP and the Expenditure Approach

Khái niệm cốt lõi

Gross Domestic Product (GDP) is the market value of all **final** goods and services produced **within a country's borders** in a given period. Three defining features: (1) it counts only *final* goods (to avoid double-counting, intermediate goods used up in producing something else are excluded); (2) it is measured by *market value* (requiring a common price-based yardstick); (3) it is a *territorial* measure (production within the country's borders, regardless of who owns the resources – this distinguishes GDP from GNP, which instead measures output produced by a country's *nationally owned* resources, at home or abroad).

GDP excludes: intermediate goods, purely financial transactions (buying stocks/bonds), **transfer payments** (government payments with no corresponding production, e.g. unemployment benefits, Social Security, welfare), and sales of used/secondhand goods (already counted when first produced).

Expenditure approach: $GDP = C + I + G + NX$, where C = personal consumption expenditures, I = gross private domestic investment (business fixed investment, residential construction, and inventory changes), G = government purchases of goods and services (*not* transfer payments), NX = net exports (exports – imports).

Ví dụ mẫu • Worked example – Computing GDP by the Expenditure Approach

In a given year: $C = \$12,000$ billion, $I = \$3,200$ billion, $G = \$3,600$ billion, exports = \$2,100 billion, imports = \$2,700 billion. In addition, the government pays \$900 billion in Social Security benefits. Find GDP.

$NX = 2,100 - 2,700 = -\$600$ billion. Social Security is a transfer payment and is *excluded* from G . $GDP = 12,000 + 3,200 + 3,600 + (-600) = \mathbf{\$18,200}$ billion.

(!) Lỗi thường gặp: Government **transfer payments** are *not* part of G – no good or service is produced in exchange. A rise in transfer payments does not, by itself, add to GDP through the G term (though it may indirectly raise C if recipients spend it).

GIẢI THÍCH TIẾNG VIỆT

VN

GDP là tổng giá trị thị trường của hàng hoá và dịch vụ **cuối cùng** sản xuất **trong lãnh thổ quốc gia** trong một kỳ. Công thức chi tiêu: $GDP = C + I + G + NX$. Không tính hàng hoá trung gian, giao dịch tài chính thuần tuý, khoản chi chuyển nhượng (trợ cấp), hay hàng đã qua sử dụng. GNP khác GDP: GNP đo sản lượng do nguồn lực THUỘC SỞ HỮU công dân một nước tạo ra (dù ở đâu), còn GDP đo sản lượng tạo ra TRONG lãnh thổ (bất kể ai sở hữu).

2.2 Real vs. Nominal GDP, and GDP Per Capita

Khái niệm cốt lõi

Nominal GDP values current-year output at **current-year prices**. **Real GDP** values current-year output at **constant base-year prices**, removing the effect of pure price changes so that real GDP changes reflect true changes in production. **GDP per capita** (real GDP ÷ population) is a common, if imperfect, proxy for average material living standards, since it does not reflect how income is distributed.

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100 \iff \text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}} \times 100.$$

Approximation for growth rates: $\% \Delta \text{Nominal GDP} \approx \% \Delta \text{Real GDP} + \% \Delta \text{GDP deflator}$.

Ví dụ mẫu · Worked example – Real GDP from Nominal GDP and the Deflator

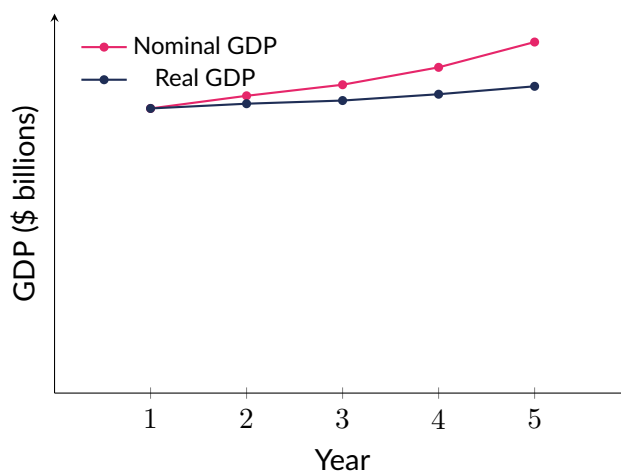
Nominal GDP is \$24,000 billion and the GDP deflator is 120 (base year = 100). Find real GDP.

$$\text{Real GDP} = \frac{24,000}{120} \times 100 = \$20,000 \text{ billion}.$$

Ví dụ mẫu · Worked example – Approximating Real Growth

Nominal GDP grew 7% and the GDP deflator rose 4% over the same year. Find the approximate real GDP growth rate.

$$\% \Delta \text{Real} \approx \% \Delta \text{Nominal} - \% \Delta \text{Deflator} = 7\% - 4\% = 3\%.$$



Nominal GDP rises faster than real GDP whenever the price level is also rising: the growing gap between the two lines reflects inflation, not extra production.

GIẢI THÍCH TIẾNG VIỆT

VN

GDP danh nghĩa tính theo giá hiện hành; GDP thực tính theo giá năm gốc, loại bỏ ảnh hưởng của lạm phát để phản ánh đúng sản lượng thực tế. $\text{GDP deflator} = (\text{GDP danh nghĩa} \div \text{GDP thực}) \times 100$. GDP bình quân đầu người ($= \text{GDP thực} \div \text{dân số}$) là thước đo mức sống trung bình phổ biến nhưng không phản ánh cách phân phối thu nhập.

2.3 Limitations of GDP**Khái niệm cốt lõi**

GDP is a useful but imperfect measure of production and an even more imperfect measure of *well-being*. It omits: **non-market production** (housework, volunteer work, DIY home repair), the **underground/informal economy** (unreported and illegal transactions), the value of **leisure time**, the **distribution** of income across the population, and **negative externalities** such as pollution generated in production. GDP also says nothing directly about the quality of goods, health outcomes, or political freedom.

GIẢI THÍCH TIẾNG VIỆT

VN

GDP KHÔNG đo được: sản xuất phi thị trường (việc nhà, tình nguyện), kinh tế ngầm, thời gian nghỉ ngơi, phân phối thu nhập, hay các ngoại tác tiêu cực (ô nhiễm). GDP là thước đo sản lượng, không phải thước đo trực tiếp chất lượng cuộc sống.

2.4 Unemployment: Definitions and Measurement**Khái niệm cốt lõi**

The **labor force** = employed + unemployed, where the **unemployed** are people without a job who are *actively seeking* one. People who are neither working nor looking for work (students, retirees, homemakers, **discouraged workers** who gave up searching) are **not in the labor force** at all.

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{\text{Labor force}} \times 100, \quad \text{Labor force participation rate} = \frac{\text{Labor force}}{\text{Working-age population}} \times 100$$

Ví dụ mẫu · Worked example – Unemployment Rate

The working-age population is 260 million; 200 million are in the labor force, of whom 185 million are employed. Find the unemployment rate and the labor force participation rate.

Unemployed = $200 - 185 = 15$ million. Unemployment rate = $\frac{15}{200} \times 100 = 7.5\%$. Participation rate = $\frac{200}{260} \times 100 \approx 76.9\%$.

(!) Lỗi thường gặp: **Discouraged workers** who stop actively searching are removed from the labor force entirely – they are *not* counted as unemployed. This can make the official unemployment rate *understate* true labor-market slack during a weak economy (as discouraged workers leave the labor force, the measured unemployment rate can even fall even though jobs are scarce).

2.5 Types of Unemployment and the Natural Rate

Khái niệm cốt lõi

- **Frictional unemployment:** short-term unemployment from normal job search and transitions between jobs (e.g., a recent graduate searching for her first job). Considered largely unavoidable and even efficient (better job matches).
- **Structural unemployment:** arises from a mismatch between workers' skills/location and available jobs (e.g., automation eliminating an entire occupation, or jobs relocating geographically).
- **Cyclical unemployment:** arises from a downturn in the business cycle (insufficient aggregate demand for labor); rises in recessions, falls in expansions.
- **Seasonal unemployment:** predictable, recurring unemployment tied to the season (e.g., agricultural or holiday-retail workers); typically removed from headline statistics via seasonal adjustment.

The **natural rate of unemployment** = frictional + structural unemployment – the rate that persists even at **full employment** (i.e., when the economy operates at **potential GDP**). The economy is at full employment precisely when **cyclical unemployment** = 0, not when the unemployment rate is zero.

Type	Typical example
Frictional	A college graduate spending six weeks searching for her first job.
Structural	A coal-plant worker permanently laid off as the industry automates and shrinks.
Cyclical	A factory worker laid off during a nationwide recession.
Seasonal	A ski-resort lift operator unemployed every summer.

Ví dụ mẫu · Worked example – Classifying Unemployment

A factory permanently automates its assembly line, eliminating an engineer's position because her specific skill set is no longer needed anywhere in the industry. Classify this unemployment. This is a permanent skills/technology mismatch, not simple job search or a cyclical downturn: **structural** unemployment.

GIẢI THÍCH TIẾNG VIỆT

VN

Lực lượng lao động = có việc làm + thất nghiệp (đang tích cực tìm việc). Người nản chí (discouraged workers) không tính vào lực lượng lao động. Bốn loại thất nghiệp: cọ xát (frictional, tìm việc bình thường), cơ cấu (structural, lệch kỹ năng/địa điểm), chu kỳ (cyclical, do suy thoái), thời vụ (seasonal). Tỷ lệ thất nghiệp tự nhiên = cọ xát + cơ cấu; toàn dụng lao động khi thất nghiệp chu kỳ = 0 (KHÔNG phải khi tỷ lệ thất nghiệp bằng 0).

2.6 Price Indices and Inflation

Khái niệm cốt lõi

The **Consumer Price Index (CPI)** tracks the cost of a fixed, representative **market basket** of goods and services over time, relative to its cost in a chosen base year. The **GDP deflator** (Section 2.2) differs from CPI in that it covers *all* domestically produced goods (not a fixed household basket, and it excludes imports but includes capital/government goods), and its basket automatically updates each year rather than staying fixed.

Unanticipated inflation redistributes wealth: from lenders to borrowers (borrowers repay with dollars that buy less), and away from people on fixed incomes. Inflation also imposes **menu costs** (the resource cost of updating posted prices) and **shoe-leather costs** (the time/effort cost of holding less cash and making more trips to the bank).

$$CPI = \frac{\text{cost of basket, current year}}{\text{cost of basket, base year}} \times 100, \quad \text{Inflation rate} = \frac{CPI_{\text{new}} - CPI_{\text{old}}}{CPI_{\text{old}}} \times 100.$$

Category	Weight	Base-year cost	Current-year cost
Housing	42%	\$840	\$924
Food & beverages	15%	\$300	\$318
Transportation	17%	\$340	\$357
Medical care	8%	\$160	\$176
Recreation & other	18%	\$360	\$369
Total basket	100%	\$2,000	\$2,144

Ví dụ mẫu · Worked example – Computing CPI from a Basket

Using the basket table above, compute the current-year CPI (base year = 100) and the inflation rate since the base year.

$$CPI = \frac{2,144}{2,000} \times 100 = 107.2. \quad \text{Inflation rate since base year} = \frac{107.2 - 100}{100} \times 100 = \mathbf{7.2\%}.$$

Ví dụ mẫu · Worked example – Inflation Rate Between Two Years

CPI is 180 in 2023 and 189 in 2024. Find the 2023–2024 inflation rate.

$$\text{Inflation rate} = \frac{189 - 180}{180} \times 100 = \mathbf{5\%}.$$

(!) Lỗi thường gặp: A *falling* inflation rate (**disinflation**) still means prices are rising, just more slowly – it is not the same as **deflation**, where the price level actually *falls* (a negative inflation rate).

GIẢI THÍCH TIẾNG VIỆT

VN

CPI đo chi phí của một giỏ hàng CỐ ĐỊNH qua các năm so với năm gốc; GDP deflator bao phủ toàn bộ hàng hoá sản xuất trong nước và giỏ hàng thay đổi theo từng năm. Lạm phát bắt nguồn từ chuyển giao của cải từ người cho vay sang người đi vay, và gây chi phí thực đơn (menu costs) + chi phí giày mòn (shoe-leather costs). Giảm phát (deflation, mức giá giảm) khác với thiếu phát

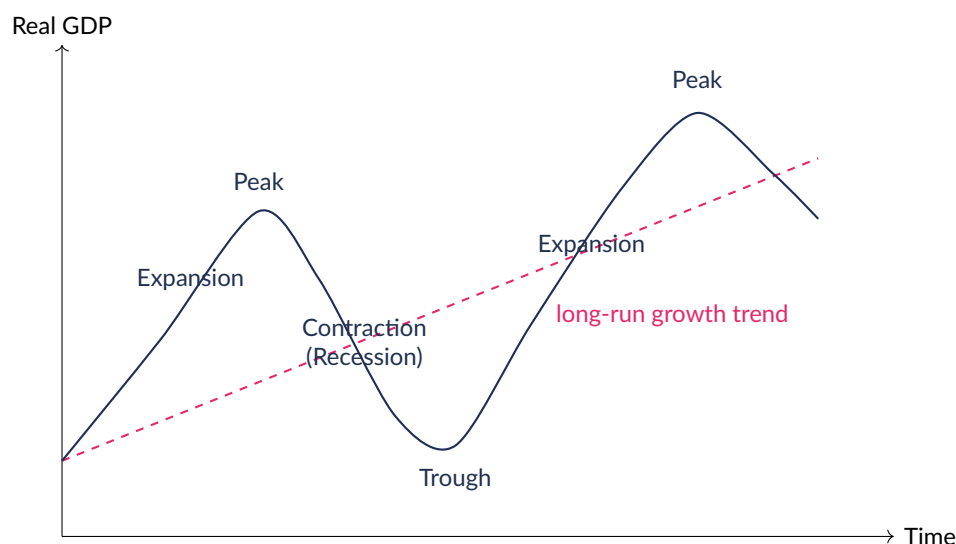
(disinflation, lạm phát vẫn dương nhưng đang chậm lại).

2.7 The Business Cycle and Economic Indicators

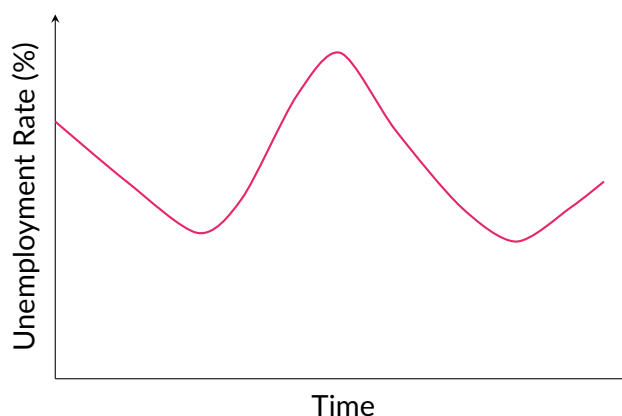
Khái niệm cốt lõi

The **business cycle** describes the recurring, irregular fluctuation of real GDP around its long-run growth trend, moving through four phases: **expansion** (real GDP rising) → **peak** (the local maximum) → **contraction/recession** (real GDP falling; conventionally, two or more consecutive quarters of falling real GDP) → **trough** (the local minimum) → expansion again. Unemployment typically *rises* during contractions and *falls* during expansions, lagging turning points in output somewhat.

Economists track **leading indicators** (change *before* the economy turns, e.g. stock prices, building permits, new orders for capital goods), **coincident indicators** (move *with* the cycle, e.g. real GDP, industrial production, employment), and **lagging indicators** (change *after* the economy turns, e.g. the unemployment rate, average duration of unemployment, inflation).



A business cycle: real GDP fluctuates around the long-run growth trend through expansion, peak, contraction, and trough.



The unemployment rate moves roughly inversely to real GDP over the business cycle, typically peaking shortly *after* the output trough (a lagging indicator).

GIẢI THÍCH TIẾNG VIỆT

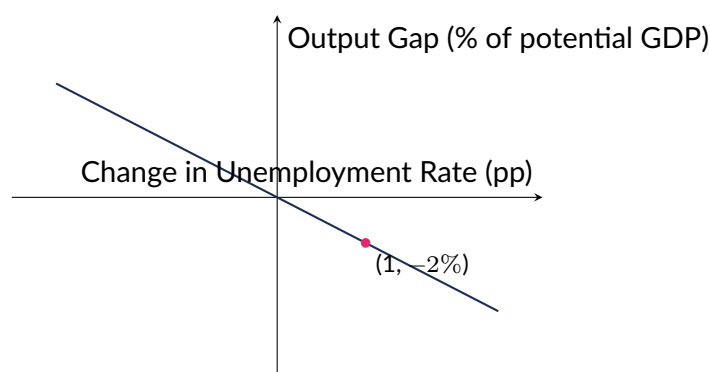
VN

Chu kỳ kinh doanh gồm 4 giai đoạn: mở rộng (expansion) → đỉnh (peak) → suy thoái (contraction/recession, thường là GDP thực giảm liên tục ≥ 2 quý) → đáy (trough), dao động quanh xu hướng tăng trưởng dài hạn. Chỉ báo dẫn đầu (leading) thay đổi TRƯỚC khi chu kỳ đổi chiều; chỉ báo trùng (coincident) thay đổi CÙNG lúc; chỉ báo trễ (lagging, ví dụ tỷ lệ thất nghiệp) thay đổi SAU.

2.8 Okun's Law: Linking Output and Unemployment**Khái niệm cốt lõi**

Okun's law is the empirical regularity that cyclical unemployment and the output gap move together: roughly, for every 1-percentage-point rise in the unemployment rate above the natural rate, real GDP falls approximately 2 percentage points below potential GDP (the precise ratio varies across time and country, but a coefficient near 2 is a standard classroom approximation).

$$\% \Delta \text{Real GDP} \approx -2 \times (\Delta \text{Unemployment rate}).$$



Okun's law: a 1-percentage-point rise in unemployment is associated with roughly a 2% shortfall of real GDP below potential.

Ví dụ mẫu · Worked example — Applying Okun's Law

The unemployment rate rises from its natural rate of 5% to 8% during a recession. Using Okun's law (coefficient of 2), estimate the resulting output gap as a percentage of potential GDP.

$\Delta \text{Unemployment} = 8\% - 5\% = 3$ percentage points. Output gap $\approx -2 \times 3 = -6\%$ of potential GDP (real GDP is roughly 6% below potential).

GIẢI THÍCH TIẾNG VIỆT

VN

Định luật Okun: thất nghiệp chu kỳ tăng 1 điểm phần trăm thường đi kèm với GDP thực giảm khoảng 2% so với GDP tiềm năng (hệ số ước lượng gần đúng, dùng để định lượng thiệt hại sản lượng từ suy thoái).

2.9 The Circular Flow Model Extended: Leakages and Injections

Khái niệm cốt lõi

The two-sector circular flow model introduced earlier in this book (households and firms trading in the product and resource markets) is a useful starting point, but it hides three real-world channels through which money can exit or re-enter the domestic spending stream. A fuller model adds the **financial sector** (banks, bond markets, and other institutions that channel saving toward borrowers), the **government sector**, and the **foreign sector**.

Money that flows **out of** the domestic income–expenditure stream, without directly returning as spending on domestic output, is a **leakage**:

- **Saving (S)** – income households and firms choose to set aside rather than spend on current consumption, flowing into banks, bond markets, and other financial institutions instead of directly back to firms as C .
- **Net taxes (T)** – income households and firms pay to government, net of any transfer payments received back (taxes minus transfers), which removes purchasing power from private hands before it can be spent on final goods.
- **Imports (M)** – spending by domestic households, firms, and government on foreign-made goods and services; this money leaves the domestic economy for foreign producers rather than supporting domestic output and domestic incomes.

Money that flows **into** the domestic spending stream, from a source other than current household consumption, is an **injection**:

- **Investment (I)** – funds that financial markets channel from savers to firms, who spend them on new capital goods (machinery, factories, software) and construction, drawing down the pool of saved funds (S) and turning it back into spending on domestic output.
- **Government spending (G)** – government purchases of goods and services (roads, schools, defense equipment), financed largely out of the pool of net tax revenue (T) collected from the private sector.
- **Exports (X)** – spending by foreign households, firms, and governments on domestically produced goods and services – the mirror image of imports, and the channel through which foreign demand re-enters the domestic spending stream.

The financial sector is the crucial intermediary in this process: it does not simply hold savers' money – it lends it out to firms, and the interest rate is the price that channels saving (S) into investment (I), a theme revisited later in this chapter (the Fisher equation) and throughout the financial-sector unit.

Macroeconomic equilibrium in this expanded model occurs precisely when total leakages equal total injections:

$$S + T + M = I + G + X.$$

This equilibrium condition is not just asserted – it follows directly from two accounting identities already used in this book. On the *output* side, aggregate output equals aggregate expenditure: $Y = C + I + G + NX = C + I + G + (X - M)$. On the *income* side, every dollar of income households and firms receive is either consumed, saved, or paid out in net taxes: $Y = C + S + T$. Setting these two expressions for Y equal to each other and cancelling C from both sides:

$$C + S + T = C + I + G + X - M \implies S + T = I + G + X - M \implies S + T + M = I + G + X.$$

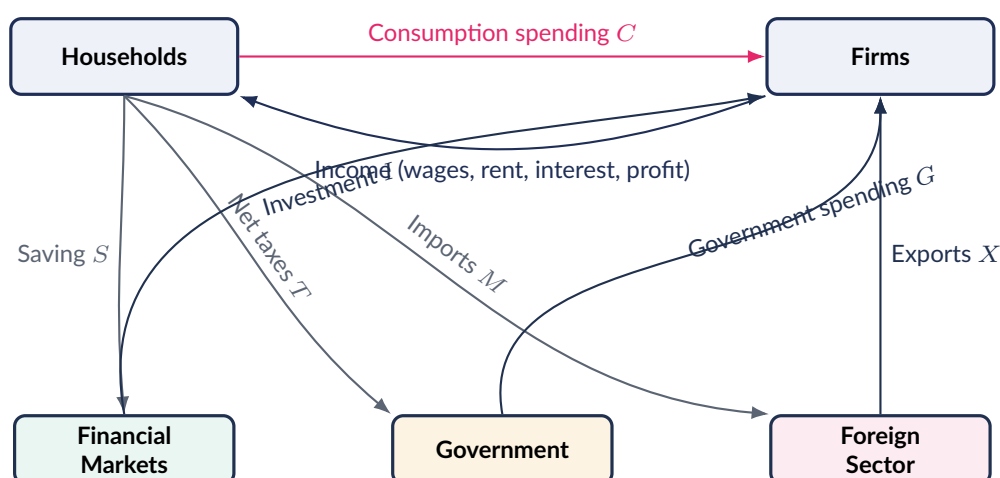
In words, this is simply an alternative way of stating that **planned aggregate expenditure equals aggregate output**: whenever leakages and injections are equal, there is no unplanned buildup

or drawdown of inventories, so firms have no incentive to change the level of production. Looking ahead: *actual* investment (including any unplanned inventory change) always equals actual saving in the aggregate, by simple accounting; it is *planned* spending that may diverge from actual output, which is exactly the gap the income-expenditure model in the next unit is built to analyze.

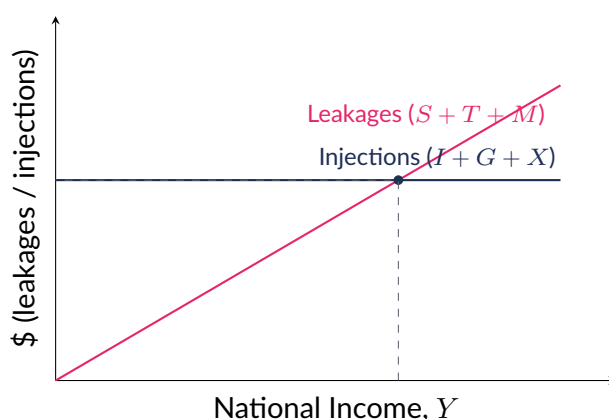
Leakage	Where the money goes
Saving (S)	A household deposits part of its paycheck into a bank savings account instead of spending it.
Net taxes (T)	A worker's income tax is withheld from her paycheck and sent to the government.
Imports (M)	A domestic consumer buys a car manufactured and imported from abroad.

Injection	Where the money comes from
Investment (I)	A bank lends out deposited savings to a firm, which uses the loan to build a new factory.
Government spending (G)	Tax revenue funds the government's purchase of new highway construction.
Exports (X)	A foreign buyer purchases domestically manufactured machinery.

Feature	Two-sector model (Ch. 1)	Five-sector model (this section)
Sectors included	Households, Firms	Households, Firms, Financial markets, Government, Foreign sector
Leakages recognized	None (all income spent as C)	Saving, net taxes, imports
Injections recognized	None	Investment, government spending, exports
Equilibrium condition	$Y = C$ (all income is spent)	$S + T + M = I + G + X$



Leakages (S, T, M) drain money out of the domestic income-expenditure stream into financial markets, government, and the foreign sector; injections (I, G, X) feed spending from those same three sectors back in. At equilibrium, total leakages equal total injections: $S + T + M = I + G + X$.



As income Y rises, leakages ($S + T + M$) tend to rise with it – people save more, pay more in taxes, and buy more imports as they earn more – while injections ($I + G + X$) are largely autonomous, roughly independent of the current level of income. Equilibrium income Y^* occurs where the two lines cross.

The upward slope of the leakages line reflects the **marginal propensity to save (MPS)** – the fraction of each extra dollar of income households save rather than spend: $MPS = \Delta S / \Delta Y$. (Its counterpart, the marginal propensity to consume, $MPC = \Delta C / \Delta Y$, satisfies $MPC + MPS = 1$ for household disposable income, and is developed fully in the aggregate expenditure model in the next unit.) A positive marginal tax rate and a positive marginal propensity to import similarly make T and M rise with income, reinforcing the leakages line's upward slope.

Ví dụ mẫu · Worked example – Marginal Propensity to Save

When a household's income rises from \$50,000 to \$54,000 in a year, its saving rises from \$4,000 to \$4,800. Find this household's marginal propensity to save.

$MPS = \frac{\Delta S}{\Delta Y} = \frac{4,800 - 4,000}{54,000 - 50,000} = \frac{800}{4,000} = \mathbf{0.2}$. Of every additional dollar earned, this household saves 20 cents – and, since $MPC + MPS = 1$, consumes the remaining 80 cents (an MPC of 0.8).

Ví dụ mẫu · Worked example – Verifying the Two Identities Behind $S + T + M = I + G + X$

An economy reports: $C = \$14,000$ billion, $I = \$3,000$ billion, $G = \$3,500$ billion, exports = \$2,000 billion, imports = \$2,500 billion, saving $S = \$4,000$ billion, and net taxes $T = \$2,000$ billion. Verify that $Y = C + I + G + NX$ and $Y = C + S + T$ give the same Y , and confirm $S + T + M = I + G + X$.

$NX = 2,000 - 2,500 = -\$500$ billion, so $Y = C + I + G + NX = 14,000 + 3,000 + 3,500 + (-500) = \$20,000$ billion. Also $Y = C + S + T = 14,000 + 4,000 + 2,000 = \$20,000$ billion – the same total income, exactly as the identity requires. Leakages: $S + T + M = 4,000 + 2,000 + 2,500 = \$8,500$ billion. Injections: $I + G + X = 3,000 + 3,500 + 2,000 = \$8,500$ billion. The two totals match exactly, confirming this economy is at equilibrium.

Ví dụ mẫu · Worked example – Leakages versus Injections

A hypothetical economy records the following flows in a given year: saving $S = \$800$ billion, net taxes $T = \$600$ billion, imports $M = \$400$ billion (leakages); investment $I = \$700$ billion, government spending $G = \$500$ billion, exports $X = \$350$ billion (injections). Is this economy at equilibrium? If not, is aggregate expenditure likely to rise or fall going forward?

Total leakages = $S + T + M = 800 + 600 + 400 = \$1,800$ billion. Total injections = $I + G + X = 700 + 500 + 350 = \$1,550$ billion.

Because leakages (\$1,800 billion) exceed injections (\$1,550 billion) by \$250 billion, the economy is **not** at equilibrium: more money is draining out of the spending stream (into saving, taxes, and imports) than is being injected back in (as investment, government spending, and exports). Firms will see planned spending fall short of current output, inventories will build up unintentionally, and firms will respond by cutting production. Aggregate expenditure – and real GDP – will therefore tend to **fall** going forward, until leakages and injections re-equate.

Ví dụ mẫu · Worked example – Restoring Equilibrium with a Policy Change

Continuing the economy above (leakages = \$1,800 billion, injections = \$1,550 billion, a \$250 billion gap), suppose the government responds with expansionary fiscal policy that raises government spending G by \$250 billion, holding S , T , M , I , and X unchanged. Does this restore equilibrium?

New injections = $I + G_{\text{new}} + X = 700 + (500 + 250) + 350 = \$1,800$ billion. Leakages remain $S + T + M = \$1,800$ billion. Since injections now equal leakages (\$1,800 = \$1,800 billion), **equilibrium is restored**.

Ví dụ mẫu · Worked example – Restoring Equilibrium via a Different Lever

Instead of a fiscal response, suppose policymakers instead want to close the original \$250 billion gap (leakages \$1,800 billion, injections \$1,550 billion) purely by encouraging import substitution – reducing imports M , holding S , T , I , G , and X fixed. By how much would M need to fall?

For equilibrium, $S + T + M_{\text{new}} = I + G + X = \$1,550$ billion. With $S + T = 800 + 600 = \$1,400$ billion fixed, $M_{\text{new}} = 1,550 - 1,400 = \150 billion – a drop from \$400 billion to \$150 billion, i.e., a \$250 billion fall in imports. Check: $S + T + M_{\text{new}} = 800 + 600 + 150 = \$1,550$ billion, matching injections exactly.

Each sector's *net position* – injection minus leakage, or vice versa – has a familiar name from elsewhere in macroeconomics:

- **Government sector:** $G - T$ is the **government budget balance**. $G > T$ means a **budget deficit**; $G < T$ means a **budget surplus**.
- **Foreign sector:** $X - M$ is **net exports**, the trade balance. $X > M$ means a **trade surplus**; $X < M$ means a **trade deficit**.
- **Financial markets:** $I - S$ compares firms' investment demand to the pool of saving households and firms supply.

Ví dụ mẫu · Worked example – Budget and Trade Balances from Leakages and Injections

Return to the original economy above ($S = \$800\text{b}$, $T = \$600\text{b}$, $M = \$400\text{b}$; $I = \$700\text{b}$, $G = \$500\text{b}$, $X = \$350\text{b}$). Find the government budget balance and the trade balance, and confirm they help explain the earlier \$250 billion leakages-injections gap.

Government budget balance = $G - T = 500 - 600 = -\$100$ billion, i.e., a **budget surplus** of \$100 billion (tax revenue exceeds government spending). Trade balance = $X - M = 350 - 400 =$

–\$50 billion, i.e., a **trade deficit** of \$50 billion (imports exceed exports). Financial markets: $I - S = 700 - 800 = -\$100$ billion (investment falls \$100 billion short of the saving supplied). These three gaps sum to exactly the earlier shortfall: $(S - I) + (T - G) + (M - X) = 100 + 100 + 50 = \250 billion – the same total by which leakages exceeded injections.

(!) Lỗi thường gặp: It is a common error to assume that saving must always equal investment ($S = I$) alone. That simple equality holds only in the barebones two-sector model with no government and no foreign sector. Once government and the foreign sector are added, equilibrium requires only that the *sum* of all three leakages equal the *sum* of all three injections ($S + T + M = I + G + X$) – S alone need not equal I alone.

GIẢI THÍCH TIẾNG VIỆT

VN

Mô hình vòng chu chuyển mở rộng thêm khu vực tài chính, chính phủ, và khu vực nước ngoài. Ba khoản **rò rỉ** (leakages) rút tiền ra khỏi dòng chi tiêu trong nước: tiết kiệm (S), thuế ròng (T), nhập khẩu (M). Ba khoản **bơm vào** (injections) đưa tiền trở lại dòng chi tiêu: đầu tư (I), chi tiêu chính phủ (G), xuất khẩu (X). Cân bằng kinh tế vĩ mô xảy ra khi tổng rò rỉ bằng tổng bơm vào: $S + T + M = I + G + X$ – đây là một cách diễn đạt khác của điều kiện chi tiêu dự kiến bằng sản lượng thực tế. Lưu ý: $S = I$ riêng lẻ CHỈ đúng trong mô hình hai khu vực đơn giản, không còn đúng khi có thêm chính phủ và khu vực nước ngoài.

2.10 GDP by the Income Approach and the Value-Added Method

Khái niệm cốt lõi

The **income approach** computes GDP by summing all the income earned by the four resource categories from producing this year's final output: **wages** (compensation of employees), **rents**, **interest**, and **profits** (proprietors' income plus corporate profits). This sum is called **national income (NI)**. Two statistical adjustments then reconcile national income with GDP: **indirect business taxes** (sales and excise taxes embedded in market prices but never paid out as income to any resource owner) must be added back, and **depreciation** (consumption of fixed capital – the wear-and-tear on the economy's capital stock) must also be added, since GDP is a *gross* measure. A small **net foreign factor income** adjustment reconciles income earned by domestically *located* resources with income earned by domestically *owned* resources.

Because every dollar a buyer spends on final output is simultaneously a dollar of income received by whichever resource helped produce it, the income approach and the expenditure approach are, in principle, two sides of the very same transaction – they must yield identical GDP figures.

Income-approach component	What it captures
Compensation of employees (wages)	Payments to labor – salaries, wages, and benefits
Rents	Payments to owners of land and property resources
Interest	Net interest income earned by owners of capital
Profits (proprietors' income + corporate profits)	Payments to entrepreneurship and business ownership
= National income (NI)	
+ Indirect business taxes (net of subsidies)	Sales/excise taxes embedded in market prices; collected by government, not paid to any factor of production
+ Depreciation (consumption of fixed capital)	Converts a <i>net</i> income measure into a <i>gross</i> (GDP) measure
± Net foreign factor income adjustment	Reconciles income earned by domestically located resources vs. domestically owned resources
= GDP (income approach)	

$$GDP = \underbrace{(\text{Wages} + \text{Rents} + \text{Interest} + \text{Profits})}_{\text{National income}} + \text{Indirect business taxes} + \text{Depreciation} \pm \text{Net foreign factor income}$$

Correctly measured, this figure equals GDP computed via the expenditure approach, $GDP = C + I + G + NX$.

Ví dụ mẫu · Worked example – GDP via the Income Approach

An economy's factor incomes for the year are: wages = \$8,000 billion, rents = \$400 billion, interest = \$600 billion, and profits = \$1,800 billion. Indirect business taxes total \$900 billion and depreciation totals \$1,100 billion (assume net foreign factor income is negligible). Find GDP via the income approach, and check it against a reported expenditure-approach GDP of \$12,800 billion.

National income = $8,000 + 400 + 600 + 1,800 = \$10,800$ billion. $GDP = 10,800 + 900 + 1,100 = \$12,800$ billion – matching the expenditure-approach figure exactly, as the underlying economics requires.

(!) Lỗi thường gặp: A common error is to assume indirect business taxes should be *subtracted* when computing GDP via the income approach, since taxes reduce a firm's take-home revenue. In fact they must be **added** to national income, precisely because they are already embedded in the market price a buyer pays (which is exactly what the expenditure approach counts) but were never received by any resource owner as income. Adding them back is what reconciles the two approaches.

Net Domestic Product (NDP) = GDP – Depreciation. Because depreciation represents capital simply being replaced (not a net addition to the capital stock), NDP better reflects the portion of this year's output genuinely available to expand – rather than merely maintain – the economy's productive capacity.

Ví dụ mẫu · Worked example – From GDP to Net Domestic Product

An economy's GDP is \$15,000 billion, and depreciation (consumption of fixed capital) for the year is \$1,200 billion. Find Net Domestic Product.

$$NDP = GDP - \text{Depreciation} = 15,000 - 1,200 = \text{\$13,800 billion.}$$

Ví dụ mẫu · Worked example – From GDP to GNP Using Net Foreign Factor Income

Recall from earlier in this chapter that GDP measures production *within a country's borders*, while GNP measures output produced by a country's *nationally owned* resources, wherever located. Country A's GDP is \$10,000 billion. Income earned by Country A's citizens and firms working or invested abroad totals \$300 billion; income earned within Country A by foreign-owned resources totals \$450 billion. Find Country A's GNP.

$$\begin{aligned} GNP &= GDP + (\text{income earned abroad by nationals}) - \\ &(\text{income earned domestically by foreigners}) = 10,000 + 300 - 450 = \text{\$9,850 billion.} \end{aligned}$$

Because more income flows out to foreign owners of resources located in Country A than flows in to Country A's own citizens from abroad, GNP is slightly *below* GDP here.

Ví dụ mẫu · Worked example – Solving for a Missing Income Component

An economy's expenditure-approach GDP is \$8,500 billion. Its income-approach data show: wages = \$5,000 billion, rents = \$300 billion, interest = \$400 billion, indirect business taxes = \$700 billion, and depreciation = \$600 billion (net foreign factor income is negligible). Profits are not directly reported. Find profits.

$$\begin{aligned} \text{National income} &= GDP - \text{Indirect business taxes} - \text{Depreciation} = 8,500 - 700 - 600 = \$7,200 \text{ billion.} \\ \text{Since } NI &= \text{Wages} + \text{Rents} + \text{Interest} + \text{Profits: Profits} = 7,200 - 5,000 - 300 - 400 = \text{\$1,500 billion.} \end{aligned}$$

Resource (Ch. 1)	Income earned	Where it appears in the income approach
Land	Rent	Rents component of national income
Labor	Wages	Compensation of employees component
Capital	Interest	Interest component of national income
Entrepreneurship	Profit	Profits component (proprietors' income + corporate profits)

Khái niệm cốt lõi

The **value-added method** computes GDP by summing the **value added** at every stage of production across the entire economy, where value added at a given stage = the value of that stage's output – the value of intermediate inputs purchased from other firms. Because each firm's value added excludes the value already counted by suppliers upstream, summing value added at every stage economy-wide avoids double-counting intermediate goods, and it must sum to exactly the same total as the final-goods value used in the expenditure approach.

This logic generalizes to a production chain of any length: summing (sale value – purchased inputs) across every firm in the chain always equals the value of the final good, provided every firm is included exactly once and the chain's final output is not itself resold as an input into some further, uncounted stage. This is why national income accountants can, in principle, total an economy's GDP either by tracking only final sales (expenditure approach) or by tracking value added at every production stage economy-wide (value-added approach) and arrive at the identical figure.

In many countries, the value-added method is not merely a teaching device: statistical agencies collect production data firm by firm, often via value-added tax (VAT) records, making value added at each stage a directly measurable, real-world input into official GDP estimates.

Stage	Firm	Sale value	Purchased inputs	Value added
1	Wheat farmer	\$200	\$0	\$200
2	Miller	\$500	\$200	\$300
3	Baker	\$900	\$500	\$400
Total				\$900

Ví dụ mẫu · Worked example – Value Added Along a Production Chain

A wheat farmer sells wheat to a miller for \$200 (the farmer purchases no material inputs). The miller processes the wheat into flour and sells it to a baker for \$500. The baker bakes bread and sells it to consumers for \$900. Find the value added at each stage, and confirm total value added equals the final retail value of the bread.

Farmer: value added = $200 - 0 = \$200$. Miller: value added = $500 - 200 = \$300$. Baker: value added = $900 - 500 = \$400$. Total value added = $200 + 300 + 400 = \mathbf{\$900}$, exactly equal to the \$900 final price consumers pay for the bread – confirming that summing value added at each stage counts the chain's true contribution to GDP exactly once, with no double-counting.

Ví dụ mẫu · Worked example – Summing Value Added Economy-Wide

Suppose a very small economy produces only two final goods in a given year: bread, from the wheat-flour-bread chain above (total value added \$900), and furniture, from a separate timber-lumber-furniture chain (total value added \$1,200). If these are the only two production chains in the economy, find this economy's GDP.

$GDP = \text{value added, bread chain} + \text{value added, furniture chain} = 900 + 1,200 = \mathbf{\$2,100}$. The value-added method scales up naturally: summing value added across every firm in every production chain, economy-wide, yields total GDP.

(!) Lỗi thường gặp: It is tempting – and wrong – to estimate this chain's contribution to GDP by summing the *sales value* at every stage: $200 + 500 + 900 = \$1,600$. This wildly overstates true production, because it counts the \$200 of wheat value three times (once as the farmer's own sale, again embedded inside the miller's \$500 sale, and again embedded inside the baker's \$900 sale) and the \$300 of milling value twice. This is exactly why GDP counts only *final* goods (expenditure approach) or *value added* at each stage (value-added approach) – never the gross transaction value summed across every stage.

GDP can be computed three equivalent ways for the same economy in the same year: the **expenditure approach** ($C + I + G + NX$, summing spending on final goods), the **income approach** (summing income earned producing that output), and the **value-added approach** (summing value added at every production stage economy-wide). All three, correctly measured, yield the same number – three different lenses on one underlying flow of production, income, and spending. In practice, official national accounts include a small **statistical discrepancy** line to reconcile the expenditure and income approaches, since each is estimated from separate, imperfect real-world data sources – but conceptually, all three approaches measure exactly the same underlying flow.

Ví dụ mẫu · Worked example – The Three Approaches Applied to One Example

Continue the wheat–flour–bread chain above. Suppose each firm's value added is paid out entirely as income to its own resources (wages, rent, interest, and profit), as follows:

Firm	Wages	Rent	Interest	Profit	= Value added
Farmer	\$150	\$0	\$0	\$50	\$200
Miller	\$180	\$0	\$20	\$100	\$300
Baker	\$250	\$50	\$0	\$100	\$400
Total	\$580	\$50	\$20	\$250	\$900

Sum of all income paid out across the chain = $580 + 50 + 20 + 250 = \$900$. This is exactly the same \$900 already found both as total value added and as the final expenditure on bread – concretely confirming that the expenditure approach, the income approach, and the value-added approach are three routes to the very same underlying number.

GIẢI THÍCH TIẾNG VIỆT

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Phương pháp thu nhập (income approach) cộng tổng thu nhập: tiền lương, tiền thuê, tiền lãi, lợi nhuận = thu nhập quốc dân (NI); cộng thêm thuế gián thu và khấu hao để ra GDP – về nguyên tắc bằng GDP tính theo phương pháp chi tiêu. Phương pháp giá trị gia tăng (value-added) cộng giá trị gia tăng ở MỖI giai đoạn sản xuất (giá trị gia tăng bằng giá trị đầu ra trừ giá trị đầu vào mua ngoài), tránh tính trùng hàng hoá trung gian. Ví dụ chuỗi lúa mì → bột → bánh mì: tổng giá trị gia tăng ($\$200 + \$300 + \$400 = \900) bằng đúng giá bán lẻ cuối cùng (\$900), trong khi cộng dồn doanh thu ở mọi giai đoạn ($\$200 + \$500 + \$900 = \$1,600$) sẽ tính trùng và phóng đại sản lượng thực.

2.11 Nominal vs. Real Interest Rates: The Fisher Equation

Khái niệm cốt lõi

The **nominal interest rate** is the stated interest rate on a loan or financial asset, *not* adjusted for inflation – the percentage increase in the dollar amount a saver receives or a borrower owes. The **real interest rate** adjusts the nominal rate for inflation, reflecting the true growth in **purchasing power** that a lender earns (or a borrower gives up). Because savers and borrowers ultimately care about what their money can *buy*, not just its face-value growth, the real interest rate – not the nominal rate – is the rate that actually drives lending, borrowing, and investment decisions. This distinction reappears throughout the financial-sector and long-run growth units later in this book.

Fisher equation (approximate form):

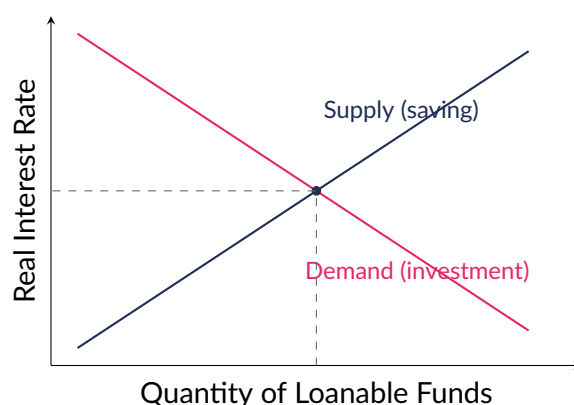
Real interest rate $\approx$ Nominal interest rate – Expected inflation rate,
equivalently,

Nominal interest rate $\approx$ Real interest rate + Expected inflation rate.

(The exact relationship is multiplicative, $1 + i = (1 + r)(1 + \pi)$, but the additive approximation above is standard at the AP level and is highly accurate whenever inflation is not extreme.)

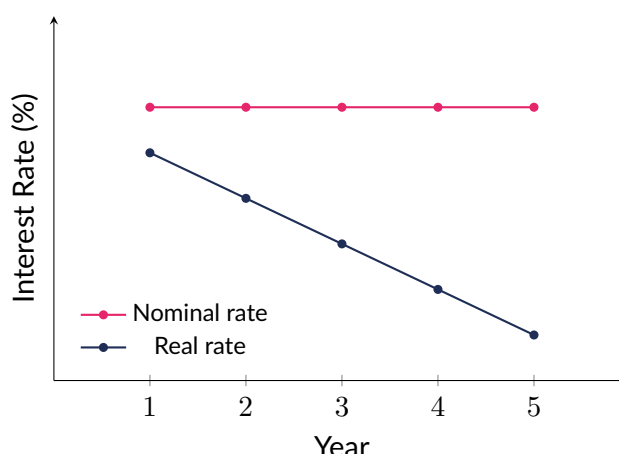
Khái niệm cốt lõi

Because it is the *real* interest rate that determines the true cost of borrowing and the true reward for saving, models of household and business borrowing/lending decisions – such as the market for loanable funds studied in a later unit – are typically built around the real interest rate, not the nominal rate. A saver comparing a 6% nominal return against 5% expected inflation earns only a 1% real reward for delaying consumption; a firm facing a 6% nominal borrowing cost against that same 5% expected inflation faces only a 1% real cost of financing a new investment project. Exactly the same logic applies to wages: the **real wage** (the percentage change in the nominal wage minus the inflation rate) determines whether a worker's paycheck actually buys more or less over time, precisely parallel to the real interest rate.



A preview of the loanable funds market (studied fully in a later unit): the equilibrium *real* interest rate r^* is where the supply of saving meets firms' demand for investment funds – one more reason economists model saving and investment decisions using the real rate, not the nominal rate.

Nominal rate	Expected inflation	Real rate (Fisher approx.)
6%	1%	5%
6%	2%	4%
6%	2.5%	3.5%
6%	3%	3%
6%	4%	2%
6%	5%	1%



With the nominal interest rate held fixed at 6%, steadily rising expected inflation erodes the real interest rate year after year.

Ví dụ mẫu · Worked example – Finding the Real Interest Rate

A bank offers a nominal interest rate of 6% on a savings account, and expected inflation over the coming year is 2.5%. Find the real interest rate.

Real rate $\approx$ Nominal rate – Expected inflation = $6\% - 2.5\% = 3.5\%$.

Ví dụ mẫu · Worked example – Finding the Required Nominal Rate

A saver wants a guaranteed real return of at least 4%, and expects inflation of 3% over the coming year. Find the minimum nominal interest rate a bond must offer to meet this target.

Nominal rate $\approx$ Real rate + Expected inflation = $4\% + 3\% = 7\%$. A bond offering less than a 7% nominal rate would fail to deliver the saver's 4% real-return target, given 3% expected inflation.

Ví dụ mẫu · Worked example – Solving for Expected Inflation

A bond offers a nominal interest rate of 10%, and its real interest rate works out to 4%. Find the expected inflation rate implied by these two figures.

Rearranging the Fisher equation: Expected inflation $\approx$ Nominal rate – Real rate = $10\% - 4\% = 6\%$. All three quantities in the Fisher equation – nominal rate, real rate, and expected inflation – can be solved for once the other two are known.

Ví dụ mẫu · Worked example – Avoiding “Money Illusion” When Comparing Rates

Bank A offers a nominal interest rate of 5%, when expected inflation is 1%. Bank B offers a nominal interest rate of 8%, when expected inflation is 5%. Which bank offers the saver a better *real* return?

Bank A: real rate $\approx 5\% - 1\% = 4\%$. Bank B: real rate $\approx 8\% - 5\% = 3\%$. Even though Bank B's nominal rate looks higher, **Bank A** offers the better real return. Comparing only nominal rates – ignoring differing inflation expectations – is a classic case of **money illusion**: mistaking a larger face-value number for a larger true reward.

Loan product	Nominal rate	Expected inflation	Real rate
Mortgage	7%	3%	4%
Auto loan	9%	3%	6%
Credit card	22%	3%	19%

Even within the very same inflation environment, the real cost of borrowing differs enormously across loan products, reflecting differences in risk, collateral, and loan term.

(!) Lỗi thường gặp: The Fisher equation uses *expected* inflation, set when a loan is made – but the *realized* real interest rate depends on *actual* inflation, which may turn out higher or lower than expected. If actual inflation during a fixed-rate loan's term unexpectedly rises above what was expected when the nominal rate was locked in, the realized real interest rate on that loan falls below what both the lender and borrower anticipated. This benefits the **borrower** (who repays with dollars of lower-than-expected purchasing power) and hurts the **lender** – the same wealth-redistribution logic already noted for unanticipated inflation earlier in this chapter. This is one reason many loans (e.g., adjustable-rate mortgages) periodically reset their nominal rate to reflect current conditions rather than locking in a single nominal rate for years at a time, shifting unanticipated-inflation risk back toward the borrower and reducing it for the lender. Some real-world instruments go further still: U.S. Treasury Inflation-Protected Securities (TIPS) are explicitly indexed to inflation, automatically adjusting their payout so that the investor is guaranteed a stated real return regardless of how actual inflation turns out.

Notice the parallel structure running through this chapter: $\% \Delta \text{Nominal GDP} \approx \% \Delta \text{Real GDP} + \% \Delta \text{Deflator}$ (Section 2.2) and $\text{Nominal interest rate} \approx \text{Real interest rate} + \text{Expected inflation}$ (this section) express the very same idea – a nominal, dollar-denominated growth rate equals a real, purchasing-power-adjusted growth rate plus the rate of inflation.

Variable	Nominal version	Real version (inflation-adjusted)
Output	Nominal GDP (current prices)	Real GDP (constant base-year prices; Section 2.2)
Wages	% growth in the paycheck	Real wage $\approx$ nominal wage growth – inflation
Interest rates	Stated (nominal) rate	Real rate $\approx$ nominal rate – expected inflation

The same core idea – strip out the effect of a changing price level – reappears throughout macroeconomics under different names.

GIẢI THÍCH TIẾNG VIỆT

VN Lãi suất danh nghĩa (nominal) là mức lãi suất công bố, CHƯA điều chỉnh lạm phát; lãi suất thực (real) đã điều chỉnh lạm phát, phản ánh đúng sức mua thực sự. Phương trình Fisher (dạng gần đúng): lãi suất thực xấp xỉ lãi suất danh nghĩa trừ tỷ lệ lạm phát kỳ vọng (hay lãi suất danh nghĩa xấp xỉ lãi suất thực cộng lạm phát kỳ vọng). Nếu lạm phát THỰC TẾ cao hơn mức kỳ vọng lúc vay, lãi suất thực THỰC HIỆN trên khoản vay lãi suất cố định sẽ thấp hơn dự tính – có lợi cho người đi vay, bất lợi cho người cho vay (giống hiệu ứng phân phối lại của cải do lạm phát bất ngờ đã nêu ở phần trước).

Practice Problems

Bài tập luyện tập – Câu 1

A country's labor force is 200 million, of whom 185 million are employed. The unemployment rate is:

- | | |
|----------|----------|
| (A) 6.5% | (C) 8.5% |
| (B) 7.5% | (D) 15% |

Lời giải chi tiết

Unemployed = 15 million; rate = $15/200 \times 100 = 7.5\%$. **(B).**

Bài tập luyện tập – Câu 2

CPI is 180 in Year 1 and 189 in Year 2. The inflation rate over this period is:

- | | |
|--------|--------|
| (A) 3% | (C) 5% |
| (B) 4% | (D) 9% |

Lời giải chi tiết

$(189 - 180)/180 \times 100 = 5\%$. **(C).**

Bài tập luyện tập – Câu 3

Nominal GDP grew 7% and the GDP deflator rose 4% over the same year. Approximate real GDP growth is:

- | | |
|--------|---------|
| (A) 3% | (C) 7% |
| (B) 4% | (D) 11% |

Lời giải chi tiết

$\% \Delta \text{Real} \approx 7\% - 4\% = 3\%$. **(A).**

Bài tập luyện tập – Câu 4

Real GDP has fallen for three consecutive quarters and unemployment is rising toward a cyclical peak. The economy is most likely in the:

- | | |
|---------------|-----------------------------|
| (A) Expansion | (C) Contraction / recession |
| (B) Peak | (D) Trough |

Lời giải chi tiết

Falling real GDP over multiple quarters with rising unemployment describes the contraction (recessionary) phase. **(C).**

Bài tập luyện tập – Câu 5

A factory permanently automates its assembly line, eliminating an engineer's position because her specific skill set is no longer needed anywhere in the industry. This is:

- | | |
|-----------------------------|---------------------------|
| (A) Frictional unemployment | (C) Cyclical unemployment |
| (B) Structural unemployment | (D) Seasonal unemployment |

Lời giải chi tiết

A permanent skills/technology mismatch is structural unemployment. **(B)**.

Bài tập luyện tập – Câu 6

In a given year: $C = \$9,000$ billion, $I = \$2,000$ billion, $G = \$2,400$ billion, exports = \$1,300 billion, imports = \$1,600 billion, and government transfer payments totaled \$700 billion. Find GDP.

Lời giải chi tiết

$NX = 1,300 - 1,600 = -300$. Transfer payments are excluded from G . $GDP = 9,000 + 2,000 + 2,400 + (-300) = \mathbf{\$13,100}$ billion.

Bài tập luyện tập – Câu 7

Nominal GDP is \$15,000 billion and real GDP is \$12,500 billion. Find the GDP deflator.

Lời giải chi tiết

$$\text{Deflator} = \frac{15,000}{12,500} \times 100 = \mathbf{120}.$$

Bài tập luyện tập – Câu 8

A country's working-age population is 300 million. 190 million are employed and 10 million are unemployed (actively seeking work). Find (a) the labor force, (b) the unemployment rate, and (c) the labor force participation rate.

Lời giải chi tiết

- (a) Labor force = $190 + 10 = \mathbf{200}$ million.
(b) Unemployment rate = $10/200 \times 100 = \mathbf{5\%}$.
(c) Participation rate = $200/300 \times 100 \approx \mathbf{66.7\%}$.

Bài tập luyện tập – Câu 9

Which of these is classified as a *leading* economic indicator?

- | | |
|---------------------------------|--------------------------------------|
| (A) The unemployment rate | (C) Real GDP |
| (B) New building permits issued | (D) Average duration of unemployment |

Lời giải chi tiết

Building permits signal future construction activity before it occurs, making them a leading indicator. **(B)**.

Bài tập luyện tập – Câu 10

An economy's unemployment rate rises from a natural rate of 4.5% to 7.5% in a recession. Using Okun's law with a coefficient of 2, estimate the output gap.

Lời giải chi tiết

$\Delta \text{Unemployment} = 3 \text{ points}$. Output gap $\approx -2 \times 3 = -6\%$ of potential GDP.

Bài tập luyện tập – Câu 11

Which best explains why a rising number of discouraged workers can cause the official unemployment rate to *fall* even though the job market has not improved?

- | | |
|---|--|
| (A) Discouraged workers are reclassified as employed | (C) Discouraged workers count as employed part-time |
| (B) Discouraged workers leave the labor force, shrinking the denominator used to calculate the rate | (D) The CPI basket automatically adjusts to exclude them |

Lời giải chi tiết

Discouraged workers exit the labor force entirely; since the unemployment rate's denominator (labor force) shrinks while the numerator (measured unemployed) also shrinks by their exit, the reported rate can fall without any real improvement in job availability. **(B)**.

Bài tập luyện tập – Câu 12

Suppose the price level fell by 1% last year (true deflation). This year, prices rose by 2%, and next year, forecasts call for prices to rise by only 1%. How should the change from this year to next year be described?

- | | |
|------------------|--------------------|
| (A) Deflation | (C) Hyperinflation |
| (B) Disinflation | (D) Stagflation |

Lời giải chi tiết

Inflation is still positive ($1\% > 0$) but slowing from 2% to 1%: this is disinflation, not deflation (which requires a falling price level). **(B)**.

Bài tập luyện tập – Câu 13

Using the CPI basket categories and weights from the worked example (Housing 42%, Food 15%, Transportation 17%, Medical 8%, Recreation 18%), if only Medical care costs rise by 25% and every other category's cost is unchanged, estimate the approximate percentage increase in overall CPI.

Lời giải chi tiết

Contribution to overall CPI change $\approx$ weight $\times$ % change in that category = $0.08 \times 25\% = 2\%$ (approximately, holding the fixed-basket weights constant).

Bài tập luyện tập – Câu 14

Which combination of GDP components would represent *unplanned* inventory investment being counted correctly in this year's GDP?

- (A) A car built in 2023 but sold to a customer in 2024 is counted in 2024 GDP as consumption, and *not* in 2023 GDP at all unaffected (inventory investment falls by an offsetting amount)
- (B) A car built but unsold at year-end 2023 is counted in 2023 GDP as inventory investment (*I*); when sold in 2024, GDP is (C) Unsold inventory is never counted in GDP at all
- (D) Unsold inventory is counted twice, once when produced and once when sold

Lời giải chi tiết

Output is counted as GDP in the year it is *produced*. An unsold car counts as inventory investment (*I*) in its production year; when later sold, the sale itself is not new production, so it is not counted again – inventory investment simply falls (a negative entry) in the year sold, keeping total cumulative GDP correct. (B).

Bài tập luyện tập – Câu 15

Real GDP per capita is often used as a proxy for average living standards. Which of the following is a valid criticism of this measure?

- (A) It cannot be calculated for countries with a floating exchange rate (C) It always overstates the true production of an economy
- (B) It says nothing about how income is distributed across the population (D) It cannot rise unless population falls

Lời giải chi tiết

Per-capita GDP is an average and can rise even while inequality worsens; it reveals nothing about distribution. (B).

Bài tập luyện tập – Câu 16

A government sharply increases spending on unemployment benefits during a recession, while its purchases of goods and services stay unchanged. All else equal, this policy directly:

- (A) Increases GDP through the *G* term *C* indirectly
- (B) Has no direct effect on GDP through the expenditure formula, though it may raise (C) Decreases GDP through the *NX* term
- (D) Increases GDP through the *I* term

Lời giải chi tiết

Unemployment benefits are a transfer payment, excluded from G ; they only affect GDP indirectly if recipients spend the money, raising C . **(B)**.

Bài tập luyện tập – Câu 17

Real GDP is currently \$21 trillion and potential GDP is \$21 trillion, while the unemployment rate equals the natural rate. This describes:

- (A) A recessionary gap
- (B) An inflationary gap
- (C) Full employment / long-run equilibrium
- (D) A period of deflation

Lời giải chi tiết

Real GDP equals potential GDP and cyclical unemployment is zero: the economy is at full employment. **(C)**.

Bài tập luyện tập – Câu 18

Nominal GDP is \$10,800 billion in Year 1 and the GDP deflator (base year = 100) is 108. Find real GDP in Year 1.

Lời giải chi tiết

$$\text{Real GDP} = \frac{10,800}{108} \times 100 = \text{\$10,000 billion.}$$

Bài tập luyện tập – Câu 19

Which scenario best illustrates the underground economy causing GDP to *understate* true production?

- (A) A homeowner mows her own lawn instead of hiring a service
- (B) A worker is paid entirely in unreported cash for freelance repair jobs
- (C) A firm produces a good that is never sold and stays in inventory
- (D) A government agency purchases office supplies

Lời giải chi tiết

Unreported cash income from freelance work is real production that never enters official statistics – the classic underground-economy case that causes GDP to understate true output. **(B)**.

Bài tập luyện tập – Câu 20

An economy's real GDP falls 4% while its population grows 1% over the same year. What happens to real GDP per capita, approximately?

- (A) Rises by about 3%
- (B) Falls by about 3%
- (C) Falls by about 5%
- (D) Rises by about 5%

Lời giải chi tiết

$\% \Delta (\text{GDP per capita}) \approx \% \Delta \text{Real GDP} - \% \Delta \text{Population} = -4\% - 1\% = -5\%$ (falls by about 5%). (C).

Bài tập luyện tập – Câu 21

Which of the following would NOT be included anywhere in this year's GDP?

- (A) A new house built and sold this year (C) A haircut purchased this year
(B) A used car built five years ago, resold this year (D) Government purchase of new military equipment this year

Lời giải chi tiết

A used car's value was already counted as production in the year it was originally built; reselling it this year involves no new production, so it is excluded from this year's GDP. (B).

Bài tập luyện tập – Câu 22 – multi-part

An economy has the following data for two consecutive years (in \$ billions):

	Year 1	Year 2
Nominal GDP	20,000	21,600
GDP deflator (base = 100)	100	108

- (a) Find real GDP in Year 1 and Year 2.
(b) Find the percentage change in real GDP from Year 1 to Year 2.
(c) If the labor force was constant and the unemployment rate rose from 4% to 6% over the same period, is this pattern of real GDP growth consistent with Okun's law (coefficient of 2)? Explain.

Lời giải chi tiết

- (a) Year 1: $\text{Real GDP} = 20,000/100 \times 100 = \$20,000$ billion. Year 2: $\text{Real GDP} = 21,600/108 \times 100 = \$20,000$ billion.
(b) $\% \Delta \text{Real GDP} = (20,000 - 20,000)/20,000 \times 100 = 0\%$ – real GDP did not grow at all; all of the nominal GDP increase was pure inflation.
(c) Okun's law predicts a 2-point rise in unemployment (natural rate presumably near 4%, now 6%, i.e. 2 points of cyclical unemployment) should coincide with real GDP falling roughly 4% below its potential growth path. Zero real growth (rather than the economy's normal trend growth) is indeed consistent with a weakening economy and rising cyclical unemployment, matching the qualitative (if not exactly numerical) prediction of Okun's law.

Bài tập luyện tập – Câu 23

Which of the following changes would most directly raise a country's GDP through the I term (holding C , G , and NX fixed)?

- (A) A household buys a newly built home (C) A firm buys shares of another firm's stock
(B) A household deposits \$5,000 into a savings account (D) A retiree receives a pension payment

Lời giải chi tiết

Investment (I) includes residential construction; buying a newly built home counts as investment spending. Savings deposits and stock purchases are financial transactions, and pensions are transfer payments – none of these directly enter $GDP = C + I + G + NX$. **(A)**.

Bài tập luyện tập – Câu 24

A statistical agency reports the unemployment rate fell from 6% to 5.5% last month. Which additional piece of information would be most useful to determine whether this reflects genuine labor-market improvement?

- (A) The exact CPI value for the month (C) The nominal GDP growth rate
(B) Whether the labor force participation rate rose, fell, or stayed the same (D) The current federal funds interest rate

Lời giải chi tiết

If participation fell (people leaving the labor force, e.g., discouraged workers), the drop in the unemployment rate could be misleading rather than reflecting genuine improvement; participation data helps distinguish the two scenarios. **(B)**.

Bài tập luyện tập – Câu 25

Real GDP is \$19.2 trillion and potential GDP is \$20 trillion. Using Okun's law with a coefficient of 2, estimate the cyclical unemployment rate above the natural rate.

Lời giải chi tiết

Output gap = $\frac{19.2 - 20}{20} \times 100 = -4\%$. By Okun's law, $-4\% \approx -2 \times (\Delta \text{Unemployment}) \Rightarrow \Delta \text{Unemployment} = \mathbf{2 \text{ percentage points}}$ of cyclical unemployment above the natural rate.

Bài tập luyện tập – Câu 26

Which of these correctly ranks the four business-cycle phases in order?

- (A) Peak → Trough → Expansion → Contraction (C) Contraction → Expansion → Trough → Peak
(B) Expansion → Peak → Contraction → Trough (D) Trough → Contraction → Peak → Expansion

Lời giải chi tiết

The standard cycle order is expansion, peak, contraction (recession), trough, then back to expansion. **(B)**.

Bài tập luyện tập – Câu 27

A government statistic shows CPI-measured inflation of 3% this year, but a worker's nominal wage rose by only 1%. What happened to this worker's real wage?

- (A) Rose by about 2% (C) Fell by about 2%
(B) Rose by about 4% (D) Stayed exactly the same

Lời giải chi tiết

$\% \Delta \text{Real wage} \approx \% \Delta \text{Nominal wage} - \text{Inflation} = 1\% - 3\% = -2\%$ (fell by about 2%). (C).

Bài tập luyện tập – Câu 28

Which best distinguishes a coincident indicator from a lagging indicator?

- (A) A coincident indicator moves with the cycle; a lagging indicator changes only after the cycle has already turned unemployment
(C) There is no meaningful distinction between the two
(B) A coincident indicator only applies to inflation; a lagging indicator only applies to (D) A lagging indicator always predicts recessions before they occur

Lời giải chi tiết

Coincident indicators (e.g., industrial production) move together with real GDP; lagging indicators (e.g., the unemployment rate) confirm a turning point only after it has already happened. (A).

Bài tập luyện tập – Câu 29

In the expanded circular flow model (with a financial sector, government, and foreign sector), which condition describes macroeconomic equilibrium?

- (A) $S = I$, regardless of the size of government or foreign trade (C) $C + I + G + NX$ must equal zero
(B) $S + T + M = I + G + X$ (D) T must always equal G exactly

Lời giải chi tiết

Equilibrium requires that total leakages equal total injections, $S + T + M = I + G + X$; $S = I$ alone holds only in the simplified two-sector model with no government or foreign sector. Option (C) confuses the equilibrium condition with the expenditure-approach GDP formula itself, and (D) describes a coincidence, not a requirement. (B).

Bài tập luyện tập – Câu 30 – multi-part

An economy records the following flows for a given year (in \$ billions): $S = 650$, $T = 500$, $M = 300$ (leakages); $I = 600$, $G = 550$, $X = 350$ (injections).

- (a) Find total leakages and total injections.
(b) Is this economy at equilibrium? If not, will aggregate expenditure and real GDP tend to rise

or fall going forward? Explain.

- (c) If G instead fell by \$50 billion from its value above (holding S , T , M , I , and X fixed), would the economy be at equilibrium? Show your work.

Lời giải chi tiết

(a) Total leakages = $S + T + M = 650 + 500 + 300 = \$1,450$ billion. Total injections = $I + G + X = 600 + 550 + 350 = \$1,500$ billion.

(b) Injections (\$1,500 billion) exceed leakages (\$1,450 billion) by \$50 billion, so the economy is *not* at equilibrium. More money is being injected into the spending stream than is leaking out, so planned aggregate expenditure exceeds current output; firms will see inventories drawn down unexpectedly and respond by raising production. Aggregate expenditure and real GDP will tend to **rise**.

(c) New $G = 550 - 50 = 500$. New injections = $600 + 500 + 350 = \$1,450$ billion, exactly equal to leakages (\$1,450 billion). Yes – the \$50 billion cut in G exactly closes the gap, restoring equilibrium.

Bài tập luyện tập – Câu 31

Which item is added to wages, rents, interest, and profits when computing GDP via the income approach, precisely because it is embedded in the market price of final goods but is never paid out as income to any factor of production?

- | | |
|-----------------------------|---------------------------------------|
| (A) Transfer payments | (C) Net exports |
| (B) Indirect business taxes | (D) Personal consumption expenditures |

Lời giải chi tiết

Indirect business taxes (e.g., sales and excise taxes) raise the market price consumers pay but are collected by government, not received as factor income – so they must be added back to national income to reach GDP. Transfer payments (A) are excluded from GDP entirely, not added to it, and net exports (C) and consumption (D) belong to the expenditure approach, not the income approach. **(B)**.

Bài tập luyện tập – Câu 32 – multi-part

A four-stage supply chain produces cotton shirts. A cotton grower sells raw cotton to a textile mill for \$150 (the grower purchases no material inputs). The mill sells cloth to a garment maker for \$400. The garment maker sells finished shirts wholesale to a retailer for \$700. The retailer sells the shirts to final consumers for \$1,000.

- Find the value added at each of the four stages.
- Find total value added across all four stages, and compare it to the final retail sale value.
- If a researcher instead summed the raw sales value at every stage, what number would result?
- Explain why the number in part (c) is not an appropriate estimate of this chain's contribution to GDP.

Lời giải chi tiết

- (a) Grower: $150 - 0 = \$150$. Mill: $400 - 150 = \$250$. Garment maker: $700 - 400 = \$300$. Retailer: $1,000 - 700 = \$300$.
- (b) Total value added = $150 + 250 + 300 + 300 = \$1,000$, exactly equal to the \$1,000 final price paid by consumers.
- (c) Summing gross sales values: $150 + 400 + 700 + 1,000 = \$2,250$.
- (d) This overstates the chain's true contribution to GDP because it counts the value of intermediate goods multiple times – the \$150 of cotton value is embedded in (and re-counted within) the mill's, garment maker's, and retailer's sale prices, and the mill's and garment maker's added value are similarly re-counted downstream. Only value added (or the single final sale) reflects the chain's true contribution to production.

Bài tập luyện tập – Câu 33

A savings account offers a nominal interest rate of 9%. Expected inflation over the year is 3.5%. The approximate real interest rate is:

- (A) 12.5% (C) 5.5%
(B) 9% (D) 3.5%

Lời giải chi tiết

Real rate $\approx 9\% - 3.5\% = 5.5\%$. Note that (B) is simply the nominal rate itself, a common “money illusion” trap that ignores inflation entirely. (C).

Bài tập luyện tập – Câu 34 – multi-part

A saver wants a guaranteed real return of at least 5% and expects inflation of 4% over the coming year on a one-year bond.

- (a) Find the minimum nominal interest rate the bond must offer to meet the saver's target.
- (b) Suppose the bond locks in exactly the nominal rate found in part (a), but actual inflation over the year turns out to be 6% instead of the expected 4%. Find the saver's realized real interest rate.
- (c) Relative to the saver's original 5% target, does this outcome help or hurt the saver? Who benefits from the unexpectedly high inflation – the saver (lender) or the bond issuer (borrower)? Explain.
- (d) Would this fixed-rate bond have been a better or worse deal for the saver than a competing inflation-indexed bond guaranteeing a fixed 5% real return? Explain.

Lời giải chi tiết

- (a) Nominal rate $\approx 5\% + 4\% = 9\%$.
- (b) Realized real rate = nominal rate – actual inflation = $9\% - 6\% = 3\%$.
- (c) This hurts the saver: the realized real return (3%) falls short of both the original 5% target and the 4% expected level, because actual inflation (6%) exceeded what was expected when the nominal rate was set. The bond issuer (borrower) benefits, since it repays the loan with dollars that have lost more purchasing power than anticipated – the same principle by which unanticipated inflation redistributes wealth from lenders to borrowers.
- (d) The fixed-rate bond was **worse** for the saver: its realized real return (3%) fell short of the

inflation-indexed bond's guaranteed 5% real return. An inflation-indexed bond automatically raises its payout when actual inflation runs high, protecting the holder's real return regardless of inflation surprises – exactly the protection the saver lacked here.

Bài tập luyện tập – Câu 35

A student estimates an economy's GDP contribution from a multi-stage production chain by adding up the total sales value reported at every single stage, rather than computing value added at each stage. This method will typically:

- | | |
|--|---|
| (A) Understate true GDP, because it ignores government spending | (C) Exactly equal true GDP, since both methods are mathematically identical |
| (B) Overstate true GDP, because it counts the value of intermediate goods multiple times | (D) Understate true GDP, because it excludes exports |

Lời giải chi tiết

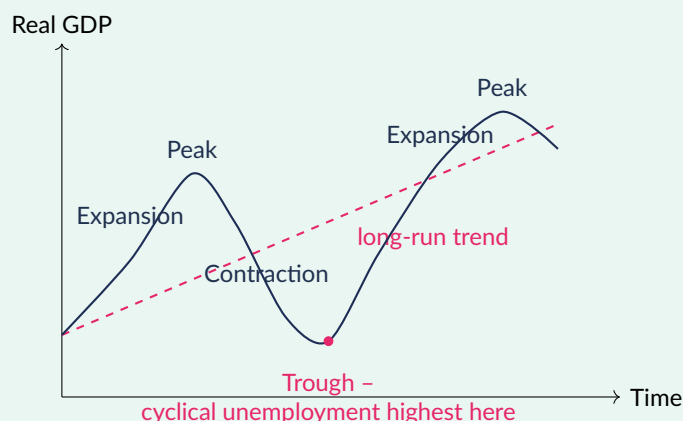
Summing gross sales at every stage counts the value of intermediate goods again and again as they pass through each downstream stage, wildly overstating the chain's true contribution to production. Only the value added at each stage – or equivalently, the single final sale – reflects the chain's genuine contribution to GDP. **(B)**.

Bài tập luyện tập – Câu 36 – multi-part

- Sketch a business-cycle diagram with real GDP on the vertical axis and time on the horizontal axis. Draw and label a long-run growth trend line and a fluctuating real-GDP curve, clearly labeling all four phases (expansion, peak, contraction/recession, trough). Then mark and label the point on your diagram where cyclical unemployment is highest, and briefly explain why you placed it there.
- At the point identified in part (a), suppose the actual unemployment rate is 9% while the natural rate of unemployment is 5%. Using Okun's law with a coefficient of 2, estimate the output gap at that point.
- Using the leakages-and-injections framework from earlier in this chapter, would policymakers trying to move the economy out of this trough most likely want to raise or lower G ? Raise or lower T ? Explain.

Lời giải chi tiết

(a)



Cyclical unemployment depends on the **output gap** – how far actual real GDP falls below potential (trend) output. That gap is largest (most negative) at the trough, the point where the cyclical curve dips furthest below the long-run trend line, so cyclical unemployment is at its greatest there. (Because the unemployment rate is itself a *lagging* indicator, the measured unemployment rate typically peaks slightly *after* the output trough, but the underlying weakness in the labor market is worst in the trough region of the cycle.)

(b) Cyclical unemployment = $9\% - 5\% = 4$ percentage points. By Okun's law, output gap $\approx -2 \times 4 = -8\%$: real GDP at the trough is roughly 8% below potential GDP.

(c) Policymakers would most likely want to **raise** G and/or **lower** T . In the leakages-and-injections framework, raising injection G or lowering leakage T (which also raises disposable income and, indirectly, C) pushes total injections above total leakages, which – exactly as in the earlier worked examples – causes planned aggregate expenditure to exceed current output, prompting firms to raise production and pulling the economy up out of the trough.

National Income and Price Determination

Mục tiêu Unit: Đường tổng cầu (AD) và các yếu tố dịch chuyển; hàm tiêu dùng, số nhân chi tiêu và số nhân thuế; tổng cung ngắn hạn (SRAS) và dài hạn (LRAS); cân bằng ngắn hạn, khoảng cách suy thoái/lạm phát và cơ chế tự điều chỉnh dài hạn; chính sách tài khoá mở rộng/thắt chặt, bộ ổn định tự động, hiệu ứng lấn át; quan điểm cổ điển và Keynes; đường cong Laffer.

3.1 Aggregate Demand: Definition and Why It Slopes Downward

Aggregate demand (AD) is the total quantity of domestically produced final goods and services that households, firms, government, and foreign buyers together are willing and able to purchase at each possible price level, holding all else equal:

$$AD = C + I + G + NX,$$

where C is consumption spending by households, I is gross private investment spending by firms, G is government purchases of goods and services, and NX is net exports (exports minus imports). Plotted against the price level, the AD curve slopes **downward** – but for entirely different reasons than a single market's demand curve.

Khái niệm cốt lõi

Three distinct mechanisms explain the downward slope of AD, each describing how a *change in the overall price level* feeds back into total spending:

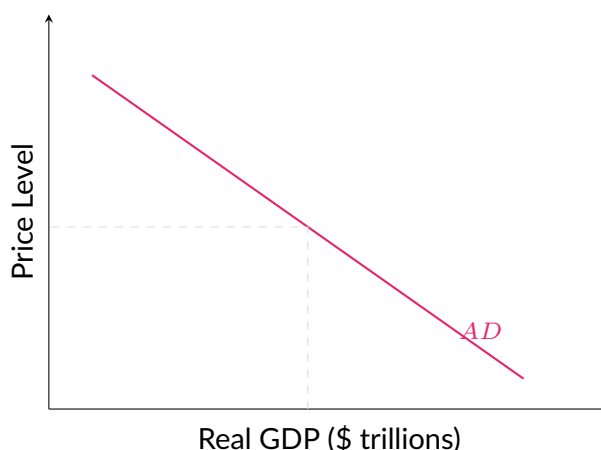
- **Wealth (real-balances) effect:** a higher price level $\Rightarrow$ the *real* (purchasing-power) value of households' fixed-nominal-value assets (cash, bank deposits, bonds) falls $\Rightarrow$ households feel and are poorer in real terms $\Rightarrow$ consumption (C) falls.
- **Interest-rate effect:** a higher price level $\Rightarrow$ households and firms need more money on hand to conduct the same volume of transactions $\Rightarrow$ the demand for money rises $\Rightarrow$ with the money supply unchanged, interest rates rise $\Rightarrow$ interest-sensitive investment (I) and durable-goods consumption fall.
- **Net exports (exchange-rate) effect:** a higher domestic price level relative to foreign price levels $\Rightarrow$ domestically produced goods become relatively more expensive than foreign goods (for both domestic and foreign buyers) $\Rightarrow$ exports fall and imports rise $\Rightarrow$ net exports (NX) fall.

In every case, a **higher** price level is associated with a **lower** quantity of real GDP demanded – and vice versa for a lower price level – which is exactly what a downward-sloping AD curve shows. A change in the *price level itself* causes a **movement along** a fixed AD curve; a change in any other determinant of C , I , G , or NX **shifts** the entire curve (Section 3.2).

Ví dụ mẫu · Worked example — Reading Quantity Demanded off an AD Equation

Aggregate demand is given by $Y = 26 - 2PL$ (in trillions of dollars). Find the quantity of real GDP demanded at $PL = 8$ and at $PL = 10$, and confirm this is consistent with a downward-sloping AD curve.

At $PL = 8$: $Y = 26 - 2(8) = 26 - 16 = \10 trillion. At $PL = 10$: $Y = 26 - 2(10) = 26 - 20 = \6 trillion. As PL rises from 8 to 10, Y falls from \$10 trillion to \$6 trillion – confirming the inverse relationship of a downward-sloping AD curve.



The aggregate demand curve: at a lower price level PL_0 , a larger real quantity of goods and services (Y_0) is demanded, through the wealth, interest-rate, and net-export effects working in reverse.

(!) Lỗi thường gặp: Do *not* explain the AD curve's slope with the microeconomic **substitution effect** (switching between two individual goods) – AD covers *every* good and service in the economy simultaneously, so there is no single “substitute” to switch toward. The three correct AP-tested reasons are the wealth effect, the interest-rate effect, and the net-export (exchange-rate) effect – know each causal chain precisely, since free-response questions often ask you to trace it step by step.

Ví dụ mẫu · Worked example — Tracing the Three Effects

Suppose the price level rises unexpectedly while the nominal money supply is held fixed. Trace, in order, how each of the three effects reduces the real quantity of GDP demanded.

Wealth effect: the real value of households' cash and fixed-value savings falls, so C falls.

Interest-rate effect: with more money now needed for the same transactions and a fixed money supply, the interest rate rises, so I (and interest-sensitive C) falls.

Net-export effect: domestic goods are now relatively more expensive than foreign goods, so exports fall and imports rise, and NX falls. All three effects push in the **same** direction – a smaller quantity of real GDP demanded at the higher price level – exactly the movement traced by a single downward-sloping AD curve. (The interest-rate effect is developed fully in the **money market** model of Unit 4, where money supply and money demand together pin down the equilibrium interest rate.)

Ví dụ mẫu · Worked example — A Movement Along AD, in Nominal and Real Terms

The price level index rises from 100 to 108 while nominal GDP rises from \$20.0 trillion to \$20.8 trillion. Find real GDP before and after, and explain why this is consistent with a movement

along a downward-sloping AD curve.

Real GDP = $\frac{\text{Nominal GDP}}{\text{Price index}} \times 100$. Before: $\frac{20.0}{100} \times 100 = \20.0 trillion. After: $\frac{20.8}{108} \times 100 \approx$ **\$19.26** trillion. Even though *nominal* GDP rose, *real* GDP **fell** as the price level rose – exactly the inverse relationship a downward-sloping AD curve describes (a movement along the curve, not a shift, since nothing besides the price level changed here).

GIẢI THÍCH TIẾNG VIỆT

VN

$AD = C + I + G + NX$ tại mỗi mức giá. AD dốc xuống vì BA hiệu ứng (khác hoàn toàn với đường cầu vi mô một mặt hàng): (1) Hiệu ứng của cải thực – giá tăng → giá trị thực của tài sản danh nghĩa cố định giảm → tiêu dùng C giảm; (2) Hiệu ứng lãi suất – giá tăng → cầu tiền để giao dịch tăng → lãi suất tăng → đầu tư I và tiêu dùng hàng lâu bền giảm; (3) Hiệu ứng xuất khẩu ròng/tỷ giá – giá trong nước tăng tương đối so với nước ngoài → hàng nội đắt hơn tương đối → xuất khẩu giảm, nhập khẩu tăng → NX giảm. Thay đổi MỨC GIÁ → di chuyển dọc theo AD; thay đổi các yếu tố khác → dịch chuyển toàn bộ đường AD.

3.2 Determinants (Shifters) of Aggregate Demand

Any change in C , I , G , or NX that is *not* caused by a change in the domestic price level shifts the entire AD curve – right if it raises total spending at every price level, left if it lowers total spending at every price level.

Khái niệm cốt lõi

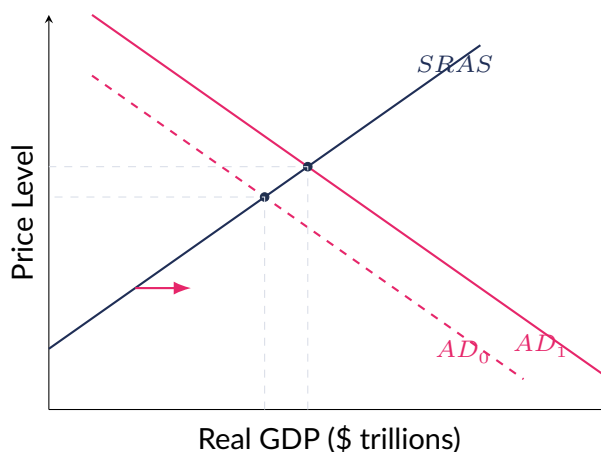
Component	Example determinant	Effect on AD
C	Consumer confidence or household wealth rises (independent of the price level)	Right
C	Personal income tax rates rise $\Rightarrow$ disposable income falls $\Rightarrow$ consumption falls	Left
I	Business confidence rises, interest rates fall, corporate tax rates fall, or firms have little excess (unused) capacity	Right
I	Business pessimism, higher interest rates, higher corporate taxes, or substantial excess capacity	Left
G	A discretionary increase in government purchases (new legislation)	Right
G	A discretionary decrease in government purchases	Left
NX	Foreign income (GDP of trading partners) rises $\Rightarrow$ foreign demand for domestic exports rises	Right
NX	The domestic currency depreciates $\Rightarrow$ exports cheaper abroad, imports pricier at home	Right
NX	The foreign price level rises relative to the domestic price level $\Rightarrow$ domestic goods relatively cheaper $\Rightarrow$ exports rise	Right

Expectations also shift AD independent of confidence surveys: if households expect *higher future income*, they tend to raise current consumption now (consumption smoothing); if firms expect *higher future sales*, or expect the cost of investment goods to rise later, they accelerate investment spending into the present – both shifting AD right. Expecting a future recession or falling prices has the opposite (leftward) effect.

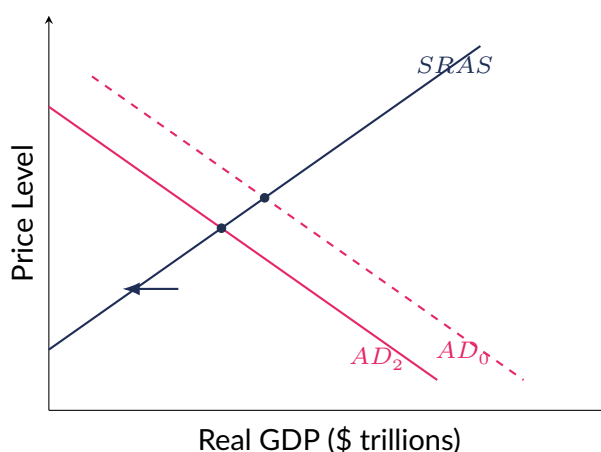
Ví dụ mẫu · Worked example – Quantifying a Shift in Autonomous Spending

Before a policy change: $C = 8$, $I = 3$, $G = 4$, $NX = 1$ (trillions). A tax cut raises consumption by \$0.3 trillion and a simultaneous export boom raises NX by \$0.2 trillion. Find the new levels of C and NX , and the total dollar shift in autonomous spending underlying the AD curve.

New $C = 8 + 0.3 = 8.3$; new $NX = 1 + 0.2 = 1.2$. Total autonomous spending before: $8 + 3 + 4 + 1 = 16$. After: $8.3 + 3 + 4 + 1.2 = 16.5$. The AD curve shifts right by exactly **\$0.5 trillion** of spending at every price level, before accounting for any further multiplier effects on the final change in equilibrium GDP.



A rightward AD shifter (e.g., rising consumer/business confidence, a currency depreciation, or a discretionary increase in G) moves $AD_0 \rightarrow AD_1$: along the given SRAS curve, both the equilibrium price level ($PL_0 \rightarrow PL_1$) and equilibrium real GDP ($Y_0 \rightarrow Y_1$) rise.



A leftward AD shifter (e.g., falling consumer confidence, higher personal income taxes, or a currency appreciation) moves $AD_0 \rightarrow AD_2$: both the equilibrium price level and equilibrium real GDP fall.

Ví dụ mẫu · Worked example — Combining Two AD Shifters

Consumer confidence falls sharply (pulling AD left) at the same time the government cuts taxes significantly (pulling AD right). If the tax cut's effect on AD is larger than the confidence shock's effect, what happens to AD, and can we be sure about the direction of the change in equilibrium real GDP?

The two shifters act in opposite directions on AD. Since the (rightward) tax-cut effect is specified as larger than the (leftward) confidence effect, the **net** effect is a shift of AD to the **right**, though by less than the tax cut alone would produce. Given a rightward net AD shift and an upward-sloping SRAS, both equilibrium real GDP and the price level rise – the direction is determined here only because we were told which effect is larger; without that information, the net direction of the AD shift (and hence of Y and PL) would be **indeterminate**, exactly as with simultaneous supply-and-demand shifts in a single market (Unit 1).

Ví dụ mẫu · Worked example — Shifting an AD Equation Algebraically

Aggregate demand is given by $Y = 30 - 2PL$ (in trillions of dollars). An increase in government purchases of \$4 trillion occurs, and (holding the price level fixed) the spending multiplier is 2.5. Write the new AD equation.

The autonomous increase in spending shifts the AD curve right by $\Delta G \times \text{multiplier} = 4 \times 2.5 = 10$ (trillion dollars of real GDP) at every price level. The new AD equation is $Y = (30 + 10) - 2PL = 40 - 2PL$.

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Bất kỳ thay đổi nào của C, I, G, NX KHÔNG do mức giá gây ra sẽ làm dịch chuyển toàn bộ đường AD. Bên phải: niềm tin người tiêu dùng/doanh nghiệp tăng, lãi suất giảm, thuế thu nhập cá nhân/doanh nghiệp giảm, chi tiêu chính phủ tăng, nội tệ mất giá, thu nhập nước ngoài tăng, hoặc mức giá nước ngoài tăng tương đối. Ngược lại của mỗi yếu tố trên làm AD dịch trái. Khi AD dịch phải dọc theo một đường SRAS dốc lên cố định, cả mức giá VÀ sản lượng thực đều tăng.

3.3 The Consumption Function, MPC/MPS, and the Spending Multiplier

Khái niệm cốt lõi

The **consumption function** models how households divide disposable income (Y_d) between spending and saving:

$$C = a + MPC \times Y_d,$$

where $a > 0$ is **autonomous consumption** (spending that occurs even at zero disposable income, financed by borrowing or past savings) and MPC is the **marginal propensity to consume** – the fraction of one additional dollar of disposable income that is spent. The **marginal propensity to save (MPS)** is the fraction saved. Since every extra dollar of disposable income is either spent or saved,

$$MPC + MPS = 1.$$

An initial injection of new autonomous spending (e.g., a rise in investment, government purchases, or exports) does not raise real GDP by only its own amount. It becomes someone else's income, a fraction MPC of which is re-spent, becoming yet more income, a fraction MPC of that re-spent, and so on – an infinite geometric series of diminishing rounds of spending. This

magnification of an initial spending change into a larger final change in real GDP is the **multiplier effect**.

$$\text{Spending multiplier} = \frac{1}{1 - MPC} = \frac{1}{MPS}, \quad \Delta Y = \Delta(\text{autonomous spending}) \times \text{Spending multiplier}.$$

Derivation: an initial spending change ΔA generates rounds ΔA , $MPC \cdot \Delta A$, $MPC^2 \cdot \Delta A$, $MPC^3 \cdot \Delta A$, ... Summing the infinite geometric series with common ratio MPC (which is between 0 and 1) gives $\Delta Y = \Delta A (1 + MPC + MPC^2 + \dots) = \frac{\Delta A}{1 - MPC}$.

Ví dụ mẫu · Worked example – The Multiplier as a Geometric Series

$MPC = 0.75$. Autonomous investment spending rises by \$50 billion. Find the spending multiplier and the resulting change in equilibrium real GDP (price level fixed), and verify using the first several rounds of re-spending.

Spending multiplier $= \frac{1}{1 - 0.75} = \frac{1}{0.25} = 4$. So $\Delta Y = 50 \times 4 = \text{\$200 billion}$.

Round-by-round check: $50 + 50(0.75) + 50(0.75)^2 + 50(0.75)^3 + \dots = 50 + 37.5 + 28.125 + 21.09375 + \dots$. This is a geometric series with first term 50 and ratio 0.75, summing to $\frac{50}{1 - 0.75} = \frac{50}{0.25} = \text{\$200}$ – matching the multiplier formula exactly.

Ví dụ mẫu · Worked example – Sizing Spending to Close a Gap

$MPC = 0.8$. The economy has a \$300 billion recessionary gap (actual real GDP is \$300 billion below potential GDP). Find the multiplier and the increase in autonomous spending needed to close the gap exactly, holding the price level fixed.

Spending multiplier $= \frac{1}{1 - 0.8} = \frac{1}{0.2} = 5$. Required $\Delta(\text{spending}) = \frac{\Delta Y}{\text{multiplier}} = \frac{300}{5} = \text{\$60 billion}$.

Ví dụ mẫu · Worked example – Finding MPC from an Observed Multiplier Effect

$MPC = 0.6$. An \$80 billion increase in autonomous consumption occurs (e.g., from a wave of consumer optimism). Find the resulting ΔY , then confirm MPS .

Spending multiplier $= \frac{1}{1 - 0.6} = 2.5$. $\Delta Y = 80 \times 2.5 = \text{\$200 billion}$. Since $MPC + MPS = 1$, $MPS = 1 - 0.6 = \text{\textbf{0.4}}$; check: $1/MPS = 1/0.4 = 2.5 \checkmark$, matching the multiplier computed from MPC .

Khái niệm cốt lõi

The multiplier can also be derived directly from the **aggregate expenditure (AE)** equation, often drawn as the **Keynesian cross**. If $AE = C + I + G + NX$ and $C = a + MPC \times Y$ (treating disposable income as equal to real GDP Y for simplicity, ignoring taxes for the moment), equilibrium real GDP occurs where $Y = AE$:

$$Y = a + MPC \cdot Y + I + G + NX \Rightarrow Y(1 - MPC) = a + I + G + NX \Rightarrow Y = \frac{a + I + G + NX}{1 - MPC}.$$

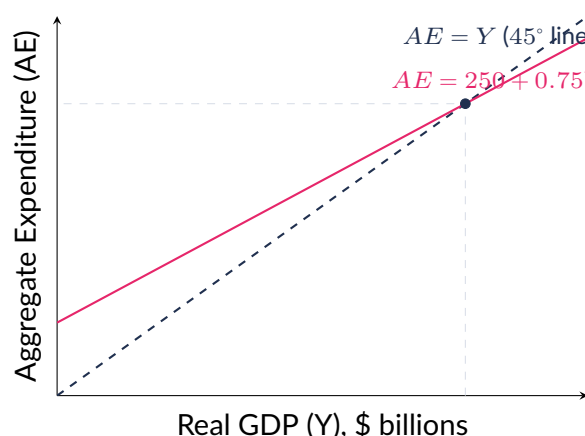
This confirms that equilibrium GDP equals total autonomous spending ($a + I + G + NX$)

multiplied by exactly the spending multiplier.

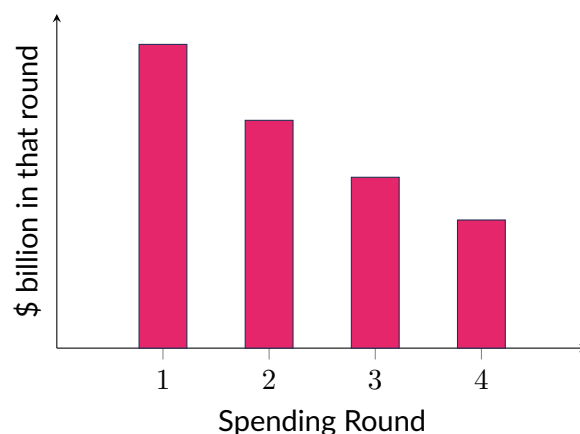
Ví dụ mẫu · Worked example – Solving for Equilibrium GDP Algebraically

$C = 100 + 0.75Y$ (billions), $I = 50$, $G = 80$, $NX = 20$ (all in billions, price level fixed). Find equilibrium real GDP.

Set $Y = C + I + G + NX = 100 + 0.75Y + 50 + 80 + 20 = 250 + 0.75Y$. Then $Y - 0.75Y = 250 \Rightarrow 0.25Y = 250 \Rightarrow Y = \text{\$1,000 billion}$. Check with the multiplier shortcut: autonomous spending = $100 + 50 + 80 + 20 = 250$; multiplier = $1/(1 - 0.75) = 4$; $Y = 250 \times 4 = 1,000 \checkmark$.



The Keynesian cross: equilibrium real GDP occurs where the aggregate expenditure line $AE = 250 + 0.75Y$ crosses the 45° line $AE = Y$, at $Y = \text{\$1,000 billion}$ – matching the algebraic solution above.



The diminishing rounds of re-spending from a \$50 billion autonomous increase with $MPC = 0.75$:
50, 37.5, 28.125, 21.09, ... – a geometric series summing to \$200 billion.

(!) Lỗi thường gặp: The **paradox of thrift**: if households across the economy simultaneously try to save a larger share of income (raising MPS, lowering MPC) in response to a downturn, one household's spending is another household's income, so the resulting fall in consumption can reduce aggregate income by so much that total (aggregate) saving fails to rise, or even falls – even though every individual household intended to save more. A plan that is rational for a single household acting alone is not necessarily beneficial for the economy as a whole when everyone adopts it simultaneously.

In an **open economy**, part of each round of new income also leaks abroad through **imports**: a fraction of each additional dollar of income, the **marginal propensity to import (MPI)**, is spent on foreign-produced goods rather than recirculating domestically. Import spending does not become someone else's *domestic* income, so it is a leakage just like saving, further shrinking the multiplier:

$$\text{Open-economy spending multiplier} = \frac{1}{MPS + MPI} \leq \frac{1}{MPS}.$$

Ví dụ mẫu · Worked example – The Open-Economy Multiplier

$MPC = 0.75$ (so $MPS = 0.25$ in a closed economy) and $MPI = 0.05$. Compare the closed-economy and open-economy spending multipliers.

Closed-economy multiplier $= 1/0.25 = 4$. Open-economy multiplier $= 1/(0.25 + 0.05) = 1/0.30 \approx 3.33$ – smaller, because some of each round's new income leaks abroad as import spending instead of recirculating as domestic income.

(!) Lỗi thường gặp: The multiplier formulas $\Delta Y = \Delta A \times \frac{1}{1 - MPC}$ assume a **fixed price level** (equivalently, a horizontal short-run supply curve over the relevant range). Once the price level is allowed to rise as AD shifts right along the normal upward-sloping SRAS curve (Section 3.5), part of the increase in nominal spending is absorbed by higher prices rather than higher real output, so the actual increase in *real* GDP is smaller than the simple multiplier predicts.

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Hàm tiêu dùng: $C = a + MPC \times Y_d$, với a là tiêu dùng tự định (autonomous). $MPC + MPS = 1$.

Số nhân chi tiêu $= \frac{1}{1 - MPC} = \frac{1}{MPS}$, xuất phát từ tổng chuỗi cấp số nhân của các vòng chi tiêu lặp lại ($\Delta A + MPC \cdot \Delta A + MPC^2 \cdot \Delta A + \dots$). Công thức số nhân giả định mức giá KHÔNG đổi; nếu SRAS dốc lên, một phần tác động bị hấp thụ bởi giá tăng thay vì sản lượng thực tăng.

3.4 The Tax Multiplier and the Balanced-Budget Multiplier

Khái niệm cốt lõi

A change in taxes affects real GDP through the *same* multiplier chain, but with one key difference: the very first round of a tax change is not *entirely* spent – part of it is saved (a fraction MPS), so the injection into the spending stream in round one is only $MPC \times \Delta T$, not the full ΔT . This makes the **tax multiplier** smaller in magnitude than the spending multiplier, and opposite in sign (a tax cut raises GDP; a spending cut lowers it).

$$\text{Tax multiplier} = -\frac{MPC}{1 - MPC} = -\frac{MPC}{MPS}, \quad \Delta Y = \Delta T \times \text{Tax multiplier}.$$

Ví dụ mẫu · Worked example – The Tax Multiplier

$MPC = 0.75$. The government cuts taxes by \$40 billion. Find the tax multiplier and ΔY .

Tax multiplier $= -\frac{0.75}{0.25} = -3$. A tax cut is $\Delta T = -40$, so $\Delta Y = (-3) \times (-40) = \textbf{+\$120 billion}$ –

smaller in magnitude than the \$160 billion a \$40 billion *spending* increase would produce with the same *MPC* (spending multiplier = $1/(1 - 0.75) = 4$, $40 \times 4 = 160$), because \$10 billion of the initial \$40 billion tax cut is saved rather than spent in round one.

Government transfer payments (unemployment benefits, Social Security, welfare payments) affect AD through the *same* channel as a tax cut: an increase in transfers raises households' disposable income directly, with no corresponding increase in government purchases of goods and services. A change in transfer payments is therefore analyzed with the **tax multiplier** (in magnitude), *not* the spending multiplier: $\Delta Y = \frac{MPC}{1 - MPC} \times \Delta(\text{Transfers})$, since a transfer increase raises disposable income by the same amount as an equal-sized tax cut.

Ví dụ mẫu · Worked example — Transfer Payments and the Multiplier

$MPC = 0.75$. The government increases unemployment benefits (a transfer payment) by \$40 billion. Find ΔY .

Transfer payments use the tax-multiplier magnitude: $\frac{MPC}{1 - MPC} = \frac{0.75}{0.25} = 3$. $\Delta Y = 40 \times 3 =$ **\$120 billion** – identical to the effect of a \$40 billion *tax cut* with the same *MPC* (the example above), since both raise disposable income by \$40 billion without any direct government purchase of goods and services.

(!) Lỗi thường gặp: Some textbooks separate *MPC* out of *disposable income* (Y_d) from the effect of the *tax rate* itself, producing more advanced multiplier formulas that also incorporate the marginal tax rate. The AP Macroeconomics exam, however, consistently uses the simple $\frac{1}{1 - MPC}$ and $-\frac{MPC}{1 - MPC}$ formulas given directly in this chapter, with *MPC* and ΔT given or easily computed from the problem – you will not be asked to derive a tax-rate-adjusted multiplier from scratch.

Now consider changing *G* and *T* *together*, by the same dollar amount and in the same direction (e.g., both rise by \$X, financed with no change in the deficit) – a **balanced-budget** change.

$$\text{Balanced-budget multiplier} = \underbrace{\frac{1}{1 - MPC}}_{\text{spending multiplier}} + \underbrace{\left(-\frac{MPC}{1 - MPC}\right)}_{\text{tax multiplier}} = \frac{1 - MPC}{1 - MPC} = 1.$$

Because the spending multiplier's effect always exceeds the (smaller, opposite-signed) tax multiplier's effect by exactly the amount of the initial dollar change, equal simultaneous increases (or decreases) in *G* and *T* change equilibrium real GDP by exactly that dollar amount – the balanced-budget multiplier is always **1**, regardless of *MPC*.

Ví dụ mẫu · Worked example — The Balanced-Budget Multiplier

$MPC = 0.6$. Government spending and taxes both rise by \$50 billion (a balanced-budget increase). Find the net change in equilibrium real GDP.

Spending multiplier = $\frac{1}{1 - 0.6} = 2.5 \Rightarrow \Delta Y_G = 50 \times 2.5 = 125$. Tax multiplier = $-\frac{0.6}{0.4} = -1.5 \Rightarrow \Delta Y_T = -1.5 \times 50 = -75$. Net $\Delta Y = 125 - 75 =$ **\$50 billion** – exactly equal to the

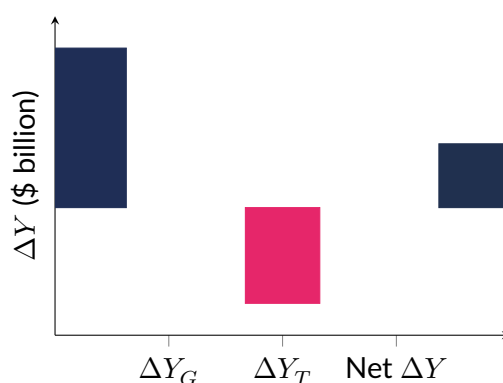
\$50 billion balanced-budget change, confirming a balanced-budget multiplier of 1.

Ví dụ mẫu · Worked example – A Balanced-Budget Decrease

$MPC = 0.75$. Government spending and taxes both *fall* by \$20 billion (a balanced-budget decrease). Find the net change in equilibrium real GDP.

Spending multiplier $= 1/(1 - 0.75) = 4 \Rightarrow \Delta Y_G = -20 \times 4 = -80$. Tax multiplier $= -0.75/0.25 = -3 \Rightarrow \Delta Y_T = -3 \times (-20) = +60$. Net $\Delta Y = -80 + 60 = \textbf{-\$20 billion}$ – again exactly equal to the size of the (negative) balanced-budget change, confirming the multiplier of 1 works in either direction.

Multiplier	Formula	Applies to
Spending multiplier	$\frac{1}{1 - MPC} = \frac{1}{MPS}$	ΔG , ΔI , $\Delta(\text{autonomous } C \text{ or } NX)$
Tax multiplier	$-\frac{MPC}{1 - MPC} = -\frac{MPC}{MPS}$	ΔT , $\Delta(\text{transfers, opposite sign})$
Balanced-budget multiplier	1	Equal, same-direction ΔG and ΔT



The balanced-budget example above ($MPC = 0.6$, $\Delta G = \Delta T = \$50$ billion): the spending effect (+\$125b) and tax effect (−\$75b) net to exactly +\$50b – the size of the balanced-budget change.

(!) Lỗi thường gặp: The balanced-budget multiplier of 1 requires $\Delta G = \Delta T$ in the same direction (both increase, or both decrease, by the same dollar amount). It does *not* apply to a spending increase paired with an unrelated tax cut (which would be strongly expansionary, not neutral-to-mildly-expansionary) or to changes of different sizes.

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Số nhân thuế $= -\frac{MPC}{MPS}$, nhỏ hơn về độ lớn và ngược dấu so với số nhân chi tiêu, vì một phần của khoản thay đổi thuế bị TIẾT KIỆM ngay ở vòng đầu tiên thay vì được chi tiêu hết. Số nhân ngân sách cân bằng (tăng/giảm G và T cùng một lượng, cùng chiều) LUÔN bằng 1, bất kể MPC, vì hiệu ứng của số nhân chi tiêu luôn lớn hơn hiệu ứng (ngược dấu) của số nhân thuế

đúng bằng khoản thay đổi ban đầu.

3.5 Short-Run Aggregate Supply (SRAS)

Khái niệm cốt lõi

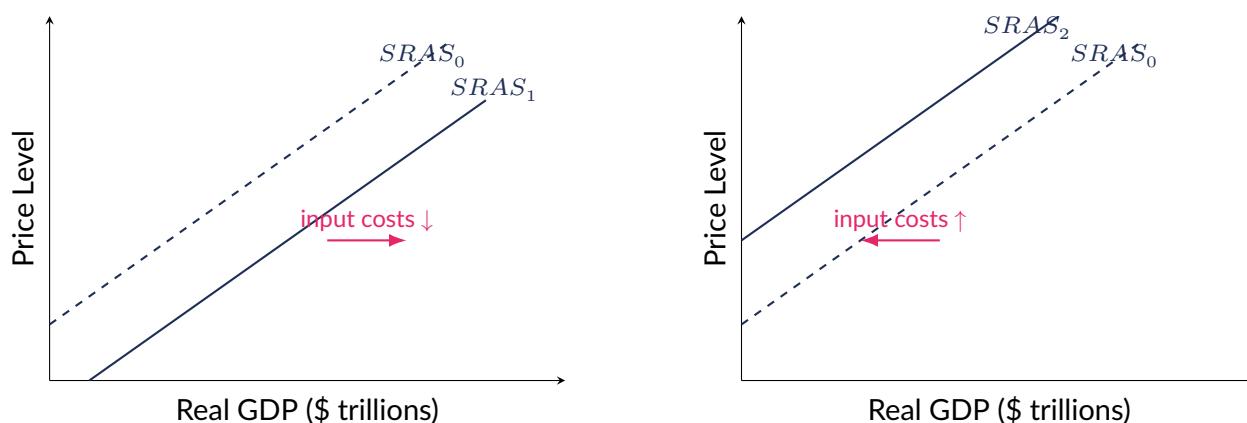
Short-run aggregate supply (SRAS) shows the relationship between the price level and the quantity of real GDP that firms are willing to supply in the short run. SRAS slopes **upward** because **nominal wages and many input prices are “sticky”** – slow to adjust – in the short run (wages are often fixed by contracts, custom, or minimum-wage laws for months or years at a time). When the overall price level rises, firms’ *output* prices rise more quickly than their largely fixed *input* costs, so profit per unit temporarily widens, and firms respond by expanding output. The reverse holds for a falling price level.

SRAS **shifts** with changes in the cost of production at every level of output:

- **Input/resource prices:** a rise in nominal wages or key commodity prices (e.g., oil) raises production costs at every output level, shifting SRAS **left**; cheaper inputs shift SRAS **right**.
- **Productivity:** higher output per unit of input lowers per-unit costs, shifting SRAS **right**; falling productivity shifts SRAS **left**.
- **Business taxes, subsidies, and regulation:** higher business taxes or stricter regulation raise costs, shifting SRAS **left**; subsidies or deregulation shift SRAS **right**.
- **Expected future price level (inflationary expectations):** if workers and firms expect *higher* inflation, they negotiate higher nominal wages and prices *now* in anticipation, raising current costs and shifting SRAS **left**; lower expected inflation shifts SRAS **right**.
- **Number of producers:** more firms entering an industry or the economy shifts SRAS **right** at every price level; firms exiting shifts SRAS **left**.

As the economy approaches full capacity, SRAS also tends to become progressively **steeper**: with little slack left, firms increasingly bid against one another for the same scarce remaining workers and materials, so additional output requires an increasingly large rise in the price level.

Why are wages and some prices “sticky” in the short run? Common explanations include **long-term contracts** (union or individual labor contracts often fix wages for one to three years), **menu costs** (the real cost to firms of frequently reprinting price lists and catalogs discourages constant price changes), **minimum-wage laws** (a legal floor prevents wages from falling below a set level), and **efficiency-wage** considerations (firms may keep wages above the market-clearing level to maintain morale and reduce turnover). Each friction fades over a long enough horizon – exactly why LRAS (Section 3.6) is drawn fully flexible.



Left: falling input costs (or rising productivity, or lower expected inflation) shift $SRAS_0 \rightarrow SRAS_1$ right. Right: rising input costs such as an oil-price shock (or rising expected inflation) shift $SRAS_0 \rightarrow SRAS_2$ left.

(!) Lỗi thường gặp: Do not confuse a movement *along* SRAS (caused only by a change in the overall price level, holding input costs and productivity fixed) with a *shift* of SRAS (caused by a change in production costs at every output level). A demand-side shock that pushes AD right and raises the price level causes a movement *along* a fixed SRAS curve, not a shift of SRAS itself.

Ví dụ mẫu · Worked example — Combining SRAS Shifters

Global oil prices fall (lowering input costs) at the same time nationwide labor productivity rises. What happens to SRAS?

Both changes independently shift SRAS **right** (lower input costs lower production costs at every output level; higher productivity also lowers per-unit costs). Because both shifters point the same way, the **combined** rightward shift of SRAS is larger than either effect alone would produce – unlike combined AD shifters pulling in opposite directions (Section 3.2), here the direction is unambiguous.

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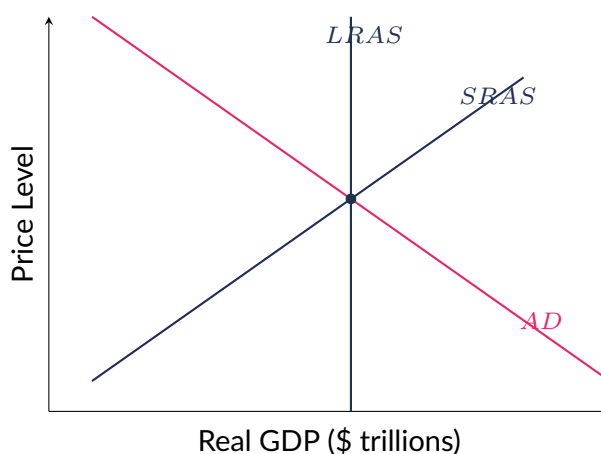
SRAS dốc lên vì tiền lương danh nghĩa và một số chi phí đầu vào “cứng nhắc” trong ngắn hạn – giá bán tăng nhanh hơn chi phí, lợi nhuận biên tăng, khuyến khích sản xuất nhiều hơn. SRAS dịch chuyển khi: giá đầu vào (lương, dầu mỏ...) thay đổi (giá đầu vào tăng → SRAS dịch TRÁI; giảm → dịch PHẢI); năng suất thay đổi (tăng → dịch PHẢI); thuế/trợ cấp/quy định kinh doanh thay đổi; và mức giá KỶ VỌNG thay đổi (kỳ vọng lạm phát tăng → lương/giá đàm phán cao hơn ngay bây giờ → SRAS dịch TRÁI).

3.6 Long-Run Aggregate Supply (LRAS) and Potential GDP

Khái niệm cốt lõi

Long-run aggregate supply (LRAS) is vertical at **potential (full-employment) real GDP**, denoted Y_p (equivalently written Y^*). In the long run, *all* wages and prices – not just some – are fully flexible: a higher price level eventually raises input costs, including nominal wages, by the same proportion as output prices, leaving firms' real profit incentives, and therefore real output, unchanged. This reflects the **classical dichotomy** (or **monetary neutrality** in the long run): purely nominal changes (like the overall price level) cannot affect real variables (like real GDP) once all prices have fully adjusted.

In the long run, real output is determined only by the *quantity and quality* of an economy's resources (land, labor, capital, entrepreneurship) and the state of **technology** – exactly the same forces that determine the position of the production possibilities curve. LRAS therefore shifts only with genuine long-run economic growth: more or better resources, greater human capital, a larger physical capital stock, technological progress, or stronger economic institutions (covered fully in Unit 5). Short-run price-level or spending changes, by contrast, move the economy along a fixed LRAS, not the curve itself.



Simultaneous long-run equilibrium: AD , $SRAS$, and the vertical $LRAS$ all intersect at the same point, at potential GDP Y_p – there is no output gap.

Ví dụ mẫu · Worked example – Short-Run Shock or Long-Run Growth?

Classify each event as affecting only $SRAS$ (a short-run cost shock) or as also shifting $LRAS$ (a change in long-run productive capacity): (a) a temporary strike that shuts down a major port for two months; (b) a nationwide rollout of a new, permanently more efficient production technology.

(a) A temporary strike raises costs and disrupts supply chains *for a limited time* without changing the economy's underlying resources or technology – this shifts **$SRAS$ only** (left), reversing once the strike ends. (b) A permanent technological improvement raises the economy's underlying productive capacity indefinitely – this shifts **both $SRAS$ and $LRAS$ right**, a genuine increase in potential GDP (Unit 5).

Potential GDP corresponds to the economy operating at the **natural rate of unemployment** – the rate consistent with normal frictional and structural unemployment but zero *cyclical* unemployment (Unit 2). Policies that shift AD (Sections 3.9–3.11) are **stabilization** tools aimed at closing temporary gaps around a given Y_p ; policies that shift $LRAS$ are **growth** tools aimed at raising Y_p itself over time. The two are not substitutes – a supply-side policy does little to close an immediate recessionary gap quickly, just as demand-side stimulus cannot permanently raise an economy's underlying productive capacity.

(!) Lỗi thường gặp: The natural rate of unemployment is **not zero** – it reflects normal frictional unemployment (people between jobs) and structural unemployment (skills mismatches), both present even at Y_p . “Full employment” in macroeconomics means zero *cyclical* unemployment, not a literal 0% unemployment rate.

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LRAS thẳng đứng tại GDP tiềm năng Y_p (hay Y^*) vì trong dài hạn, lương và giá hoàn toàn linh hoạt – đây là nguyên lý “tính trung lập của tiền” (money neutrality): thay đổi danh nghĩa (mức giá) không ảnh hưởng đến biến số thực (sản lượng thực) khi mọi giá đã điều chỉnh xong. LRAS chỉ dịch chuyển khi số lượng/chất lượng nguồn lực hoặc công nghệ thay đổi (tăng trưởng dài hạn) – giống hệt các yếu tố làm dịch chuyển PPC. Khi AD , $SRAS$, $LRAS$ cùng cắt nhau tại một điểm, nền kinh tế đang ở cân bằng dài hạn, không có khoảng cách sản lượng.

3.7 Short-Run Macroeconomic Equilibrium: Recessional and Inflationary Gaps

Khái niệm cốt lõi

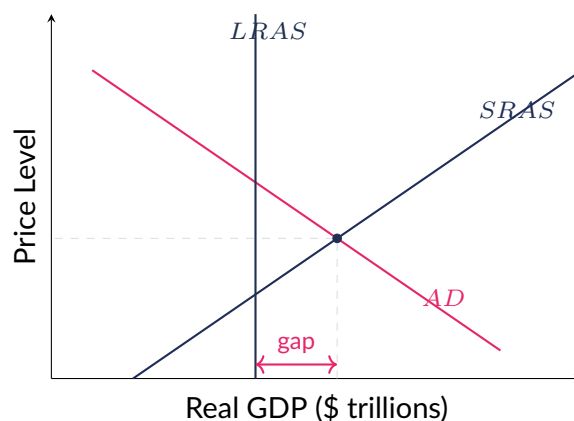
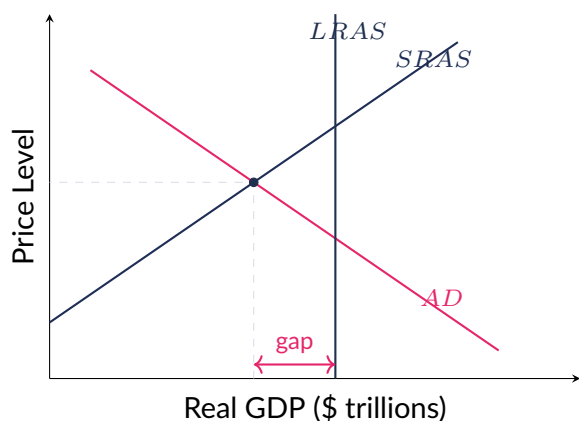
Short-run macroeconomic equilibrium occurs where the AD curve intersects the SRAS curve, determining short-run real GDP (Y_1) and the price level. Comparing Y_1 to potential output Y_p reveals the economy's position in the business cycle:

- $Y_1 < Y_p$: a **recessional gap** – actual output lies below potential, cyclical unemployment is positive (unemployment above the natural rate), and resources (including labor) are underutilized.
- $Y_1 > Y_p$: an **inflationary gap** – actual output lies above potential (the economy is “overheating”), cyclical unemployment is negative (unemployment below the natural rate), and a very tight labor market puts upward pressure on wages and prices.
- $Y_1 = Y_p$: **long-run equilibrium** – no gap; AD, SRAS, and LRAS intersect at the same point (Section 3.6).

The **size of the gap** is measured as $|Y_p - Y_1|$, typically expressed in dollars of real GDP.

		Recessional gap ($Y_1 < Y_p$)	Inflationary gap ($Y_1 > Y_p$)
Cyclical unemployment		Positive (above natural rate)	Negative (below natural rate)
Labor market		Slack; workers easier to find	Tight; workers hard to find
Wage/price pressure		Downward (slow to materialize)	Upward
AD ∩ SRAS relative to LRAS		Left of LRAS	Right of LRAS
Appropriate fiscal policy		Expansionary ($\uparrow G, \downarrow T$)	Contractionary ($\downarrow G, \uparrow T$)

(!) Lỗi thường gặp: When asked for the “size” of a gap, report it as a positive dollar magnitude ($|Y_p - Y_1|$) and separately state its type (recessional or inflationary) in words – do not leave the sign ambiguous. A recessional gap of \$600 billion and an inflationary gap of \$600 billion describe very different situations requiring opposite policy responses, even though the number is the same.



Left: a **recessionary gap** – short-run equilibrium Y_1 lies left of potential Y_p . Right: an **inflationary gap** – Y_1 lies right of Y_p , an overheating economy.

Ví dụ mẫu · Worked example – Identifying the Gap from Economic Data

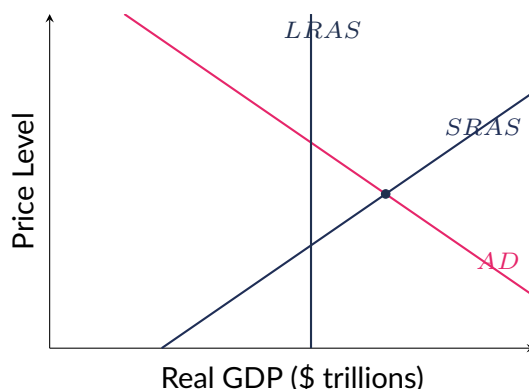
Potential real GDP is \$20 trillion. Current real GDP is \$19.4 trillion, and the unemployment rate is above the natural rate of unemployment. Identify the type of gap, its size, and sketch the graph in words.

Since Y_1 (\$19.4 tn) $<$ Y_p (\$20 tn) and unemployment exceeds the natural rate (positive cyclical unemployment), this is a **recessionary gap** of $20 - 19.4 = \mathbf{\$0.6 \text{ trillion} = \$600 \text{ billion}}$. On the graph, the AD curve intersects the SRAS curve at a point *left* of the vertical LRAS line, with the horizontal distance between the two intersection points marking the \$600 billion gap.

Ví dụ mẫu · Worked example – Solving for an Inflationary Gap Algebraically

Potential real GDP is \$7 trillion. Aggregate demand is given by $PL = 15 - Y$ and short-run aggregate supply by $PL = Y - 3$ (in trillions of dollars of real GDP). Find the short-run equilibrium, identify the type of gap, and state its size.

Set $AD = SRAS$: $15 - Y = Y - 3 \Rightarrow 18 = 2Y \Rightarrow Y_1 = \9 trillion , $PL_1 = 9 - 3 = 6$ (check: $15 - 9 = 6 \checkmark$). Since Y_1 (\$9 tn) $>$ Y_p (\$7 tn), this is an **inflationary gap** of $9 - 7 = \mathbf{\$2 \text{ trillion}}$.



The inflationary gap from the worked example above: $Y_1 = 9$ lies right of $Y_p = 7$, a gap of $9 - 7 = 2$.

Ví dụ mẫu · Worked example — No Gap at All

Potential GDP is \$14 trillion, and short-run equilibrium real GDP is also \$14 trillion. What type of gap exists, and what does this imply about the current unemployment rate?

Since $Y_1 = Y_p$, there is **no gap** – the economy is in long-run equilibrium. Unemployment equals the **natural rate** (cyclical unemployment is exactly zero).

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Cân bằng ngắn hạn: giao điểm AD và SRAS. So sánh Y_1 với Y_p : nếu $Y_1 < Y_p$ là **khoảng cách suy thoái** (thất nghiệp chu kỳ dương, thất nghiệp thực tế trên mức tự nhiên); nếu $Y_1 > Y_p$ là **khoảng cách lạm phát** (nền kinh tế “quá nóng”, thất nghiệp dưới mức tự nhiên, áp lực tăng lương/giá); nếu $Y_1 = Y_p$ là cân bằng dài hạn. Độ lớn khoảng cách = $|Y_p - Y_1|$.

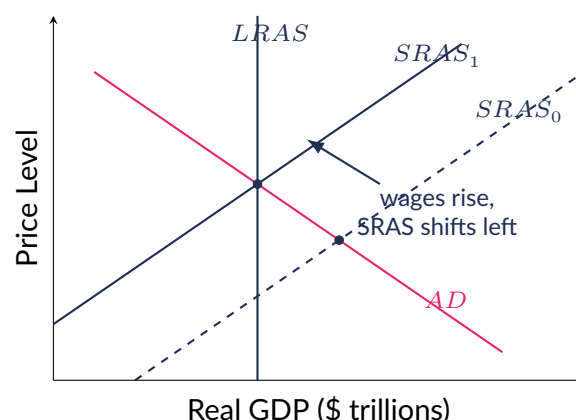
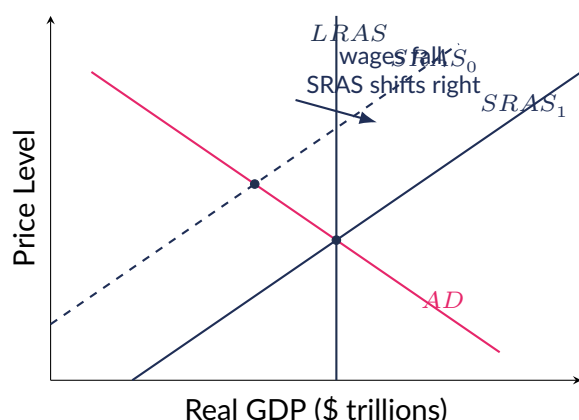
3.8 Long-Run Self-Correction: The Adjustment Mechanism

Khái niệm cốt lõi

Absent any policy action, an economy with an output gap tends to **self-correct** back toward potential GDP through gradual adjustments in nominal wages:

- **Recessionary gap:** high unemployment creates slack in the labor market. Over time, nominal wages fall (or at least grow more slowly than before), lowering firms' production costs. This shifts **SRAS right**, and the economy moves along the unchanged AD curve to a new equilibrium at Y_p , but at a *lower* price level than the original short-run equilibrium.
- **Inflationary gap:** a tight labor market (unemployment below the natural rate) pushes nominal wages *up* as firms compete for scarce workers. This raises costs and shifts **SRAS left**, moving the economy along the unchanged AD curve back to Y_p , but at a *higher* price level than the original short-run equilibrium.

This process can be **slow**, especially for a recessionary gap, because nominal wages tend to be **sticky downward** – workers, unions, and long-term contracts strongly resist nominal wage cuts even when demand for labor has fallen. This asymmetry (wages adjust upward more readily than downward) is a central justification economists give for using active fiscal or monetary policy to speed a recessionary economy's return to Y_p rather than simply waiting for self-correction (Section 3.9; see also Section 3.12's classical/Keynesian debate over how reliable and fast this mechanism really is).



Left: recessionary self-correction – falling wages shift $SRAS_0 \rightarrow SRAS_1$ right, restoring Y_p at a lower price level (7→5), AD unchanged. Right: inflationary self-correction – rising wages shift $SRAS_0 \rightarrow SRAS_1$ left, restoring Y_p at a

higher price level (5→7), AD unchanged.

The two adjustment paths are not symmetric in **speed**: because nominal wages are sticky *downward* but adjust upward more readily, inflationary self-correction (wages rising) tends to occur **faster** than recessionary self-correction (wages needing to fall). This asymmetry is a major reason many economists view an economy as more likely to get “stuck” below potential for an extended period than persistently above it.

GIẢI THÍCH TIẾNG VIỆT

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Nếu không can thiệp chính sách, nền kinh tế tự điều chỉnh về Y_p qua điều chỉnh lương danh nghĩa: khoảng cách suy thoái → thất nghiệp cao → lương giảm dần → SRAS dịch PHẢI → sản lượng về Y_p ở mức giá THẤP hơn; khoảng cách lạm phát → thị trường lao động thắt chặt → lương tăng → SRAS dịch TRÁI → sản lượng về Y_p ở mức giá CAO hơn. Quá trình này có thể CHẬM, đặc biệt với khoảng cách suy thoái, vì lương danh nghĩa thường “cứng nhắc” theo hướng giảm (sticky downward) – đây là lý do nhiều nhà kinh tế học ủng hộ chính sách chủ động thay vì chờ tự điều chỉnh.

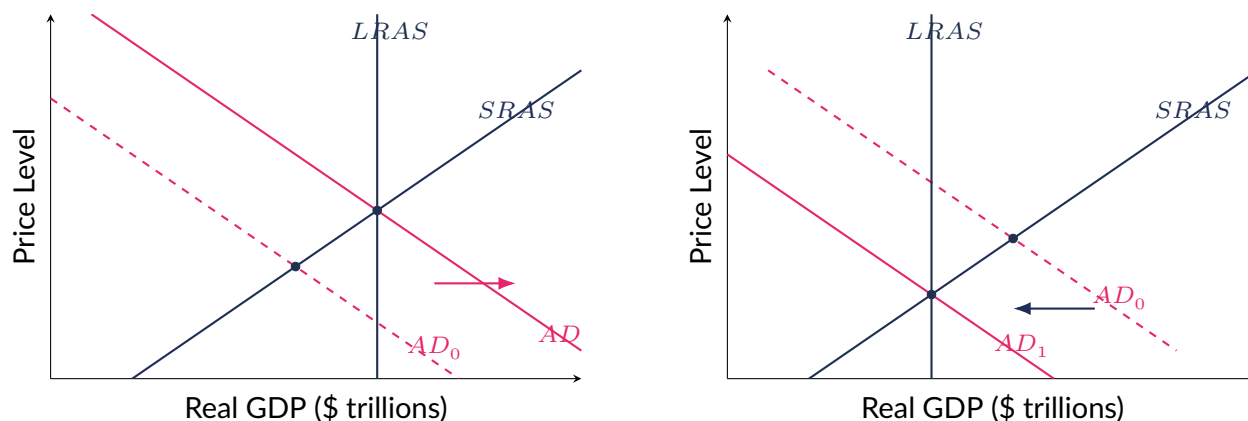
3.9 Fiscal Policy: Expansionary and Contractionary

Khái niệm cốt lõi

Fiscal policy is the deliberate use of government spending (G) and taxation (T) to influence aggregate demand and stabilize the business cycle.

- **Expansionary fiscal policy** – an increase in G , a decrease in T , or both – shifts **AD right**. It is the appropriate response to a **recessionary gap**, closing it faster than waiting for the (potentially slow) self-correction process of Section 3.8.
- **Contractionary fiscal policy** – a decrease in G , an increase in T , or both – shifts **AD left**. It is the appropriate response to an **inflationary gap**, cooling an overheating economy back toward Y_p .

Historical examples of expansionary fiscal policy include the American Recovery and Reinvestment Act of 2009 (passed in response to the Great Recession) and the CARES Act of 2020 (passed in response to the COVID-19 recession) – both combined increases in G (infrastructure, aid to state and local governments) with direct payments to households (functioning like a tax cut or transfer) to shift AD right and close large recessionary gaps.



Left: expansionary fiscal policy ($\uparrow G, \downarrow T$) shifts $AD_0 \rightarrow AD_1$, closing a recessionary gap exactly at Y_p , price level 4 → 6. Right: contractionary fiscal policy ($\downarrow G, \uparrow T$) shifts $AD_0 \rightarrow AD_1$, closing an inflationary gap exactly at Y_p , price level 5 → 3.

Ví dụ mẫu · Worked example — Sizing Expansionary Fiscal Policy

The economy has a \$400 billion recessionary gap. $MPC = 0.8$. By how much should government spending rise to close the gap exactly, holding the price level fixed?

Spending multiplier $= \frac{1}{1 - 0.8} = 5$. Required $\Delta G = \frac{\Delta Y}{\text{multiplier}} = \frac{400}{5} = \text{\$80 billion}$.

Ví dụ mẫu · Worked example — Closing the Same Gap with a Tax Cut

Using the same \$400 billion recessionary gap and $MPC = 0.8$, find the tax cut alone that would close the gap instead of the \$80 billion spending increase found above.

Tax multiplier $= -\frac{0.8}{0.2} = -4$. $400 = -4 \times \Delta T \Rightarrow \Delta T = -100$: a tax cut of **\$100 billion** – larger in dollar terms than the \$80 billion spending increase, since part of any tax cut leaks into saving in the first round.

Ví dụ mẫu · Worked example — A Mixed Fiscal Package

Using the same gap and $MPC = 0.8$, suppose the government instead combines a \$40 billion increase in G with a tax cut. Find the additional tax cut needed to close the remaining gap.

The \$40 billion spending increase alone contributes $\Delta Y = 40 \times 5 = 200$ billion, leaving $400 - 200 = \$200$ billion of the gap still open. Using the tax multiplier of -4 : $200 = -4 \times \Delta T \Rightarrow \Delta T = -50$, a tax cut of **\$50 billion**. Combined, a \$40 billion spending increase plus a \$50 billion tax cut closes the \$400 billion gap exactly.

Ví dụ mẫu · Worked example — A Full Fiscal-Policy Scenario

Potential real GDP is \$18 trillion. Short-run equilibrium is currently at \$18.9 trillion, with unemployment below the natural rate. $MPC = 0.6$. (a) Identify the gap. (b) Find the exact change in G needed to close it. (c) Find the exact change in T needed to close it instead. (d) State the required direction of each change.

(a) $Y_1 (\$18.9 \text{ tn}) > Y_p (\$18 \text{ tn})$: an **inflationary gap** of $\$0.9 \text{ trillion} = \900 billion .

(b) Spending multiplier $= 1/(1 - 0.6) = 2.5$. $\Delta G = -900/2.5 = \text{\$-360 billion}$.

(c) Tax multiplier $= -0.6/0.4 = -1.5$. $-900 = -1.5 \times \Delta T \Rightarrow \Delta T = \text{\$+600 billion}$.

(d) Government spending should **fall** and taxes should **rise** – both contractionary, consistent with closing an inflationary (overheating) gap.

(!) Lỗi thường gặp: Compare the graphs of Section 3.8 (self-correction) and Section 3.9 (fiscal policy) closely: **both** routes can return the economy exactly to Y_p , but they leave the economy at *different price levels*. Closing a recessionary gap via **expansionary AD policy** pushes the price level *up* along the unchanged SRAS curve (from 4 to 6 above), while closing the *same* gap via self-correction (unchanged AD, SRAS shifting right) pushes the price level *down*. This is a genuine economic trade-off, not just a graphing detail: using fiscal stimulus to speed a recovery tends to leave the economy with *higher* prices than patiently waiting for wages to adjust – one reason some economists (Section 3.12) are cautious about aggressive demand-side intervention.

GIẢI THÍCH TIẾNG VIỆT

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Chính sách tài khoá mở rộng (tăng G , giảm T) đẩy AD sang PHẢI để đóng khoảng cách suy thoái nhanh hơn tự điều chỉnh; chính sách thắt chặt (giảm G , tăng T) đẩy AD sang TRÁI để đóng khoảng cách lạm phát. Lưu ý: đóng khoảng cách bằng chính sách (AD dịch chuyển) và bằng tự điều chỉnh (SRAS dịch chuyển) đều đưa sản lượng về Y_p , nhưng cho ra MỨC GIÁ cuối cùng khác nhau – chính sách mở rộng thường để lại mức giá cao hơn so với chờ tự điều chỉnh.

3.10 Automatic Stabilizers versus Discretionary Fiscal Policy

Khái niệm cốt lõi

Discretionary fiscal policy requires new legislation each time – Congress (or the equivalent legislature) must actively vote to change G or T . This makes it powerful but subject to significant **time lags** (recognizing the problem, passing a law, and implementing spending all take time – explored fully in Unit 5).

Automatic stabilizers, by contrast, are built into existing law and adjust the budget *automatically* as the economy fluctuates, with **no new legislation required**:

- A **progressive income tax** automatically collects *less* revenue when incomes fall in a recession (both because incomes are lower and because taxpayers fall into lower brackets), cushioning the fall in disposable income and consumption; it automatically collects *more* revenue in a boom, restraining consumption growth.
- **Unemployment insurance** and other transfer programs automatically pay out *more* as job losses rise in a downturn, supporting household spending exactly when private income is falling; payouts automatically shrink as the economy recovers and joblessness falls.

Automatic stabilizers therefore *automatically* widen the budget deficit (or shrink the surplus) during a recession and shrink the deficit (or widen the surplus) during a boom, reducing the amplitude of the business cycle without requiring policymakers to correctly diagnose and time a discretionary response.

Ví dụ mẫu · Worked example – A Progressive Tax as an Automatic Stabilizer

A simplified progressive tax schedule taxes the first \$50,000 of income at 10% and any income above \$50,000 at 25%. A recession causes a household's pretax income to fall from \$70,000 to \$50,000. Compare the percentage fall in disposable income to the percentage fall in pretax income.

At \$70,000: tax = $0.10(50,000) + 0.25(20,000) = 5,000 + 5,000 = \$10,000$; disposable income = $70,000 - 10,000 = \$60,000$.

At \$50,000: tax = $0.10(50,000) = \$5,000$; disposable income = $50,000 - 5,000 = \$45,000$.

Pretax income fell by $\frac{20,000}{70,000} = 28.6\%$, while disposable income fell by only $\frac{15,000}{60,000} = 25.0\%$

– a *smaller* percentage decline, because the average tax rate itself fell (from 14.3% to 10.0%) as income dropped. The progressive tax automatically cushioned part of the income shock, exactly as an automatic stabilizer is supposed to.

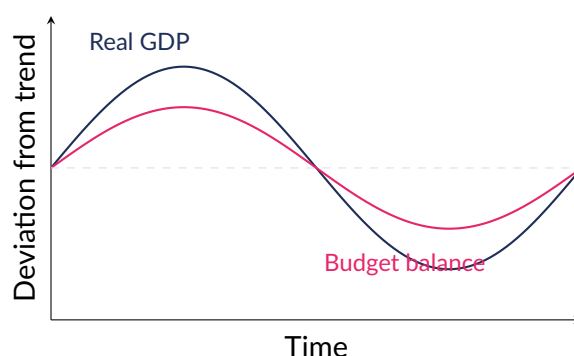
Ví dụ mẫu · Worked example – Automatic or Discretionary?

Classify each: (a) tax revenue falls automatically as a recession reduces incomes; (b) Congress passes a new \$200 billion infrastructure act; (c) unemployment insurance payouts rise as lay-

offs increase; (d) the government temporarily suspends payroll taxes via new emergency legislation.

(a) **Automatic stabilizer** (built into the existing progressive tax code, no new law). (b) **Discretionary** (a new act of legislation). (c) **Automatic stabilizer** (built into existing unemployment insurance law). (d) **Discretionary** (requires new, specific legislation, even though it resembles a tax cut).

Automatic stabilizers have a second, related effect: because a progressive income tax means disposable income (and hence consumption) responds *less* than one-for-one to a change in pretax income, the **effective** spending multiplier in an economy with automatic stabilizers is **smaller** than the simple $1/(1 - MPC)$ formula would suggest using a constant MPC out of pretax income. A smaller multiplier means smaller swings in real GDP for any given shock – automatic stabilizers make the economy inherently more stable, beyond their direct cushioning of disposable income shown above.



Automatic stabilizers make the budget balance move *with* the business cycle: automatically toward deficit when GDP dips below trend (tax revenue falls, transfers rise), and automatically toward surplus when GDP rises above trend – with no new legislation required.

GIẢI THÍCH TIẾNG VIỆT

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Chính sách tài khoá tùy nghi (discretionary) cần luật mới mỗi lần áp dụng, chịu độ trễ về thời gian. Bộ ổn định tự động (thuế lũy tiến, trợ cấp thất nghiệp) tự động điều chỉnh ngân sách theo chu kỳ kinh tế mà KHÔNG cần luật mới: suy thoái → thu thuế tự động giảm (thu nhập giảm + rơi vào bậc thuế thấp hơn), trợ cấp thất nghiệp tự động tăng → thâm hụt ngân sách tự động mở rộng, đệm bớt cú sốc thu nhập khả dụng.

3.11 Crowding Out: A First Look

Khái niệm cốt lõi

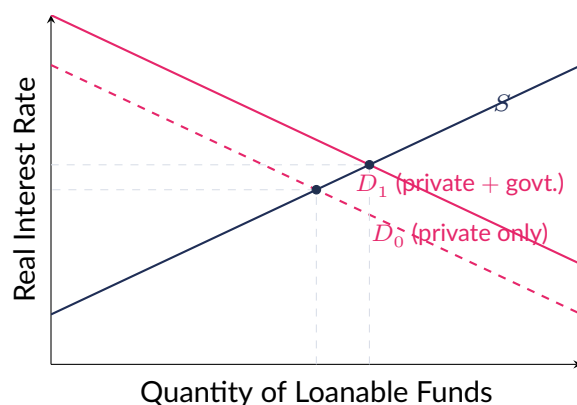
When expansionary fiscal policy is financed by government **borrowing** (a budget deficit) rather than by raising taxes elsewhere, the government must compete with private borrowers for loanable funds. This increased demand for borrowed funds tends to raise **real interest rates**, which in turn discourages interest-sensitive private **investment** spending (and some interest-sensitive consumption). This is the **crowding-out effect**: part of the intended increase in AD from higher G is *offset* by a fall in private I , so the net increase in AD – and in real GDP – is smaller than the simple multiplier alone would predict.

Ví dụ mẫu · Worked example — A First Look at Partial Crowding Out

$MPC = 0.8$ (spending multiplier = 5). Government spending rises by \$100 billion, deficit-financed. The simple multiplier predicts $\Delta Y = 100 \times 5 = \500 billion. Suppose the resulting rise in real interest rates crowds out \$40 billion of private investment. Approximate the actual change in real GDP once (partial) crowding out is taken into account.

The net increase in autonomous spending reaching the economy is only $100 - 40 = \$60$ billion (the \$100 billion injection minus the \$40 billion of investment it displaced). Applying the same multiplier: $\Delta Y \approx 60 \times 5 = \300 billion – noticeably smaller than the naive \$500 billion prediction that ignores crowding out.

(!) Lỗi thường gặp: Crowding out **partially offsets**, but does not usually *fully cancel*, expansionary fiscal policy's effect on AD – the multiplier example above still shows a net expansion (\$300 billion > 0), just smaller than the naive prediction. A full treatment of interest rates and the market for loanable funds – including how monetary policy and international capital flows interact with crowding out – appears later.



The market for loanable funds: government borrowing adds to private demand for funds ($D_0 \rightarrow D_1$), raising the equilibrium real interest rate from r_0 to r_1 and crowding out some interest-sensitive private investment that would have occurred at r_0 .

Crowding out is often distinguished by cause: **financial crowding out** operates through the interest-rate/loanable-funds channel above, relevant at any point in the business cycle; some economists also describe **resource crowding out** at or near full employment, where government purchases directly compete with private firms for the same scarce labor and materials, regardless of interest rates. Both mechanisms point the same way – government spending increases can displace private spending – but through different channels.

Ví dụ mẫu · Worked example — From Interest Rates to Investment

Investment demand is given by $I = 200 - 10r$ (in billions of dollars), where r is the real interest rate in percent. If government borrowing raises the equilibrium real interest rate from 5% to 7%, find the resulting change in investment spending.

At $r = 5$: $I = 200 - 10(5) = 150$. At $r = 7$: $I = 200 - 10(7) = 130$. $\Delta I = 130 - 150 = -\20 billion – the amount of private investment crowded out by the 2-percentage-point rise in the real interest rate.

The **size** of crowding out in practice is itself debated. Some economists argue it is small when the economy has substantial slack, since government borrowing need not compete as fiercely for

funds when private borrowing demand is already weak, and accommodating monetary policy (Unit 4) can help limit the rise in interest rates. Others argue it can be significant, especially near full employment – a view more associated with the classical skepticism of fiscal stimulus discussed next (Section 3.12).

(!) Lỗi thường gặp: In the extreme “complete crowding-out” case sometimes associated with the classical view, a \$1 increase in deficit-financed government spending crowds out exactly \$1 of private investment, leaving AD (and real GDP) completely unchanged. Most economists view *complete* crowding out as an extreme special case rather than the typical outcome, but how close to “complete” realistic crowding out is remains central to disagreements over fiscal policy’s effectiveness.

Applying this to the \$80 billion spending increase from Section 3.9’s worked example: if that policy were deficit-financed and crowded out, say, \$15 billion of private investment, the net effect on AD would be smaller than the full gap-closing amount computed there under the simplifying assumption of no crowding out – in practice, policymakers often deliberately oversize a fiscal package somewhat to compensate for this expected offset.

GIẢI THÍCH TIẾNG VIỆT

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Khi chính sách tài khoá mở rộng được tài trợ bằng VAY NỢ (thâm hụt ngân sách), chính phủ cạnh tranh với khu vực tư nhân trên thị trường vốn vay, đẩy lãi suất thực tăng, làm giảm đầu tư tư nhân nhạy cảm với lãi suất – đây là **hiệu ứng lấn át (crowding out)**, khiến tác động thực tế lên AD/GDP NHỎ hơn dự đoán của số nhân đơn giản. Đây chỉ là cái nhìn sơ lược; mô hình thị trường vốn vay đầy đủ sẽ được trình bày ở các Unit sau.

3.12 Classical Economics, Say's Law, and the Keynesian Perspective

Khái niệm cốt lõi

Two influential schools of thought disagree about how quickly and reliably an economy self-corrects, and therefore about how active fiscal (and monetary) policy should be.

Classical economists emphasize that wages and prices are flexible and that markets clear (self-correct) fairly quickly. Their view traces back to **Say's Law**: “supply creates its own demand” – the very act of producing goods and services generates income (wages, rent, interest, profit) exactly sufficient to purchase that output, so a persistent, economy-wide shortfall of aggregate demand (a “general glut”) should not occur for long. Classical economists are therefore skeptical of activist demand-side management and tend to favor policies that expand **aggregate supply** directly – tax cuts, deregulation, and other incentives to work, save, and invest (**supply-side policy**, Section 3.13) – over repeated fine-tuning of AD.

Keynesian economists emphasize that wages (especially) and some prices are **sticky**, particularly sticky *downward*, so self-correction after a negative demand shock can be **slow and costly** – a deep recession could persist for years with high involuntary unemployment before wages fully adjust. Keynesians therefore favor **active** fiscal (and monetary) policy to manage AD directly and speed the economy’s return to full employment, rather than waiting on a self-correction mechanism they view as unreliable in the short-to-medium run.

This debate is not merely academic: it shaped the actual policy response to the Great Depression of the 1930s, when John Maynard Keynes first articulated many of these ideas in direct opposition to the classical orthodoxy of his time, arguing that simply waiting for markets to self-correct was needlessly prolonging mass unemployment.

	Classical view	Keynesian view
Wage/price flexibility	Flexible; adjust fairly quickly	Sticky, especially wages downward; adjust slowly
Self-correction	Fast and reliable	Potentially slow and costly, especially in deep recessions
Say's Law	"Supply creates its own demand"; persistent demand shortfalls are unlikely	Aggregate demand can fall short of potential output for a sustained period
Preferred policy role	Minimal demand-side intervention; favor supply-side measures	Active fiscal/monetary management of AD to stabilize output and employment

Ví dụ mẫu · Worked example — Two Views, One Policy Question

The economy has just entered a mild recessionary gap. Contrast how a strict classical economist and a strict Keynesian economist would each answer: "Should the government pass a new stimulus bill right now?"

A **classical** economist would likely answer *no* (or "not yet"): flexible wages and prices should self-correct the mild gap within a reasonable time, and premature stimulus risks unnecessary inflation and larger government debt with little lasting benefit to real output. A **Keynesian** economist would more likely answer *yes*: with wages sticky downward, waiting could mean months or years of unnecessary unemployment (Section 3.8), so acting now to shift AD back toward Y_p is worth the cost.

(!) **Lỗi thường gặp:** This is a genuine, long-running debate in macroeconomics, not a settled question with one "correct" side – the AP exam expects you to explain *both* perspectives accurately and to recognize which one underlies a given policy argument (e.g., "wages will eventually adjust on their own" signals the classical view; "the economy could remain depressed for years without intervention" signals the Keynesian view).

(!) **Lỗi thường gặp:** Neither view claims wages and prices *never* adjust (the classical view) or that they *never* adjust at all (the Keynesian view) – the disagreement is about **speed and reliability**, not the mere existence of adjustment. Avoid caricaturing either side as claiming markets are permanently broken or perfectly instantaneous.

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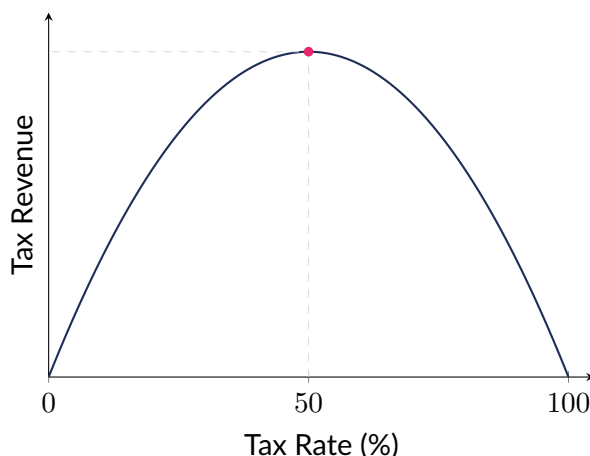
Trường phái cổ điển: lương/giá linh hoạt, thị trường tự điều chỉnh nhanh; dựa trên **Định luật Say** ("cung tạo ra cầu của chính nó"), ít ủng hộ can thiệp chủ động vào AD, thiên về chính sách trọng cung (supply-side). Trường phái Keynes: lương (đặc biệt) cứng nhắc theo hướng giảm, tự điều chỉnh có thể **CHẬM** và tốn kém, nên ủng hộ chính sách tài khóa/tiền tệ chủ động để ổn định AD và rút ngắn thời gian quay về toàn dụng lao động. Đây là một cuộc tranh luận thực sự, cần trình bày công bằng cả hai phía.

3.13 The Laffer Curve

Khái niệm cốt lõi

The **Laffer curve** plots the relationship between the tax rate (horizontal axis) and total tax revenue collected (vertical axis). Two endpoints are certain: at a **0% tax rate**, tax revenue is \$0 (no tax is collected on any income); at a **100% tax rate**, tax revenue is *also* \$0, because no one has any incentive to earn or report taxable income if the government takes all of it. Between these two endpoints, revenue rises from zero, reaches a **maximum** at some intermediate rate t^* (the revenue-maximizing rate), and then falls back to zero as the rate continues to rise toward 100%.

The key implication: to the *right* of t^* (rates above the revenue-maximizing rate), a *further increase* in the tax rate actually **reduces** total revenue, because the shrinkage of the taxed activity (less work, saving, investment, or more tax avoidance/evasion) outweighs the higher rate applied to what remains. Symmetrically, a *tax cut* starting from a rate above t^* could *raise* revenue by expanding the tax base enough to offset the lower rate – the central claim of **supply-side** tax policy. Where the *current* tax rate actually sits relative to t^* is an empirical question and a matter of genuine economic debate, not something the curve itself can answer.



The Laffer curve: revenue is \$0 at both a 0% and a 100% tax rate, and is maximized ($R_{\max}$) at an intermediate rate t^* .
Rate increases beyond t^* reduce revenue.

The curve is named for economist Arthur Laffer, who popularized the idea in the late 1970s during debates over high marginal tax rates; it became a central argument for the large marginal tax-rate cuts enacted in the United States in the early 1980s, though economists continue to debate how much of the resulting revenue changes were actually explained by incentive effects versus other factors (economic growth, inflation, changes in the tax base).

Ví dụ mẫu · Worked example – Finding the Revenue-Maximizing Rate

A simplified model gives total tax revenue as $R(t) = 1,000t - 10t^2$ (in millions of dollars), where t is the tax rate expressed as a whole number from 0 to 100. Evaluate R at $t = 40$, $t = 50$, and $t = 60$, and determine which is closest to the revenue-maximizing rate.

$$R(40) = 1,000(40) - 10(1,600) = 40,000 - 16,000 = \$24,000 \text{ million.}$$

$$R(50) = 1,000(50) - 10(2,500) = 50,000 - 25,000 = \$25,000 \text{ million.}$$

$$R(60) = 1,000(60) - 10(3,600) = 60,000 - 36,000 = \$24,000 \text{ million.}$$

Revenue is highest at $t = 50$ (\$25,000 million) and falls symmetrically on either side (both $t = 40$ and $t = 60$ give \$24,000 million), confirming that the revenue-maximizing rate for this model is $t^* = 50$. Checking the two textbook endpoints: $R(0) = 1,000(0) - 10(0)^2 = 0$ and

$$R(100) = 1,000(100) - 10(100)^2 = 100,000 - 100,000 = 0, \text{ exactly as the Laffer curve predicts.}$$

(!) **Lỗi thường gặp:** The Laffer curve does *not* claim that tax cuts always raise revenue – only that they *can*, if the starting rate is above t^* . A tax cut starting from a rate *below* t^* straightforwardly reduces revenue, since revenue is still rising with the rate in that region. Also, a supply-side tax cut aimed at incentives is fundamentally an **AS**-side argument (or a Laffer-curve revenue argument), distinct from the standard **AD**-side tax-multiplier story of Section 3.4, which is about disposable income and consumption, not revenue or incentives to produce.

GIẢI THÍCH TIẾNG VIỆT

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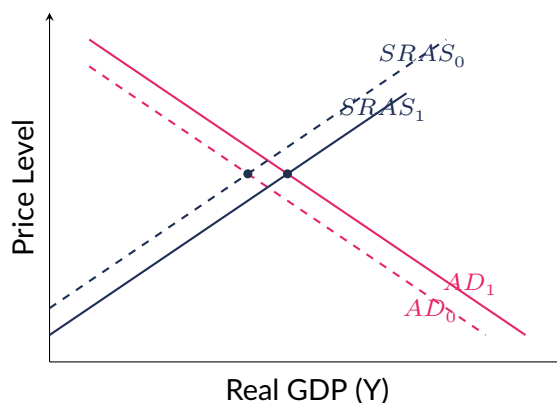
Đường cong Laffer: trục hoành là thuế suất, trục tung là tổng doanh thu thuế. Doanh thu = 0 tại thuế suất 0% VÀ tại 100%; doanh thu đạt cực đại $R_{\max}$ tại một mức thuế suất trung gian t^* . Ở bên PHẢI t^* , tăng thuế suất thêm sẽ làm GIẢM doanh thu (vì hoạt động chịu thuế co lại nhiều hơn mức thuế suất tăng); do đó cắt giảm thuế suất từ mức trên t^* có thể làm TĂNG doanh thu – lập luận cốt lõi của chính sách trọng cung. Vị trí thuế suất hiện tại so với t^* là câu hỏi thực nghiệm, còn nhiều tranh cãi.

3.14 Putting It Together: Combined Shifts and a Chapter Review

Every AD-AS free-response question in this unit ultimately asks the same underlying question: which curve (AD, SRAS, or LRAS) moves, in which direction, and what happens to real GDP and the price level as a result? A classic and especially exam-favored variant presents two shocks at once – one shifting AD, the other shifting SRAS – and asks you to determine what is certain and what is not, rather than simply reading off a single shift.

Ví dụ mẫu · Worked example — Combining a Rightward AD Shift and a Rightward SRAS Shift

Government spending rises (shifting AD right) at the same time a fall in oil prices lowers production costs (shifting SRAS right). What happens to equilibrium real GDP and the price level? Both shifts independently **raise** equilibrium real GDP (AD right along a fixed SRAS raises Y ; SRAS right along a fixed AD also raises Y), so the combined effect on real GDP is **unambiguously higher**. The price level, however, is **indeterminate**: AD shifting right pushes the price level up, while SRAS shifting right pushes the price level down. The net price-level effect depends on the relative sizes of the two shifts – exactly as with simultaneous supply-and-demand shifts in a single market (Unit 1).



In this particular numeric example the two price-level effects happen to offset exactly (both equilibria at $PL = 7$), but real GDP still rises unambiguously from $Y_0 = 5$ to $Y_1 = 6$ – illustrating that only the direction of Y , not of PL , is guaranteed in general when AD and SRAS shift right simultaneously by arbitrary amounts.

Ví dụ mẫu · Worked example – Combining a Leftward AD Shift and a Rightward SRAS Shift

Consumer confidence falls sharply (shifting AD left) while, separately, a wave of productivity-enhancing automation lowers production costs (shifting SRAS right). What is certain, and what is not?

AD left lowers both Y and PL ; SRAS right raises Y but lowers PL . The price level is **unambiguously lower** (both shifts push it down), but the effect on real GDP is **indeterminate** – it depends on which shift is larger. This is the mirror image of the previous example: whichever variable both shocks push in the *same* direction is certain; the other is not.

Ví dụ mẫu · Worked example – Combining a Leftward AD Shift and a Leftward SRAS Shift

A wave of pessimism reduces consumer confidence (AD left) at the same time a spike in oil prices raises production costs (SRAS left). What is certain, and what is not?

Both shifts **lower** real GDP (AD left along a fixed SRAS lowers Y ; SRAS left along a fixed AD also lowers Y), so real GDP falls **unambiguously**. The price level is **indeterminate**: AD left lowers PL , while SRAS left raises PL – the net effect depends on the relative size of the two shocks. (This is a realistic description of a severe **stagflationary** recession, where demand-side and supply-side problems compound each other.)

Ví dụ mẫu · Worked example – Combining a Rightward AD Shift and a Leftward SRAS Shift

A currency depreciation boosts net exports (AD right) at the same time a spike in oil prices raises production costs (SRAS left). What is certain, and what is not?

Both shifts **raise** the price level (AD right raises PL ; SRAS left also raises PL), so the price level rises **unambiguously**. Real GDP is **indeterminate**: AD right raises Y , while SRAS left lowers Y – the net effect depends on the relative size of the two shocks. This combination is a common real-world pattern: a weaker currency helps exports (AD right) but also raises the domestic-currency price of imported inputs like oil (SRAS left), so the two shifts often occur together for exactly this reason.

The general rule for combined AD/SRAS shifts: if AD and SRAS shift in the *same* direction (both right, or both left), the effect on real GDP is certain (matching that direction) while the effect on the price level is indeterminate. If AD and SRAS shift in *opposite* directions, the effect on the price level is certain while the effect on real GDP is indeterminate. This mirrors exactly the supply-and-demand shift rules of Unit 1: whichever variable both shocks agree on is certain; the other requires knowing the relative size of the two shifts.

AD shift	SRAS shift	Certain	Indeterminate
Right	Right	Y up	PL
Left	Left	Y down	PL
Left	Right	PL down	Y
Right	Left	PL up	Y

Ví dụ mẫu · Worked example – A Comprehensive Case Study

An economy begins in long-run equilibrium at $Y_p = \$16$ trillion. A global recession sharply reduces foreign demand for this country's exports, and $MPC = 0.75$.

- Which component of AD is affected, and which direction does AD shift?
 - If the export decline is \$150 billion, find the resulting change in short-run equilibrium real GDP (holding the price level fixed).
 - Name the resulting gap.
 - Describe the fiscal policy response needed to close the gap exactly using G alone, and find its required size.
- (a) A fall in **net exports (NX)** shifts AD **left**.
 (b) Multiplier $= 1/(1 - 0.75) = 4$. $\Delta Y = -150 \times 4 = \textbf{-\$600 billion}$.
 (c) Real GDP now lies \$600 billion below potential: a **recessionary gap**.
 (d) Expansionary fiscal policy ($\uparrow G$) is needed: $\Delta G = 600/4 = \textbf{\$150 billion}$ – exactly offsetting the initial export shortfall, since both act through the same multiplier.

Unit 3 formula recap:

Concept	Formula
Consumption function	$C = a + MPC \times Y_d$
MPC and MPS	$MPC + MPS = 1$
Spending multiplier (closed economy)	$\frac{1}{1 - MPC} = \frac{1}{MPS}$
Spending multiplier (open economy)	$\frac{1}{MPS + MPI}$
Tax multiplier	$-\frac{MPC}{1 - MPC} = -\frac{MPC}{MPS}$
Balanced-budget multiplier	1
Equilibrium GDP (expenditure model)	$Y = \frac{a + I + G + NX}{1 - MPC}$
Output gap	$Y_p - Y_1$ (positive $\Rightarrow$ recessionary; negative $\Rightarrow$ inflationary)

Common exam traps in Unit 3:

- Confusing a **movement along** a curve (caused by the variable on that curve's own axis) with a **shift** of the curve (caused by everything else).
- Using the **spending** multiplier for a change in taxes or transfer payments instead of the (smaller, opposite-signed) **tax** multiplier.
- Forgetting that LRAS is **vertical** – a common error is to draw it upward-sloping like SRAS.
- Mixing up SRAS shift directions: higher input costs ⇒ SRAS **left**; lower input costs or higher productivity ⇒ SRAS **right**.
- Assuming self-correction and fiscal policy always leave the economy at the *same* final price level – they generally do not (Section 3.9).
- Applying the balanced-budget multiplier to an unequal, or oppositely-directed, change in G and T .
- Treating the Laffer curve as proof that all tax cuts raise revenue – it only implies this is *possible* above the revenue-maximizing rate t^* .
- Assuming crowding out *completely* negates fiscal policy – in most models it only *partially* offsets the multiplier effect (Section 3.11).

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Khi AD và SRAS dịch chuyển CÙNG chiều (cả hai sang phải hoặc cả hai sang trái), sản lượng thực chắc chắn thay đổi theo chiều đó, còn mức giá KHÔNG XÁC ĐỊNH. Khi AD và SRAS dịch chuyển NGƯỢC chiều, mức giá chắc chắn thay đổi theo chiều mà cả hai cùng “đồng ý”, còn sản lượng thực KHÔNG XÁC ĐỊNH – quy tắc này giống hoàn toàn với quy tắc dịch chuyển cung-cầu ở Unit 1. Bảng công thức và các lỗi thường gặp ở trên tổng hợp lại toàn bộ Unit 3 trước khi làm bài tập. Hãy ôn lại bảng bốn trường hợp kết hợp AD/SRAS và ví dụ tổng hợp phía trên trước khi chuyển sang phần bài tập luyện tập.

Before moving on to the practice problems, make sure you can, from memory: (1) state and explain the three reasons AD slopes downward; (2) list the shifters of C , I , G , and NX and their direction; (3) compute the spending multiplier, tax multiplier, and balanced-budget multiplier from a given MPC ; (4) explain why SRAS slopes upward and LRAS is vertical; (5) identify a recessionary or inflationary gap from data and describe the self-correction mechanism for each; (6) size an expansionary or contractionary fiscal policy response using the multiplier; and (7) explain the classical/Keynesian debate and the Laffer curve in your own words.

Practice Problems

Bài tập luyện tập – Câu 1

A rise in the price level increases households' and firms' need for money to conduct the same volume of transactions, pushing up interest rates and reducing investment spending. This describes the:

- (A) Wealth (real-balances) effect
- (B) Interest-rate effect
- (C) Net-exports (exchange-rate) effect
- (D) Substitution effect

Lời giải chi tiết

Higher price level → higher money demand → higher interest rates → lower investment – the interest-rate effect. **(B)**.

Bài tập luyện tập – Câu 2

An increase in the personal income tax rate will, all else equal:

- (A) Shift AD right
- (B) Shift AD left
- (C) Cause a movement up along a fixed AD curve
- (D) Shift SRAS left

Lời giải chi tiết

Higher income taxes reduce disposable income, lowering consumption at every price level and shifting AD left. **(B)**.

Bài tập luyện tập – Câu 3

$MPC = 0.7$. Investment spending rises by \$60 billion. Find the spending multiplier and the resulting ΔY (price level fixed).

Lời giải chi tiết

Multiplier = $\frac{1}{1 - 0.7} = \frac{1}{0.3} \approx 3.33$. $\Delta Y = 60 \times \frac{1}{0.3} = \frac{60}{0.3} = \text{\$200 billion}$.

Bài tập luyện tập – Câu 4

Using the same $MPC = 0.7$, suppose instead taxes are cut by \$60 billion. Find the tax multiplier and ΔY .

Lời giải chi tiết

Tax multiplier = $-\frac{0.7}{0.3} \approx -2.33$. $\Delta Y = (-2.33) \times (-60) = \text{\$140 billion}$ – smaller than the \$200 billion from an equal-sized spending change, since part of the tax cut is saved rather than spent in round one.

Bài tập luyện tập – Câu 5

If government spending and taxes rise by the same dollar amount in the same period, the balanced-budget multiplier equals:

- (A) 0
(B) MPC
(C) 1/MPS
(D) 1

Lời giải chi tiết

The spending multiplier's effect always exceeds the (opposite-signed) tax multiplier's effect by exactly the size of the initial change, so the balanced-budget multiplier is always **1**, regardless of MPC . **(D)**.

Bài tập luyện tập – Câu 6

$MPC = 0.5$. Government spending and taxes both rise by \$80 billion. Find the net change in equilibrium real GDP, verifying the balanced-budget multiplier.

Lời giải chi tiết

Spending multiplier = $\frac{1}{1-0.5} = 2 \Rightarrow \Delta Y_G = 80 \times 2 = 160$. Tax multiplier = $-\frac{0.5}{0.5} = -1 \Rightarrow \Delta Y_T = -1 \times 80 = -80$. Net $\Delta Y = 160 - 80 = \text{\$80 billion} = \text{the balanced-budget change, confirming a multiplier of 1.}$

Bài tập luyện tập – Câu 7

Real GDP is \$18.5 trillion; potential GDP is \$18 trillion; unemployment is below the natural rate. This economy is experiencing a(n):

- (A) Recessionary gap
(B) Inflationary gap
(C) Long-run equilibrium
(D) Cannot be determined from this information

Lời giải chi tiết

$Y_1 (\text{\$18.5 tn}) > Y_p (\text{\$18 tn})$ and unemployment is below the natural rate (negative cyclical unemployment): an **inflationary gap**. **(B)**.

Bài tập luyện tập – Câu 8

Potential GDP is \$12 trillion; current real GDP is \$11.7 trillion. $MPC = 0.75$. Find the increase in government spending needed to close this gap exactly (price level fixed).

Lời giải chi tiết

Gap = $12 - 11.7 = \text{\$0.3 trillion} = \text{\$300 billion}$. Multiplier = $\frac{1}{1-0.75} = 4$. Required $\Delta G = \frac{300}{4} = \text{\$75 billion}$.

Bài tập luyện tập – Câu 9

Using the same \$300 billion gap and $MPC = 0.75$, find the tax cut needed to close the gap instead of a spending increase.

Lời giải chi tiết

Tax multiplier $= -\frac{0.75}{0.25} = -3$. $300 = -3 \times \Delta T \Rightarrow \Delta T = -100$: a tax cut of **\$100 billion**.

Bài tập luyện tập – Câu 10

A sharp, sustained rise in the world price of crude oil, a key production input across the economy, will most directly:

- | | |
|----------------------|----------------------|
| (A) Shift AD right | (C) Shift SRAS left |
| (B) Shift SRAS right | (D) Shift LRAS right |

Lời giải chi tiết

Higher input costs raise production costs at every output level, shifting SRAS left. **(C)**.

Bài tập luyện tập – Câu 11

A widespread improvement in labor productivity (more output per worker at the same wage) will most directly:

- | | |
|----------------------|---------------------------------|
| (A) Shift SRAS right | (C) Shift AD left |
| (B) Shift SRAS left | (D) Have no effect on any curve |

Lời giải chi tiết

Higher productivity lowers per-unit production costs, shifting SRAS right. **(A)**.

Bài tập luyện tập – Câu 12

Which of the following would shift LRAS to the right?

- | | |
|---|--|
| (A) A temporary, one-time consumer tax rebate | (C) A sustained wave of immigration that permanently increases the labor force |
| (B) A short-lived spike in the world price of oil that fully reverses within a year | (D) A one-time increase in government purchases financed by new borrowing |

Lời giải chi tiết

Only a permanent increase in productive resources (here, the labor force) shifts LRAS; the other options are temporary or purely demand-side. **(C)**.

Bài tập luyện tập – Câu 13

The LRAS curve is vertical because:

- (A) Nominal wages remain sticky even in the long run
- (B) In the long run, all wages and prices are fully flexible, so real output is determined only by resources, technology,
- (C) Government policy fixes real GDP by law
- (D) Aggregate demand always equals potential GDP by definition

Lời giải chi tiết

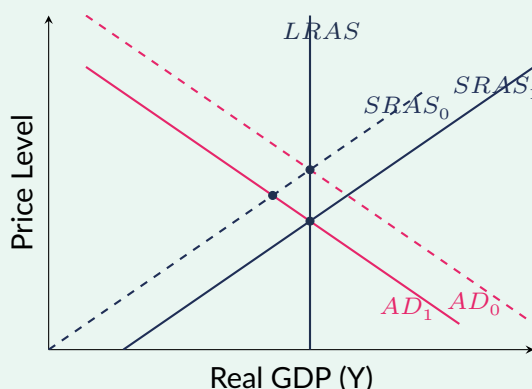
Full long-run wage/price flexibility means the price level cannot affect real output once all prices have adjusted – the classical dichotomy. (B).

Bài tập luyện tập – Câu 14 – FRQ graph

A sudden, sharp decrease in consumer confidence occurs. Draw a correctly labeled AD-AS graph showing (a) the initial long-run equilibrium, (b) the new short-run equilibrium immediately after the confidence shock, and (c) the new long-run equilibrium after the economy fully self-corrects, assuming no policy response. Label the type of gap that opens up in the short run.

Lời giải chi tiết

Falling consumer confidence reduces C at every price level, shifting $AD_0 \rightarrow AD_1$ left. Along the unchanged $SRAS_0$, the economy moves to a new short-run equilibrium with lower real GDP and a lower price level – a **recessionary gap**. Absent policy, persistent unemployment eventually pushes nominal wages down, shifting $SRAS_0 \rightarrow SRAS_1$ right until output returns to Y_p at an even lower price level than the short-run equilibrium.

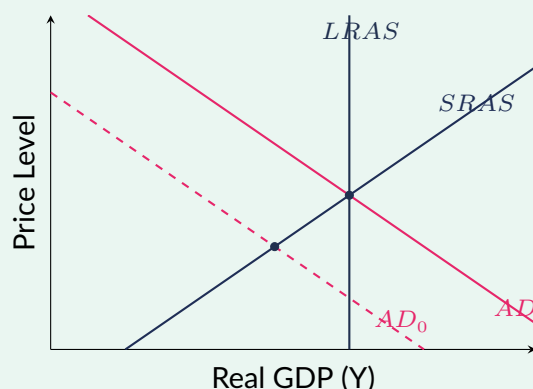


Bài tập luyện tập – Câu 15 – FRQ graph

The economy is in a recessionary gap. Draw a correctly labeled AD-AS graph showing expansionary fiscal policy closing the gap exactly at potential GDP. Label the change in both real GDP and the price level.

Lời giải chi tiết

An increase in G and/or a decrease in T shifts $AD_0 \rightarrow AD_1$ right along the unchanged $SRAS$. If sized correctly (using the spending and/or tax multiplier), the new equilibrium lands exactly on the vertical $LRAS$ at Y_p , with both real GDP and the price level rising relative to the initial recessionary equilibrium.

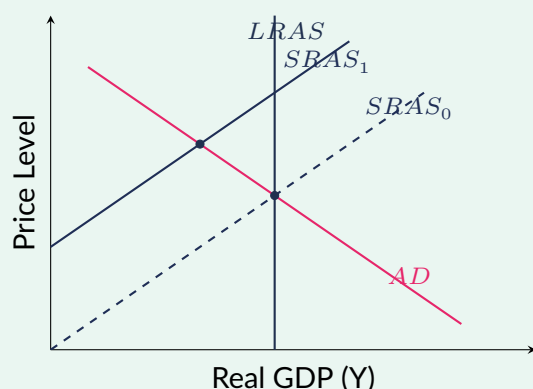


Bài tập luyện tập – Câu 16 – FRQ graph

A sudden spike in the world price of oil hits an economy that begins in long-run equilibrium. Draw a correctly labeled AD-AS graph showing the short-run effect. What happens to real GDP and the price level simultaneously?

Lời giải chi tiết

A negative supply shock (higher input costs) shifts $SRAS_0 \rightarrow SRAS_1$ left, while AD is unaffected in the short run. The new short-run equilibrium has a *lower* real GDP and a *higher* price level simultaneously – a combination sometimes called **stagflation**.

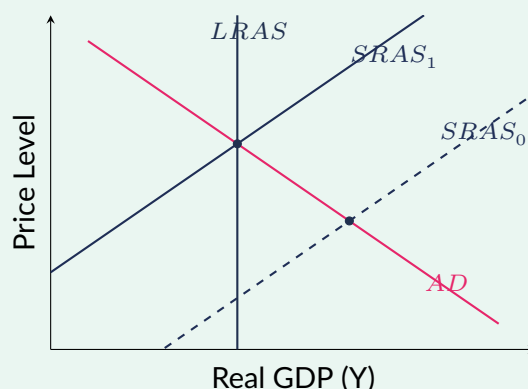


Bài tập luyện tập – Câu 17 – FRQ graph

The economy is in an inflationary gap. Draw a correctly labeled AD-AS graph showing the long-run self-correction of this gap, assuming no policy response.

Lời giải chi tiết

A tight labor market pushes nominal wages up, shifting $SRAS_0 \rightarrow SRAS_1$ left. Along the unchanged AD curve, real GDP falls back to Y_p while the price level rises *further* above its already-elevated short-run level.

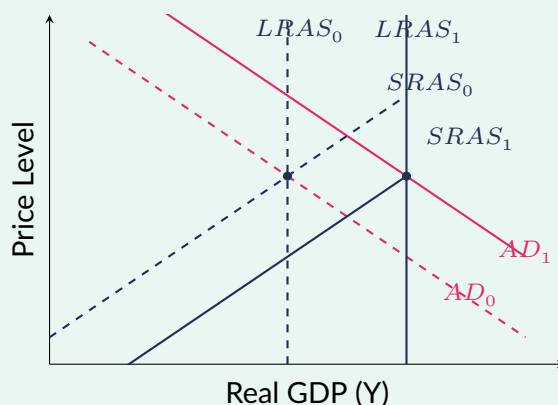


Bài tập luyện tập – Câu 18 – FRQ graph

A major, permanent breakthrough in production technology raises the economy's productive capacity. Draw a correctly labeled graph showing its long-run effect on LRAS (and SRAS), assuming AD grows correspondingly over time as incomes rise with the expanding economy.

Lời giải chi tiết

A permanent technological advance raises potential output, shifting $LRAS_0 \rightarrow LRAS_1$ right; because firms can now produce more at every price level, $SRAS_0 \rightarrow SRAS_1$ shifts right as well. As the larger economy generates correspondingly higher incomes and spending over time, $AD_0 \rightarrow AD_1$ shifts right too, so the new long-run equilibrium lands at a *higher* real GDP without necessarily raising the price level.



Bài tập luyện tập – Câu 19

Which of the following is an example of an automatic stabilizer?

- | | |
|--|---|
| (A) Congress passes a new one-time infrastructure spending bill | (C) The central bank lowers its target interest rate |
| (B) Unemployment insurance payments automatically rise as more people lose their jobs in a recession | (D) The government issues new long-term bonds to finance a stimulus package |

Lời giải chi tiết

Unemployment insurance pays out more automatically as joblessness rises, with no new legislation required. **(B)**.

Bài tập luyện tập – Câu 20

The legislature votes to pass a new, one-time \$500 billion spending package specifically in response to a recession. This is an example of:

- (A) An automatic stabilizer (C) Monetary policy
(B) Discretionary fiscal policy (D) Crowding out

Lời giải chi tiết

A new law passed in response to a specific situation is discretionary fiscal policy, not an automatic stabilizer. **(B)**.

Bài tập luyện tập – Câu 21

Using a tax schedule of 10% on the first \$40,000 of income and 30% above \$40,000, a household's income falls from \$60,000 to \$40,000 in a recession. Find the percentage fall in pretax income and in disposable income, and explain which is smaller and why.

Lời giải chi tiết

At \$60,000: tax = $0.10(40,000) + 0.30(20,000) = 4,000 + 6,000 = \$10,000$; disposable income = \$50,000.

At \$40,000: tax = $0.10(40,000) = \$4,000$; disposable income = \$36,000.

Pretax income falls by $\frac{20,000}{60,000} = 33.3\%$; disposable income falls by $\frac{14,000}{50,000} = 28.0\%$ – a *smaller* percentage decline, because the average tax rate fell automatically (from 16.7% to 10%) as income dropped, cushioning the household's after-tax income loss (the automatic-stabilizer effect).

Bài tập luyện tập – Câu 22

Deficit-financed expansionary fiscal policy increases government borrowing. According to the crowding-out effect, this most directly tends to:

- (A) Lower real interest rates, increasing private investment (C) Have no effect on real interest rates
(B) Raise real interest rates, reducing private investment (D) Directly increase net exports

Lời giải chi tiết

More government borrowing raises the demand for loanable funds, pushing real interest rates up and discouraging interest-sensitive private investment. **(B)**.

Bài tập luyện tập – Câu 23

$MPC = 0.75$ (spending multiplier = 4). Government spending rises by \$120 billion, deficit-financed, and crowds out \$40 billion of private investment. Approximate the actual change in real GDP, taking partial crowding out into account.

Lời giải chi tiết

Net increase in autonomous spending reaching the economy = $120 - 40 = \$80$ billion. Applying the multiplier: $\Delta Y \approx 80 \times 4 = \320 billion – smaller than the naive prediction of $120 \times 4 = \$480$ billion that ignores crowding out.

Bài tập luyện tập – Câu 24

“Supply creates its own demand” is most closely associated with:

- | | |
|---------------------------------------|-----------------------------|
| (A) Keynesian economics | (C) The multiplier effect |
| (B) Classical economics and Say’s Law | (D) The crowding-out effect |

Lời giải chi tiết

This is Say’s Law, the classical view that production itself generates sufficient income/demand to purchase that output. **(B)**.

Bài tập luyện tập – Câu 25

The Keynesian emphasis on sticky wages implies that, absent policy action, an economy in a deep recessionary gap will most likely:

- | | |
|--|--|
| (A) Self-correct almost instantly through flexible wages | (C) Never return to potential output under any circumstances |
| (B) Potentially remain below potential output for an extended period | (D) Automatically shift LRAS right to match current output |

Lời giải chi tiết

Because nominal wages resist falling, the SRAS-right adjustment that would restore Y_p can take a long time, potentially leaving the economy below potential for years. **(B)**.

Bài tập luyện tập – Câu 26

Briefly compare how a classical economist and a Keynesian economist would each recommend responding to a deep recessionary gap.

Lời giải chi tiết

A **classical** economist, trusting that flexible wages and prices will self-correct the economy back to Y_p reasonably quickly, would generally recommend limited direct demand-side intervention – perhaps supply-side measures (tax cuts, deregulation) to support long-run growth, but not aggressive AD stimulus. A **Keynesian** economist, doubting that sticky (especially downward-sticky) wages will adjust quickly enough, would recommend **active expansionary fiscal policy** (and/or monetary policy) to shift AD right directly, closing the gap faster than

waiting on a self-correction process that could otherwise leave the economy in a prolonged slump.

Bài tập luyện tập – Câu 27

According to the Laffer curve, total tax revenue equals \$0 at:

- (A) Only a 0% tax rate
(B) Only a 100% tax rate
(C) Both a 0% and a 100% tax rate
(D) The revenue-maximizing rate t^*

Lời giải chi tiết

At 0%, nothing is collected; at 100%, no one has any incentive to earn taxable income, so revenue is again \$0. (C).

Bài tập luyện tập – Câu 28

If the current tax rate lies to the right of the revenue-maximizing rate t^* on the Laffer curve, a decrease in the tax rate would, according to the model:

- (A) Always reduce total tax revenue the lower rate
(B) Potentially increase total tax revenue by expanding the tax base enough to offset
(C) Have no effect on revenue by definition
(D) Shift AD left, unrelated to revenue

Lời giải chi tiết

To the right of t^* , revenue is falling as the rate rises (or equivalently, rising as the rate falls back toward t^*), so a cut can raise revenue as the tax base expands. (B).

Bài tập luyện tập – Câu 29

A \$30 billion increase in autonomous investment raises equilibrium real GDP by \$240 billion. Find (a) the spending multiplier, (b) MPC, (c) MPS, and (d) the implied tax multiplier.

Lời giải chi tiết

(a) Multiplier = $\frac{240}{30} = 8$.

(b) $8 = \frac{1}{1 - MPC} \Rightarrow 1 - MPC = 0.125 \Rightarrow MPC = 0.875$.

(c) $MPS = 1 - 0.875 = 0.125$.

(d) Tax multiplier = $-\frac{MPC}{MPS} = -\frac{0.875}{0.125} = -7$.

Bài tập luyện tập – Câu 30 – multi-part

The economy begins in long-run equilibrium at Y_p . A boom among trading partners sharply raises foreign demand for domestic exports.

- (a) Describe the immediate short-run effect on AD, the price level, and real GDP.
(b) Name the resulting output gap.

- (c) Describe two different paths back to Y_p – one relying on self-correction, one using discretionary fiscal policy – and compare their likely speed and resulting price level, using the insight from Section 3.9.

Lời giải chi tiết

- (a) Higher export demand raises NX , shifting AD right; moving up along SRAS, both the price level and real GDP **rise** above their initial long-run levels.
(b) Real GDP now exceeds potential: an **inflationary gap**.
(c) *Self-correction*: a tight labor market gradually pushes nominal wages up, shifting SRAS left until output falls back to Y_p – but at a price level *even higher* than the initial overheated short-run equilibrium, and this process may be slow. *Discretionary contractionary fiscal policy*: raising T and/or cutting G shifts AD back left directly, restoring Y_p potentially *faster* and at a *lower* price level than the self-correction path – illustrating why policymakers concerned about inflation often prefer not to simply wait.

Bài tập luyện tập – Câu 31

Which of the following would shift AD right through the NX component specifically?

- (A) A rise in the domestic interest rate that appreciates the currency
(B) A depreciation of the domestic currency
(C) A recession abroad that lowers foreign demand for domestic exports
(D) An increase in the domestic price level

Lời giải chi tiết

A weaker domestic currency makes exports cheaper abroad and imports pricier at home, raising NX and shifting AD right. **(B)**.

Bài tập luyện tập – Câu 32

Which of the following would most likely shift the SRAS curve *without* shifting the LRAS curve?

- (A) A brief, temporary spike in the price of imported oil that fully reverses within a year
(B) A permanent, economy-wide rise in the average education level of the workforce
(C) The discovery of a large new domestic natural gas reserve
(D) A nationwide breakthrough in automation technology that permanently raises productivity

Lời giải chi tiết

A temporary cost shock raises short-run production costs (shifting SRAS) without changing the economy's permanent productive capacity (LRAS); the other options are durable increases in resources/technology that shift LRAS (and eventually SRAS too). **(A)**.

Bài tập luyện tập – Câu 33

A government observes the following tax revenue at different tax rates: 10% → \$100b, 30% → \$220b, 50% → \$250b, 70% → \$200b, 90% → \$60b. Based on the Laffer curve, should the government raise the tax rate from 70% to 90% to increase revenue? Explain.

Lời giải chi tiết

No. Revenue rises from \$100b to \$250b as the rate rises from 10% to 50%, then *falls* from \$250b to \$200b to \$60b as the rate rises further to 70% and 90%. This pattern shows the revenue-maximizing rate t^* is near 50%, and the current 70% rate is already *beyond* t^* (on the downward-sloping side of the curve). Raising the rate further, to 90%, would reduce revenue even more (from \$200b to \$60b); the government should instead consider *lowering* the rate toward 50% to raise revenue.

Bài tập luyện tập – Câu 34

Which sequence correctly describes the classical self-correction process following an inflationary gap, absent policy intervention?

- (A) Tight labor market → nominal wages rise → SRAS shifts left → price level rises further, output falls back to Y_p output rises toward Y_p
 (C) AD automatically shifts left with no change in wages
 (B) Tight labor market → nominal wages fall → SRAS shifts right → price level falls, (D) LRAS shifts left permanently to match current output

Lời giải chi tiết

An inflationary gap features a tight labor market, pushing nominal wages *up*, raising costs and shifting SRAS *left*, which raises the price level further while returning output to Y_p . (A).

Bài tập luyện tập – Câu 35

Explain, using the concept of “leakage” in the first round of spending, why the tax multiplier is smaller in magnitude than the spending multiplier for the same MPC.

Lời giải chi tiết

A \$1 increase in government spending enters the economy as \$1 of new spending (new income) in round one, all of which then re-circulates according to MPC in later rounds. A \$1 tax cut, by contrast, first becomes \$1 of additional *disposable income*, of which only a fraction MPC is actually spent in round one – the remaining fraction MPS leaks immediately into saving and never enters the spending stream at all. Because the tax multiplier’s chain of re-spending starts one round “behind” the spending multiplier’s (with only $MPC \times \Delta T$, not the full ΔT , injected initially), its total effect on equilibrium real GDP is smaller in magnitude:

$$\left| -\frac{MPC}{1 - MPC} \right| < \frac{1}{1 - MPC} \text{ for any } MPC \text{ between 0 and 1.}$$

Bài tập luyện tập – Câu 36 – FRQ graph

Sketch a Laffer curve and mark a point t_1 that lies to the *right* of the revenue-maximizing rate t^* . Using your graph, explain what would happen to tax revenue if the government cut the rate from t_1 toward t^* .

Lời giải chi tiết

Moving the rate from t_1 (right of t^*) back toward t^* moves *up* the downward-sloping right-hand branch of the curve, so tax revenue **rises** even though the rate falls – because the tax base expands enough (more work, saving, investment, and reporting of taxable income) to more than offset the lower rate.



Financial Sector

Mục tiêu Unit: Chức năng và các thước đo cung tiền (M1, M2); cầu tiền và cân bằng thị trường tiền tệ; các công cụ chính sách tiền tệ của Fed; hệ thống ngân hàng dự trữ một phần, T-account và số nhân tiền; thị trường vốn vay (loanable funds) và hiệu ứng lấn át; lãi suất danh nghĩa so với thực (phương trình Fisher); giá trái phiếu và lãi suất; cơ chế truyền dẫn chính sách tiền tệ; thuyết số lượng tiền tệ.

4.1 Money: Definition and Functions

Money is any asset that is widely accepted in exchange for goods, services, and the repayment of debt. Money is a *financial* asset – it has value because society agrees to accept it, not because it is directly useful the way a machine or a bushel of wheat is. Economists identify money by what it *does*, not by what it is physically made of.

Khái niệm cốt lõi

Money performs three distinct functions:

- **Medium of exchange:** money is accepted in exchange for goods and services, eliminating the need for **barter** (which requires a costly “double coincidence of wants” – each party must want exactly what the other is offering).
- **Unit of account:** money provides a common measuring stick for expressing and comparing the prices and relative value of very different goods (a car “costs” \$30,000, a haircut “costs” \$25 – both stated in the same unit).
- **Store of value:** money allows purchasing power to be carried forward from the present into the future. Money is an *imperfect* store of value whenever inflation erodes its purchasing power over time – other assets (real estate, stocks) often store value better over long horizons, but are far less convenient as a medium of exchange.

For an asset to function well as money, it should satisfy four properties:

- **Highly liquid:** easily and quickly converted into purchasing power at a predictable value, with minimal transaction cost or delay.
- **Divisible:** able to be split into small units so it can settle transactions of any size, from a cup of coffee to a car.
- **Durable:** physically able to survive repeated handling and storage without losing its usefulness.
- **Generally accepted:** trusted and taken in exchange by a wide community of buyers and sellers, not just a small, local group.

Do not confuse money with two related but distinct concepts: **income** is a **flow** – an amount earned *per period of time* (e.g., \$60,000 *per year*). **Wealth** is a **stock** – the total value of *everything* a person or household owns (a house, a car, stocks, bonds, cash) at a single point in time, minus liabilities. **Money** is only the small, highly liquid *subset* of wealth held specifically in forms that are readily spendable (cash, checking balances) – most wealth (a house, a stock portfolio) is *not* money.

(!) **Lỗi thường gặp:** A credit card is **not** money. Swiping a credit card creates a short-term **loan** from the card issuer – a promise by the cardholder to repay later – rather than transferring an asset the cardholder already owns. Only the cardholder's own liquid assets (cash on hand, a checking account balance) are counted as money; the unused credit limit on a card is *credit*, not money.

Money is only one type of **financial asset**. Compared with other financial assets such as stocks and bonds, money offers the **highest liquidity** but typically the **lowest return** (little or no interest) and no protection against inflation, since its nominal value is fixed. Bonds (Section 4.11) offer a contractual, moderate return with moderate liquidity (resellable, but at a fluctuating price) and moderate risk. Stocks offer the potential for the **highest long-run return** but also carry the highest risk and are not directly spendable. A general **risk-return-liquidity trade-off** runs through nearly every financial asset: safer, more liquid assets (money) tend to pay less; higher-paying assets (stocks) tend to be riskier and less liquid. This is exactly why a share of stock, despite being a financial asset, is excluded from both M1 and M2 (Section 4.2).

Financial asset	Liquidity	Typical return	Risk
Money (cash, checking)	Highest	Lowest (near 0%)	Essentially none (nominal)
Bonds	Moderate	Moderate, contractual	Low to moderate
Stocks	Lower	Highest (long run)	Highest

Commodity Money vs. Fiat Money

Historically, money has ranged along a spectrum. **Commodity money** is an item that would have value even if it were never used as money – gold and silver coins, cattle, or (famously) cigarettes used as currency in World War II prisoner-of-war camps – so its acceptance rests partly on independent, intrinsic value. **Fiat money** (the paper and digital currency used today) has *no* intrinsic use value; it is declared legal tender by government decree and accepted only because the community trusts that everyone else will also accept it, and because governments require it for tax payments and the legal settlement of debts. Fiat money is cheaper to produce and far easier for a central bank to manage in the pursuit of macroeconomic goals than commodity money.

But its value depends entirely on public confidence – a fiat currency that loses public trust (as in a hyperinflation) can effectively collapse as money even though the paper itself still physically exists.

Ví dụ mẫu · Worked example – Evaluating a Candidate for Money

During a severe currency shortage, residents of a small town begin using bags of rice as a medium of exchange for local trade. Evaluate rice against the four properties of good money, and explain why it remains an inferior substitute for official currency.

Divisibility: strong – rice can be measured out in any small quantity (cups, kilograms). **Durability:** weak – rice can spoil, attract pests, or rot over time, unlike coins or properly stored paper currency. **Liquidity:** moderate *locally*, where residents who know and trust each other will accept it quickly, but very low *outside* the town, where it is just another ordinary good rather than a recognized medium of exchange. **General acceptance:** limited to the local community, far narrower than the wide, impersonal acceptance official currency enjoys across an entire economy. Rice can function as an emergency, informal medium of exchange within a small, trust-based community.

But its poor durability and narrow acceptance make it a poor long-run substitute for officially issued money.

GIẢI THÍCH TIẾNG VIỆT

VN

Tiền có ba chức năng: (1) phương tiện trao đổi (thay thế hàng đổi hàng – barter); (2) đơn vị tính toán (thước đo giá trị chung để so sánh giá cả các hàng hoá khác nhau); (3) phương tiện lưu trữ giá trị (dù không hoàn hảo vì lạm phát làm giảm sức mua). Một tài sản tốt để làm tiền cần: tính thanh khoản cao, có thể chia nhỏ, bền, và được chấp nhận rộng rãi. Thu nhập (income) là DÒNG theo thời gian; của cải (wealth) là TỔNG TÀI SẢN tại một thời điểm; tiền chỉ là một PHẦN NHỎ, thanh khoản cao của của cải. Thẻ tín dụng KHÔNG phải là tiền – đó là một khoản vay. So với cổ phiếu/trái phiếu, tiền có thanh khoản CAO NHẤT nhưng lợi suất THẤP NHẤT (đánh đổi rủi ro–lợi suất–thanh khoản). Tiền hàng hoá (commodity money, ví dụ vàng) có giá trị nội tại; tiền pháp định (fiat money, tiền giấy hiện nay) KHÔNG có giá trị nội tại, chỉ dựa vào niềm tin công chúng và quy định pháp luật.

4.2 Measuring the Money Supply: M1 and M2

Because “money” includes several different types of assets with different degrees of liquidity, the Federal Reserve tracks more than one official measure of the money supply.

Khái niệm cốt lõi

M1 includes only the *most liquid* assets – those usable almost instantly as a medium of exchange:

$$M1 = \text{currency in circulation} + \text{checkable (demand) deposits} + \text{traveler's checks.}$$

M2 is a broader measure that adds assets that are slightly less liquid (they typically require a short conversion step, and may carry a small penalty or delay) but are still easily turned into spendable cash:

$$M2 = M1 + \text{savings deposits} + \text{small-denomination time deposits (e.g., CDs under \$100,000)} + \text{retail money market funds}$$

Every asset in M1 is also part of M2 – M1 is a subset of M2 – but M2 also contains additional, less-liquid assets that M1 excludes.

Component	In M1?	In M2?
Currency in circulation	Yes	Yes
Checkable (demand) deposits	Yes	Yes
Traveler's checks	Yes	Yes
Savings deposits	No	Yes
Small-denomination time deposits (e.g., CDs under \$100,000)	No	Yes
Retail money market mutual funds	No	Yes

Liquidity ranking, most to least liquid: currency > checkable deposits $\approx$ traveler's checks > savings deposits $\approx$ retail money funds > small time deposits (CDs, which impose an early-withdrawal penalty). M1 captures only the top tier; M2 captures the full ranking down to CDs.

Ví dụ mẫu · Worked example – Classifying Assets into M1 and M2

Classify each of the following as (i) part of M1, (ii) part of M2 but *not* M1, or (iii) not part of the money supply at all: **(a)** \$40 in cash in a wallet; **(b)** the balance in a checking account; **(c)** the balance in a savings account; **(d)** a 6-month certificate of deposit; **(e)** a house; **(f)** a share of stock.

(a) Currency held by the public $\Rightarrow$ **M1**.

(b) A checkable (demand) deposit $\Rightarrow$ **M1**.

(c) A savings deposit is less liquid than a checking balance (no checks can be written directly against it) $\Rightarrow$ **M2 only**.

(d) A small-denomination time deposit, locked up for a fixed term with an early-withdrawal penalty $\Rightarrow$ **M2 only**.

(e) A house is an illiquid physical (real) asset – it cannot be used directly to buy groceries and can take months to sell at an uncertain price $\Rightarrow$ **neither M1 nor M2**; it is part of *wealth*, not money.

(f) A share of stock is a financial asset, but its value fluctuates and it must be sold (with transaction costs and price risk) before it can be spent $\Rightarrow$ **neither M1 nor M2**; also part of *wealth*, not money.

Summary: (a) and (b) are in M1 (and therefore also M2); (c) and (d) are in M2 only; (e) and (f) are in neither – they are *wealth*, not money.

Ví dụ mẫu · Worked example – Calculating M1 and M2 from Component Data

An economy reports the following (all figures in \$ trillions): currency in circulation = 1.5; checkable deposits = 3.3; traveler's checks = 0.2; savings deposits = 9; small-denomination time deposits = 1; retail money market mutual funds = 0.7. Calculate M1 and M2.

Component	Amount (\$ trillions)
Currency in circulation	1.5
Checkable deposits	3.3
Traveler's checks	0.2
M1 (sum of the above)	5.0
+ Savings deposits	9.0
+ Small time deposits	1.0
+ Retail money market funds	0.7
M2 (M1 + the above three)	15.7

$M1 = 1.5 + 3.3 + 0.2 = \$5.0$ trillion. $M2 = M1 + 9 + 1 + 0.7 = 5.0 + 10.7 = \15.7 trillion. Notice that M2 is roughly three times the size of M1 in this economy – realistic, since savings deposits alone (a component excluded from M1) are typically the single largest piece of the broader money supply.

GIẢI THÍCH TIẾNG VIỆT

VN

M1 gồm những tài sản thanh khoản CAO NHẤT: tiền mặt đang lưu hành, tiền gửi có thể phát séc (checkable/demand deposits), và séc du lịch. $M2 = M1 +$ tiền gửi tiết kiệm + tiền gửi có kỳ hạn mệnh giá nhỏ (dưới \$100.000) + quỹ thị trường tiền tệ bán lẻ – những tài sản kém thanh khoản hơn nhưng vẫn dễ chuyển đổi thành tiền mặt. M1 là TẬP CON của M2. Nhà và cổ phiếu KHÔNG thuộc M1 hay M2 – đó là của cải (wealth), không phải tiền, vì kém thanh khoản và giá trị biến động. Các nhà kinh tế thường theo dõi tốc độ tăng trưởng M2 vì tăng trưởng M2 quá nhanh so với GDP thực có thể là dấu hiệu cảnh báo sớm cho lạm phát trong tương lai (Mục 4.13).

The savings deposits, small time deposits, and retail money market funds that separate M2 from M1 are sometimes called **near-monies**: assets that are not directly spendable (you cannot write a check or swipe a card against a savings account) but that can be converted into spendable M1 quickly, cheaply, and at a fairly predictable value. This is precisely what distinguishes near-monies from illiquid wealth like real estate or equities, whose conversion value is uncertain and whose sale can take considerable time.

(!) **Lỗi thường gặp:** The AP course tests only **M1** and **M2**. Do not invent or rely on a broader “M3”-style measure – for AP purposes, any liquid financial asset not explicitly listed in the M1/M2 table above (stocks, bonds, real estate, large institutional time deposits over \$100,000) is simply **not counted** in the money supply at all, even though it may still be quite valuable as *wealth*.

(!) **Lỗi thường gặp:** A balance held in a mobile payment app (such as a peer-to-peer transfer service) is generally just a claim on money already sitting in a linked checking account – it does not create any *new* money. Moving money between a checking account and such an app does not, by itself, change M1 or M2; it is simply the same checkable-deposit money changing form, not new money being created (compare this to Section 4.7, where only new *loans* genuinely create new money).

4.3 The Money Demand Curve

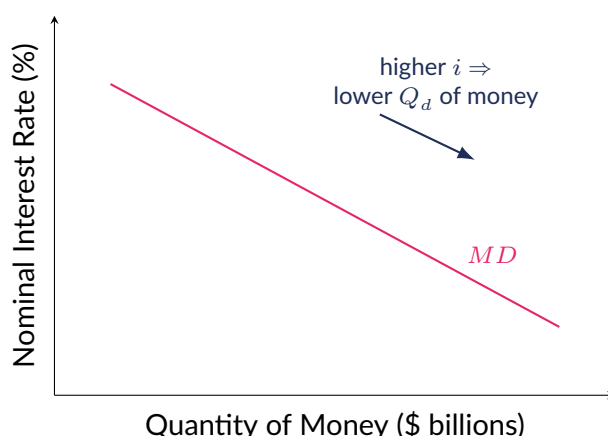
Households and firms choose how much of their wealth to hold as money (cash and checking balances) versus interest-bearing assets like bonds. This choice is captured by the **money demand curve**.

Khái niệm cốt lõi

The **money demand curve** plots the quantity of money people wish to hold at each possible **nominal interest rate**, and slopes **downward**. The key insight is that the nominal interest rate is the **opportunity cost** of holding wealth as money rather than as an interest-bearing asset (a bond, a savings account earning market rates): money itself pays little or no interest, so every dollar held as cash or in a checking account is a dollar *not* earning the market interest rate. When the nominal interest rate **rises**, this forgone interest becomes more costly, so households and firms economize on money holdings and the quantity of money demanded **falls** – a movement *along* a fixed money demand curve.

Three factors **shift** the entire money demand curve:

- **Real GDP (real income):** higher real GDP means more transactions (more goods and services being bought and sold), so people need to hold more money at every interest rate ⇒ money demand shifts **right**. A recession (falling real GDP) shifts money demand **left**.
- **The price level:** a higher price level means the same real quantity of transactions now requires more *nominal* dollars to complete, so money demand shifts **right**. (Note: this is a *nominal* effect, distinct from – but related in spirit to – the interest-rate effect that helps explain why the AD curve itself slopes downward.)
- **Expectations about future interest rates:** if people expect interest rates to rise soon (and bond prices to fall, Section 4.11), they may prefer to hold more money now and buy bonds later, shifting money demand right in the interim; the reverse expectation shifts it left.



The money demand curve slopes downward: a higher nominal interest rate raises the opportunity cost of holding money, reducing the quantity demanded.

(!) Lỗi thường gặp: Money demand's downward slope is **not** the same story as an ordinary goods-market demand curve. It has nothing to do with substituting between two consumption goods or diminishing marginal utility of a good – it is entirely about the **opportunity cost of forgone interest** on an alternative, interest-bearing asset.

Ví dụ mẫu · Worked example – The Expectations Shifter

Households and firms strongly expect the Fed to raise interest rates sharply next quarter. Explain the effect on money demand *today*, before rates have actually moved.

Since bond prices and interest rates move inversely (Section 4.11), an expected future rate increase implies an expected future *fall* in bond prices. To avoid holding bonds through that

anticipated capital loss, households and firms today prefer to sell bonds now and hold more of their wealth as money temporarily, waiting for rates to rise (and bond prices to fall) before buying bonds again at a better price. This shifts money demand **right today**, at every current interest rate – even though real GDP and the price level have not changed at all. Once the anticipated rate increase actually occurs, this temporary effect fades.

GIẢI THÍCH TIẾNG VIỆT

VN

Đường cầu tiền dốc XUỐNG vì lãi suất danh nghĩa là CHI PHÍ CƠ HỘI của việc giữ tiền thay vì giữ tài sản sinh lãi (như trái phiếu): lãi suất tăng → chi phí cơ hội giữ tiền tăng → lượng tiền cầu giảm (di chuyển dọc theo đường). Ba yếu tố làm DỊCH CHUYỂN toàn bộ đường cầu tiền: GDP thực tăng (nhiều giao dịch hơn) → dịch phải; mức giá tăng (cần nhiều tiền danh nghĩa hơn cho cùng giao dịch thực) → dịch phải; kỳ vọng lãi suất tương lai tăng → mọi người tạm giữ nhiều tiền hơn để tránh mất giá trái phiếu → dịch phải TẠM THỜI ngay hôm nay.

4.4 The Money Supply Curve and Money Market Equilibrium

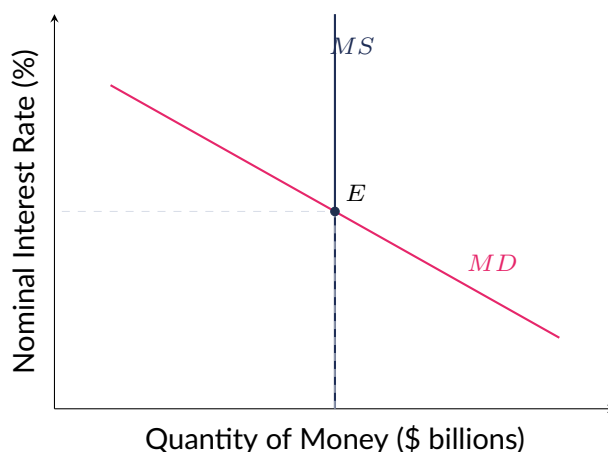
Khái niệm cốt lõi

The **money supply (MS)** is set directly by the central bank (the Federal Reserve, “the Fed”) using the policy tools of Section 4.5. Because the Fed chooses a specific quantity of money as a matter of policy, independent of the interest rate, the money supply curve is modeled as a **vertical line** at that chosen quantity: at *any* nominal interest rate, the quantity of money in circulation is exactly what the Fed has decided it should be. Only a deliberate policy action shifts this vertical line.

A change in the interest rate itself never does.

Money market equilibrium occurs where the vertical MS curve intersects the downward-sloping MD curve, determining the equilibrium **nominal interest rate** i^* and the *quantity* of money Q^* held (which simply equals the Fed’s chosen money supply). Away from equilibrium, market forces push the interest rate back toward i^* :

- If $i > i^*$ (temporarily above equilibrium): the quantity of money demanded falls short of the fixed supply, and people holding “too much” money use it to buy bonds, bidding bond prices **up** and interest rates **down** until i^* is restored.
- If $i < i^*$ (temporarily below equilibrium): the quantity of money demanded exceeds the fixed supply, so people sell bonds to raise cash, pushing bond prices **down** and interest rates **up** until i^* is restored.

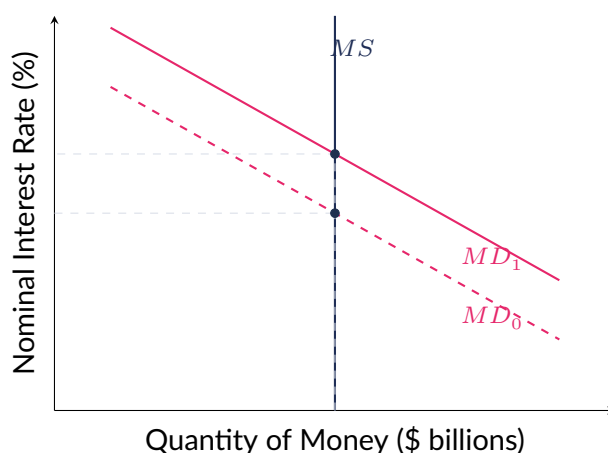


Money market equilibrium: the vertical MS (set by the Fed) intersects the downward-sloping MD at equilibrium point E , determining i^* and Q^* .

Ví dụ mẫu · Worked example — Real GDP Growth Raises the Equilibrium Interest Rate

The economy experiences a strong expansion: real GDP rises sharply while the Fed keeps the money supply unchanged. Show and explain the effect on the money market.

Higher real GDP means more transactions at every interest rate, so the entire money demand curve shifts **right**, from MD_0 to MD_1 . Because the money supply curve is vertical and unchanged (the Fed has not acted), the new equilibrium occurs at the **same** quantity of money but a **higher** equilibrium nominal interest rate.



Real GDP growth shifts $MD_0 \rightarrow MD_1$ along the fixed vertical MS : the equilibrium interest rate rises from i_0 to i_1 at the unchanged quantity of money Q^* .

GIẢI THÍCH TIẾNG VIỆT

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Cung tiền (MS) do Fed **ẤN ĐỊNH**, không phụ thuộc lãi suất $\Rightarrow$ đường **THẲNG ĐỨNG**. Cân bằng thị trường tiền tệ tại giao điểm MS và MD , xác định lãi suất danh nghĩa cân bằng i^* . Khi GDP thực tăng mạnh (Fed không thay đổi MS), đường MD dịch phải, lãi suất cân bằng **TĂNG** dù lượng tiền không đổi.

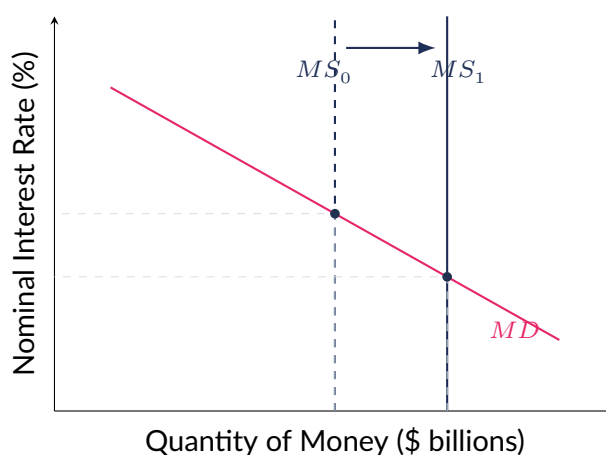
4.5 The Federal Reserve and Monetary Policy Tools

Khái niệm cốt lõi

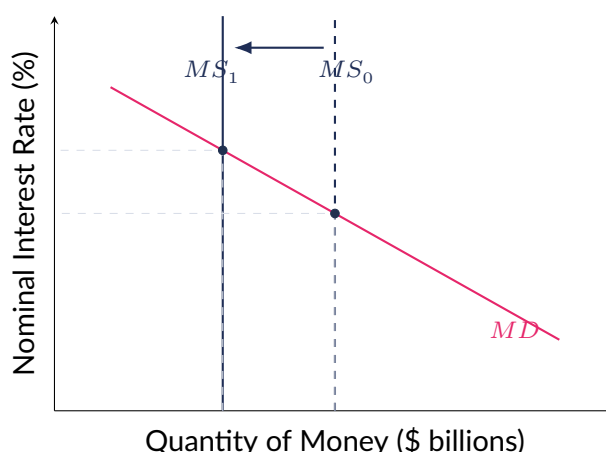
The **Federal Reserve (the Fed)** is the central bank of the United States. It pursues **monetary policy** – deliberately changing the money supply and interest rates – using four principal tools, in service of its congressionally assigned **dual mandate**: (1) **maximum (sustainable) employment** and (2) **stable prices** (low, predictable inflation). The Fed's Federal Open Market Committee (FOMC) decides how aggressively to use these tools by weighing current conditions against both goals.

Tool	Expansionary action	Contractionary action	Mechanism
Open market operations (OMO)	Fed buys government bonds from banks, paying with newly created reserves	Fed sells government bonds to banks, draining reserves from the banking system	Directly changes the quantity of bank reserves, shifting the vertical MS curve; the Fed's most frequently used, most precise tool
Discount rate	Fed lowers the rate charged on direct loans to banks, encouraging banks to borrow more reserves	Fed raises the discount rate, discouraging direct borrowing of reserves	Changes banks' cost of obtaining additional reserves from the Fed itself
Reserve requirement (RRR)	Fed lowers the required reserve ratio, so banks can lend a larger share of every deposit	Fed raises the RRR, so banks must hold back a larger share of every deposit	Changes the money multiplier ($1/RRR$, Section 4.7) directly; rarely changed in practice because of its blunt, disruptive effect on bank balance sheets
Interest on reserves (IOR)	Fed lowers the rate paid on reserves, making it less attractive for banks to sit on idle reserves	Fed raises IOR, making it more attractive for banks to hold reserves rather than lend	Changes banks' opportunity cost of lending versus holding reserves; a key tool since the Fed began paying interest on reserves

In every case, an **expansionary** action increases the (effective) money supply, shifting MS **right** and lowering the equilibrium nominal interest rate; a **contractionary** action decreases the (effective) money supply, shifting MS **left** and raising the equilibrium nominal interest rate.



Expansionary OMO (the Fed buys bonds): $MS_0 \rightarrow MS_1$ shifts right, and the equilibrium nominal interest rate falls from i_0 to i_1 .



Contractionary OMO (the Fed sells bonds): $MS_0 \rightarrow MS_1$ shifts left, and the equilibrium nominal interest rate rises from i_0 to i_1 .

(!) Lỗi thường gặp: Do not assume all Fed tools work through an identical channel. A **higher discount rate** is contractionary because it discourages banks from *borrowing additional* reserves. A **higher IOR** is *also* contractionary, but through the opposite-signed channel: it encourages banks to *hold on to reserves they already have* rather than lend them out. Both shrink the effective money supply, but for different behavioral reasons.

Ví dụ mẫu · Worked example — Identifying the Correct Tool and Direction

For each scenario, identify which Fed tool is being used and whether the action is expansionary or contractionary. **(a)** The Fed purchases \$50 billion of government bonds from commercial banks. **(b)** The Fed raises the rate it charges banks for emergency, direct overnight loans. **(c)** The Fed lowers the fraction of deposits banks must hold as reserves from 12% to 8%. **(d)** The Fed raises the rate it pays banks on reserves held at the Fed.

(a) Open market operations – buying bonds injects reserves $\Rightarrow$ **expansionary**.

(b) Discount rate – a higher rate discourages direct borrowing of reserves $\Rightarrow$ **contractionary**.

(c) Reserve requirement – a lower RRR raises the money multiplier and lending capacity $\Rightarrow$ **expansionary**.

(d) Interest on reserves – a higher IOR makes holding reserves more attractive than lending them $\Rightarrow$ **contractionary**.

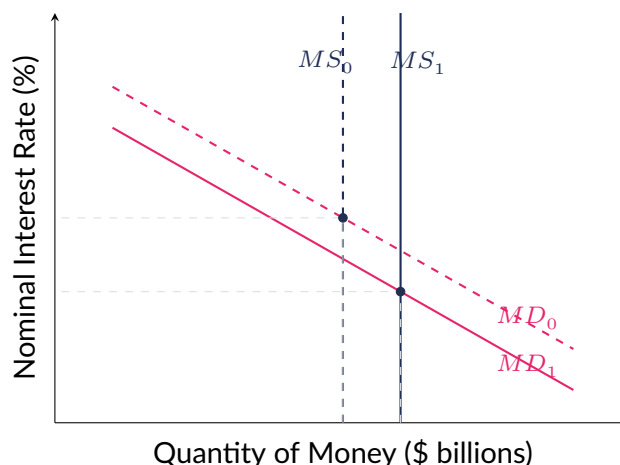
In practice, **open market operations** are by far the Fed's most frequently used tool: they can be executed in small, precise, reversible increments almost daily, unlike the reserve requirement (rarely changed, highly disruptive to bank planning) or the discount rate (a blunter signal, used more as a backstop lending facility than a primary lever).

Ví dụ mẫu · Worked example — Combining a Recession with a Fed Response

The economy enters a recession: real GDP falls, shifting money demand from MD_0 to MD_1 (left). At the same time, the Fed conducts an expansionary open market purchase, shifting money supply from MS_0 to MS_1 (right). Describe the combined effect on the equilibrium nominal interest rate and quantity of money.

Both shocks push the equilibrium nominal interest rate in the **same** direction – **down** – since a leftward MD shift and a rightward MS shift each lower i^* on their own; together they produce a **larger** fall in i^* than either shock alone would. The effect on the equilibrium *quantity*

of money, however, is determined entirely by the Fed's action: because MS is vertical, the equilibrium quantity always equals whatever the Fed has chosen, so quantity rises from Q_0 to Q_1 purely because of the OMO purchase, regardless of what happens to money demand.



A recession shifts $MD_0 \rightarrow MD_1$ left while the Fed's expansionary OMO shifts $MS_0 \rightarrow MS_1$ right. Both effects push the equilibrium interest rate down, from i_0 to a substantially lower i_1 .

The equilibrium quantity of money rises from Q_0 to Q_1 , driven entirely by the Fed's OMO.

GIẢI THÍCH TIẾNG VIỆT

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Bốn công cụ chính sách tiền tệ của Fed: (1) Nghiệp vụ thị trường mở (OMO) – Fed MUA trái phiếu → mở rộng (tăng dự trữ, MS dịch phải, lãi suất giảm); Fed BÁN trái phiếu → thắt chặt. (2) Lãi suất chiết khấu (discount rate) – GIẢM → mở rộng (ngân hàng vay dự trữ rẻ hơn); TĂNG → thắt chặt. (3) Tỷ lệ dự trữ bắt buộc (RRR) – GIẢM → mở rộng (số nhân tiền tăng); TĂNG → thắt chặt. (4) Lãi suất trên dự trữ (IOR) – TĂNG → thắt chặt (ngân hàng giữ dự trữ thay vì cho vay); GIẢM → mở rộng.

4.6 Fractional-Reserve Banking and T-Accounts

Khái niệm cốt lõi

The United States operates a **fractional-reserve banking system**: banks are required to hold only a *fraction* of each checkable deposit as reserves, and may lend out the remainder.

Required reserves = $RRR \times \text{deposits}$, Excess reserves = actual (total) reserves – required reserves.

Only **excess reserves** may legally be lent out; required reserves must stay on hand (either as vault cash or on deposit with the Fed) and cannot be loaned. A bank's simplified balance sheet (**T-account**) always balances: **Assets** (reserves + loans + securities, ...) must equal **Liabilities** (deposits owed to customers, ...) + owners' equity, which for these examples we take to be zero so that Assets = Liabilities exactly.

Ví dụ mẫu · Worked example – A New Deposit and a New Loan

First National Bank receives a new checkable deposit of \$10,000 in cash. The required reserve ratio is 10%. (a) Find required and excess reserves. (b) Show the T-account immediately after the deposit. (c) Show the T-account after the bank lends out all of its excess reserves.

(a) Required reserves = $RRR \times \text{deposits} = 0.10 \times \$10,000 = \mathbf{\$1,000}$.

Excess reserves = total reserves – required reserves = $\$10,000 - \$1,000 = \mathbf{\$9,000}$ – this is the maximum the bank may lend.

First National Bank – immediately after the deposit

Assets	Liabilities
Reserves: \$10,000	Deposits: \$10,000

First National Bank – after lending out excess reserves

Assets	Liabilities
Reserves: \$1,000 Loans: \$9,000	Deposits: \$10,000

Total assets remain $\$1,000 + \$9,000 = \$10,000$, exactly equal to total liabilities (deposits) of \$10,000 – the T-account still balances. The bank now holds only its *required* reserves of \$1,000 and has converted the other \$9,000 into an interest-earning loan.

Ví dụ mẫu · Worked example – A Second Bank, a Different Reserve Requirement

Community Savings Bank receives a new checkable deposit of \$40,000. The required reserve ratio here is 15%. (a) Find required and excess reserves. (b) Show the T-account before and after the bank lends out all of its excess reserves.

(a) Required reserves = $0.15 \times \$40,000 = \mathbf{\$6,000}$.

Excess reserves = $\$40,000 - \$6,000 = \mathbf{\$34,000}$.

Community Savings Bank – immediately after the deposit

Assets	Liabilities
Reserves: \$40,000	Deposits: \$40,000

Community Savings Bank – after lending out excess reserves

Assets	Liabilities
Reserves: \$6,000 Loans: \$34,000	Deposits: \$40,000

Again, total assets ($\$6,000 + \$34,000 = \$40,000$) exactly equal total liabilities (\$40,000). Comparing the two examples: a *lower* RRR (10% versus 15%) leaves a bank able to lend out a *larger* share of any given deposit, which – as Section 4.7 shows – also produces a *larger* money multiplier system-wide.

GIẢI THÍCH TIẾNG VIỆT

VN

Ngân hàng dự trữ một phần: dự trữ bắt buộc = tỷ lệ dự trữ bắt buộc (RRR) × tiền gửi; dự trữ dư (excess reserves) = dự trữ thực tế – dự trữ bắt buộc – CHỈ phần dự trữ dư mới được cho vay. T-account luôn cân: Tài sản (dự trữ + khoản vay) = Nợ (tiền gửi khách hàng). Ví dụ 1: tiền gửi mới \$10,000, RRR = 10% → dự trữ bắt buộc \$1,000, dự trữ dư \$9,000 có thể cho vay. Ví dụ 2: tiền gửi \$40,000, RRR = 15% → dự trữ bắt buộc \$6,000, dự trữ dư \$34,000. RRR thấp hơn → ngân hàng cho vay được tỷ lệ CAO hơn của mỗi khoản tiền gửi.

4.7 The Money Multiplier and Deposit Expansion

A single bank's loan does not just help one borrower – it sets off a chain reaction across the entire banking system, because the borrower spends the loan and the recipient of that spending deposits it in *another* bank, which in turn keeps a required fraction and lends out the rest.

Khái niệm cốt lõi

$$\text{Money multiplier} = \frac{1}{RRR}, \quad \Delta MS_{\max} = (\text{new excess reserves injected}) \times \frac{1}{RRR}.$$

Each round of lending creates a new checkable deposit – new money – equal to $(1 - RRR)$ times the previous round's deposit, since a fraction RRR of each new deposit must stay as required reserves and only the rest, $(1 - RRR)$, can be lent onward. Writing ER for the initial excess reserves injected, the total increase in the money supply, summed over every round of this infinite process, is a geometric series:

$$\begin{aligned} \Delta MS &= ER + ER(1 - RRR) + ER(1 - RRR)^2 + ER(1 - RRR)^3 + \dots \\ &= ER \left[1 + (1 - RRR) + (1 - RRR)^2 + \dots \right] = ER \cdot \frac{1}{1 - (1 - RRR)} = \frac{ER}{RRR}. \end{aligned}$$

This derivation is exactly why $1/RRR$ is called the money multiplier.

It gives the **theoretical maximum** increase in the money supply that an initial injection of new excess reserves can support, system-wide.

Ví dụ mẫu · Worked example – Deposit Expansion at $RRR = 10\%$

Continuing the First National Bank example from Section 4.6: the bank lent out its \$9,000 in excess reserves. The borrower spends this \$9,000, and the recipient deposits it at Bank B, starting a multi-round expansion.

$$\text{Money multiplier} = \frac{1}{RRR} = \frac{1}{0.10} = 10.$$

$$\text{Maximum possible increase in the money supply} = \$9,000 \times 10 = \mathbf{\$90,000}.$$

Round	New deposit	Required reserve (10%)	New loan (excess reserves)
1 (Bank B)	\$9,000.00	\$900.00	\$8,100.00
2 (Bank C)	\$8,100.00	\$810.00	\$7,290.00
3 (Bank D)	\$7,290.00	\$729.00	\$6,561.00
4 (Bank E)	\$6,561.00	\$656.10	\$5,904.90
...continuing to infinity, total new deposits			$9,000 \times \frac{1}{1 - 0.9} = \mathbf{\$90,000.00}$

Each round's new deposit is 90% of the previous round's (since 90% of each new deposit is excess reserves, re-lent). Summing the full geometric series $9,000 + 8,100 + 7,290 + \dots = 9,000 \times \frac{1}{1 - 0.9} = 9,000 \times 10 = \$90,000$, exactly matching the money-multiplier formula.

Ví dụ mẫu · Worked example – Deposit Expansion at $RRR = 20\%$

Now suppose the required reserve ratio is instead 20%, and Second Commerce Bank receives a brand-new customer deposit of \$5,000 in cash (currency previously held outside the banking

system). (a) Find the excess reserves created. (b) Find the money multiplier and the maximum increase in the money supply.

(a) Required reserves = $0.20 \times \$5,000 = \$1,000$.

Excess reserves = $\$5,000 - \$1,000 = \$4,000$.

(b) Money multiplier = $1/0.20 = 5$.

Maximum $\Delta MS = \$4,000 \times 5 = \$20,000$.

Round	New deposit	Required reserve (20%)	New loan (excess reserves)
1	\$4,000.00	\$800.00	\$3,200.00
2	\$3,200.00	\$640.00	\$2,560.00
3	\$2,560.00	\$512.00	\$2,048.00
4	\$2,048.00	\$409.60	\$1,638.40
...continuing to infinity, total new deposits			$4,000 \times \frac{1}{1 - 0.8} = \$20,000.00$

(!) Lỗi thường gặp: The figures above are a **theoretical maximum**. They assume every bank lends out *all* of its excess reserves and no borrower holds any loan proceeds as cash outside the banking system. In reality, banks may voluntarily hold reserves beyond the legal minimum (especially if IOR is attractive) and some loan proceeds leak into currency holdings, so the *actual* increase in the money supply is typically smaller than $(\text{excess reserves}) \times (1/RRR)$.

Do not confuse the **money multiplier** ($1/RRR$, how much a single injection of reserves can expand the *money supply*) with the **velocity of money** (V in $MV = PQ$, Section 4.13, how many times the *existing* money supply turns over to finance transactions in a year). Both describe a kind of “multiplying” effect of money on the economy, but the money multiplier operates through the banking system’s balance sheets, while velocity operates through the speed of spending – they are conceptually distinct and are not interchangeable on the AP exam.

Economists can also measure an **actual** (empirical) money multiplier by dividing the observed money supply ($M1$ or $M2$) by the **monetary base** (currency plus total bank reserves). Because of the leakages described above – cash held outside banks, and reserves banks voluntarily hold beyond the legal minimum – this actual, observed multiplier is typically well below the theoretical $1/RRR$, especially during periods when banks and the public are cautious (such as a financial crisis or recession) and prefer to hold more liquidity than usual.

GIẢI THÍCH TIẾNG VIỆT

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Số nhân tiền = $1/RRR$. Ví dụ: $RRR = 10\% \rightarrow$ số nhân = 10; \$9.000 dự trữ dư ban đầu có thể tạo ra tối đa \$90.000 tiền gửi mới trong toàn hệ thống ngân hàng (tổng chuỗi hình học $9000 + 8100 + 7290 + \dots = 9000 \times 10$). Nếu $RRR = 20\% \rightarrow$ số nhân = 5; \$4.000 dự trữ dư ban đầu $\rightarrow$ tối đa \$20.000. Đây là con số LÝ THUYẾT TỐI ĐA – thực tế thường nhỏ hơn vì rò rỉ tiền mặt và dự trữ dư tự nguyện.

4.8 The Loanable Funds Market

Beyond the money market (which determines the *nominal* interest rate), macroeconomists also model a separate market for **loanable funds**, which determines the **real** interest rate.

Khái niệm cốt lõi

The **market for loanable funds** operates in (real interest rate, quantity of loanable funds) space:

- **Supply of loanable funds** represents **national saving** (household, business, and, when the budget is balanced, government saving) and slopes **upward**: a higher real interest rate rewards savers with a higher return, inducing more saving/lending.
- **Demand for loanable funds** represents **borrowing to finance investment** (firms buying capital, building factories) and slopes **downward**: a higher real interest rate raises the cost of financing a project, so fewer investment projects remain profitable and less is borrowed.

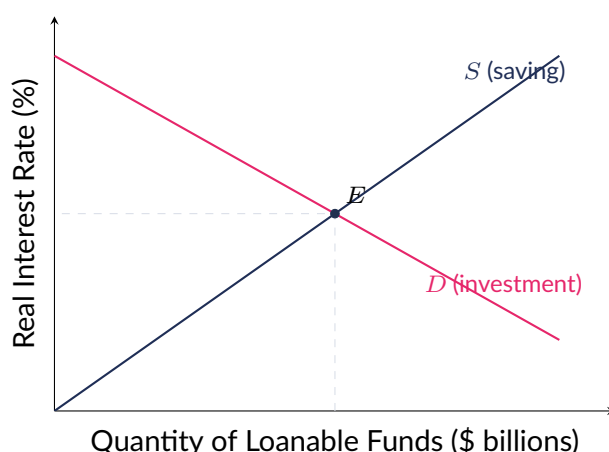
Equilibrium occurs where supply meets demand, determining the equilibrium **real interest rate** r^* and the equilibrium **quantity of loanable funds** Q^* actually saved and borrowed.

Shifters of demand (loanable funds borrowed for investment) – each shifts demand **right** and raises r^* :

- Higher expected returns on investment projects.
- Greater business optimism about the future.
- **Government borrowing** (a larger budget deficit).

Shifters of supply (national saving) – each shifts supply **right** and lowers r^* :

- Higher private saving (e.g., from tax incentives to save).
- Foreign capital inflows (foreigners lending into this economy).



The loanable funds market: upward-sloping supply (national saving) meets downward-sloping demand (investment borrowing) at equilibrium real interest rate r^* and quantity Q^* .

Ví dụ mẫu · Worked example – A Baseline Loanable Funds Equilibrium

Supply of loanable funds: $Q_s = 50 + 5r$. Demand for loanable funds: $Q_d = 350 - 5r$ (r in percent, Q in \$ billions). Find the equilibrium real interest rate and quantity of loanable funds.

Set $Q_s = Q_d$: $50 + 5r = 350 - 5r \Rightarrow 10r = 300 \Rightarrow r^* = \mathbf{30\%}$.

$Q^* = 50 + 5(30) = \mathbf{\$200}$ billion (check: $350 - 5(30) = 200$ ✓).

Ví dụ mẫu · Worked example – A Supply Shifter: Foreign Capital Inflows

Continuing the previous example, suppose foreign investors begin purchasing this country's bonds, adding \$30 billion of loanable funds supply at every interest rate. Demand is unchanged

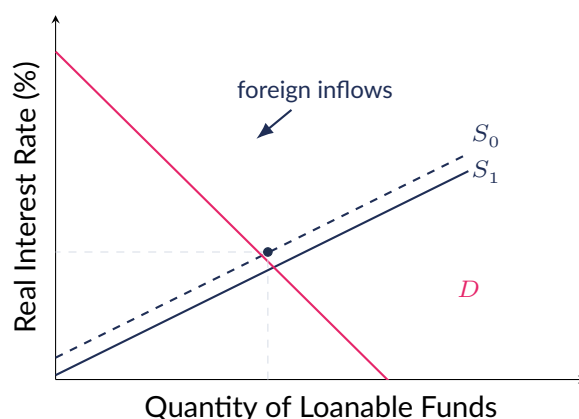
at $Q_d = 350 - 5r$. Find the new equilibrium.

New supply: $Q'_s = Q_s + 30 = 80 + 5r$.

Set $Q'_s = Q_d$: $80 + 5r = 350 - 5r \Rightarrow 10r = 270 \Rightarrow r^* = 27\%$.

$Q^* = 80 + 5(27) = \text{\$215 billion}$ (check: $350 - 5(27) = 215$ ✓).

As expected from a rightward supply shift, the equilibrium real interest rate **fell** (from 30% to 27%) while the equilibrium quantity of loanable funds **rose** (from \$200 to \$215 billion).



Foreign capital inflows shift the supply of loanable funds $S_0 \rightarrow S_1$ right; along the fixed demand curve D , the equilibrium real interest rate falls and the equilibrium quantity rises.

GIẢI THÍCH TIẾNG VIỆT

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Thị trường vốn vay (loanable funds) xác định LÃI SUẤT THỰC. Cung vốn vay = tiết kiệm quốc gia, dốc LÊN (lãi suất thực cao hơn khuyến khích tiết kiệm nhiều hơn). Cầu vốn vay = vay để đầu tư, dốc XUỐNG (lãi suất thực cao hơn khiến ít dự án đầu tư còn sinh lời). Cầu dịch phải khi: kỳ vọng lợi nhuận đầu tư tăng, doanh nghiệp lạc quan hơn, hoặc chính phủ thâm hụt ngân sách (vay nợ). Cung dịch phải khi: tiết kiệm tư nhân tăng, hoặc dòng vốn nước ngoài chảy vào.

4.9 Crowding Out in the Loanable Funds Model

Khái niệm cốt lõi

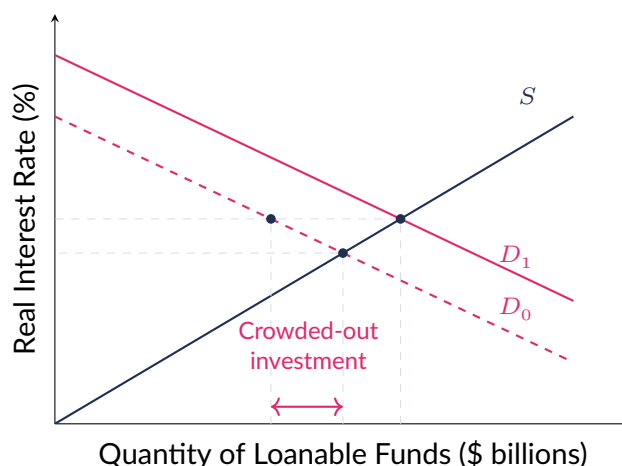
When the government runs a **budget deficit**, it must borrow to cover the shortfall, adding to the total demand for loanable funds at every real interest rate. The causal chain runs as follows:

- The government borrows to finance its deficit $\Rightarrow$ demand for loanable funds shifts **right**.
- The equilibrium real interest rate r^* **rises**.
- Borrowing becomes more expensive for *private* firms $\Rightarrow$ the quantity of private investment they undertake **falls**.

This reduction in private investment caused by government borrowing is called **crowding out**. Crowding out works entirely *through* the interest rate: a bigger deficit does not mechanically “use up” funds directly; it raises r^* , and it is the higher r^* that discourages private investment.

(!) Lỗi thường gặp: Do not describe crowding out as a direct, mechanical substitution (“the government simply takes funds that would have gone to firms”). The correct causal chain is:

larger deficit → demand for loanable funds shifts right → equilibrium real interest rate rises → private investment (and interest-sensitive consumption) falls in response to the higher cost of borrowing.



A budget deficit shifts demand for loanable funds $D_0 \rightarrow D_1$ (borrowing to cover the deficit). The equilibrium real interest rate rises from r_0 to r_1 ; reading the *original* private-investment demand curve D_0 at the new, higher r_1 shows private investment has fallen – the crowded-out amount is marked between that point and the old equilibrium quantity Q_0 .

Ví dụ mẫu · Worked example – Quantifying Crowding Out

Supply of loanable funds: $Q_s = 100 + 10r$. Demand for loanable funds *before* any government borrowing (private investment only): $Q_d = 500 - 10r$ (r in percent, Q in \$ billions). (a) Find the initial equilibrium. (b) A new budget deficit adds \$80 billion of government borrowing at every interest rate; find the new equilibrium. (c) Find the dollar amount of private investment crowded out.

(a) Set $Q_s = Q_d$: $100 + 10r = 500 - 10r \Rightarrow 20r = 400 \Rightarrow r^* = 20\%$.

Then $Q^* = 100 + 10(20) = \$300$ billion (check: $500 - 10(20) = 300$ ✓). Since the government is not yet borrowing, all \$300 billion is private investment.

(b) New demand: $Q'_d = Q_d + 80 = 580 - 10r$.

Set equal to supply: $100 + 10r = 580 - 10r \Rightarrow 20r = 480 \Rightarrow r^{*'} = 24\%$. Then $Q^{*'} = 100 + 10(24) = \340 billion (check: $580 - 10(24) = 340$ ✓).

(c) Private investment at the new rate $r = 24\%$ is read off the *original* (unchanged) private demand curve: $500 - 10(24) = \$260$ billion. Crowded-out investment = $\$300 - \$260 = \$40$ billion. (Check: of the \$80 billion deficit, \$40 billion is financed by additional saving induced by the higher rate, $340 - 300 = 40$, and the other \$40 billion crowds out private investment: $40 + 40 = 80$ ✓.)

Ví dụ mẫu · Worked example – Combining an Investment Boom with a Rising Deficit

Suppose, at the same time the government's budget deficit widens (shifting demand for loanable funds right, as above), an unrelated wave of business optimism about new technology *also* shifts investment demand further right. Describe the combined effect on the equilibrium real interest rate and the size of crowding out, relative to the deficit acting alone.

Both shocks shift the demand for loanable funds in the **same** direction – **right** – so the equilibrium real interest rate rises by **more** than from the deficit alone, and the interest-rate channel of crowding out (Section 4.9) becomes correspondingly stronger.

In this scenario it becomes difficult to know, from the interest-rate movement alone, how much of the increase is attributable to the deficit versus to private investment optimism – both compete for the same pool of loanable funds and both push r^* up together.

An equivalent way to see the same result: national saving = private saving + public (government) saving, where public saving = $T - G$ (tax revenue minus government spending). A budget **deficit** means public saving is **negative**, which directly reduces national saving (the supply of loanable funds) at every interest rate – some textbooks illustrate crowding out as a *leftward shift of supply* instead of a rightward shift of demand. This chapter follows the standard AP convention of modeling government borrowing as an increase in **demand**; either framing produces the same qualitative result – a higher equilibrium real interest rate and reduced private investment.

GIẢI THÍCH TIẾNG VIỆT

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Thâm hụt ngân sách → chính phủ vay thêm → đường cầu vốn vay dịch PHẢI → lãi suất thực cân bằng TĂNG → đầu tư tư nhân giảm (hiệu ứng LẤN ÁT / crowding out). Cơ chế hoạt động THÔNG QUA lãi suất, không phải trực tiếp. Ví dụ số: $Q_s = 100 + 10r$, $Q_d = 500 - 10r \rightarrow r^* = 20\%$, $Q^* = \$300$ tỷ (toàn bộ là đầu tư tư nhân). Thâm hụt thêm \$80 tỷ → $Q'_d = 580 - 10r \rightarrow r^{*'} = 24\%$, $Q^{*'} = \$340$ tỷ; đầu tư tư nhân còn lại = $500 - 10(24) = \$260$ tỷ → lượng bị lấn át = $\$300 - \$260 = \$40$ tỷ.

4.10 Nominal vs. Real Interest Rates and the Fisher Equation (Recap and Application)

Khái niệm cốt lõi

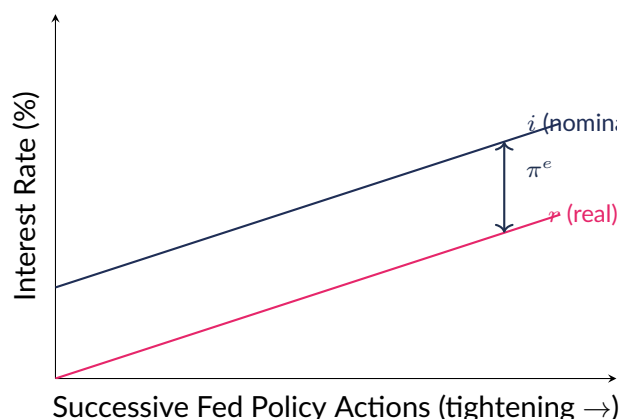
The **nominal interest rate** (i) is the interest rate actually stated on a loan or bond, in current dollars. The **real interest rate** (r) adjusts for inflation, measuring the true growth in *purchasing power*. The **Fisher equation** links them:

$$i \approx r + \pi^e, \quad \text{equivalently } r \approx i - \pi^e,$$

where π^e is **expected** inflation (the exact relationship is $(1 + i) = (1 + r)(1 + \pi^e)$, but the additive approximation above is standard for AP-level work).

Crucially, the two markets of this chapter determine two *different* interest rates: the **loanable funds market** (Section 4.8) determines the underlying **real** interest rate from saving and investment fundamentals, while the **money market** (Sections 4.3–4.4) determines the **nominal** interest rate from money supply and demand. Holding expected inflation π^e fixed, the Fisher equation means these two rates move *together*: any policy action that changes the nominal rate (e.g., an OMO) changes the real rate by the same amount in the short run, since π^e adjusts only slowly.

$$i = r + \pi^e \quad \Longleftrightarrow \quad r = i - \pi^e.$$



With expected inflation π^e constant, the nominal rate i and the real rate r move up and down *together*, always separated by the same vertical gap π^e – exactly what the Fisher equation predicts.

Feature	Money Market	Loanable Funds Market
Interest rate determined	Nominal rate (i)	Real rate (r)
Supply curve	Vertical (quantity set by the Fed)	Upward-sloping (national saving)
Demand curve	Downward-sloping (money demand)	Downward-sloping (investment demand)
Key shifters	Fed policy tools shift MS ; real GDP, price level, and rate expectations shift MD	Business optimism and government borrowing shift D ; private saving and foreign capital inflows shift S
Economic role	Opportunity cost of holding money instead of bonds	Cost of borrowing to finance investment versus the reward for saving

Ví dụ mẫu · Worked example – Linking the Two Interest Rates

Suppose the loanable funds market currently implies a real interest rate of $r = 3\%$, and expected inflation is $\pi^e = 2\%$. **(a)** Find the nominal interest rate implied by the Fisher equation. **(b)** The Fed then conducts a contractionary open market sale that pushes the nominal interest rate up to 6% , while π^e remains at 2% . Find the new real interest rate.

(a) $i = r + \pi^e = 3\% + 2\% = 5\%$.

(b) $r = i - \pi^e = 6\% - 2\% = 4\%$. The real interest rate has risen from 3% to 4% , even though nothing in the underlying loanable funds market (saving and investment fundamentals) has changed – this is precisely the short-run channel used in the monetary transmission mechanism (Section 4.12): with π^e sticky, a change in the nominal rate becomes a change in the real rate.

(!) Lỗi thường gặp: The Fisher equation as written uses **expected** inflation π^e , giving the *ex-ante* (before the fact) real interest rate that borrowers and lenders actually use when making decisions. If **actual** inflation later turns out higher than expected, the *ex-post* (after the fact) real interest rate borrowers actually pay turns out *lower* than anticipated – unexpectedly high inflation systematically benefits borrowers and hurts lenders, since debts are repaid in dollars that buy less than either party expected.

GIẢI THÍCH TIẾNG VIỆT

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Phương trình Fisher: $i \approx r + \pi^e$ (lãi suất danh nghĩa $\approx$ lãi suất thực + lạm phát kỳ vọng). Thị trường vốn vay xác định lãi suất THỰC (từ tiết kiệm/đầu tư); thị trường tiền tệ xác định lãi suất DANH NGHĨA (từ cung/cầu tiền). Nếu lạm phát kỳ vọng không đổi, hai lãi suất này di

chuyển CÙNG NHAU – một hành động chính sách tiền tệ làm thay đổi i cũng làm thay đổi r tương ứng trong ngắn hạn.

4.11 Bond Prices and Interest Rates

Khái niệm cốt lõi

A **bond** is a contract promising fixed future payments to its holder. Once issued, those payments are fixed in dollar terms – but the **market price** of the bond (what it sells for today) must adjust so that buying it offers a return competitive with prevailing market interest rates. This produces an **inverse relationship between bond prices and interest rates**: when market interest rates **rise**, a bond's already-fixed future payments look *less* attractive relative to new bonds/deposits offering the higher rate, so the old bond's price must **fall** to offer a competitive yield. When market interest rates **fall**, existing bonds' fixed payments look *more* attractive, and their price **rises**.

(!) Lỗi thường gặp: Students often assume bond prices and interest rates move in the *same* direction. They move in **opposite** directions – this is one of the most heavily tested relationships in this unit.

Ví dụ mẫu · Worked example – Bond Price as a Present Value

A simple 1-year, zero-coupon-style bond promises to pay \$1,050 in exactly one year. **(a)** If the current market interest rate is 5%, find the bond's price (present value) today. **(b)** If the market interest rate instead rises to 10%, find the new price. Confirm the inverse relationship.

The bond's price is the present value of its future payment: $\text{Price} = \frac{\text{future payment}}{1 + i}$.

$$\text{(a) Price} = \frac{1,050}{1.05} = \text{\$1,000.00.}$$

$$\text{(b) Price} = \frac{1,050}{1.10} \approx \text{\$954.55.}$$

Note that this is *not* simply \$1,050 minus 10%: dividing by 1.10, rather than multiplying by 0.90, is what correctly reflects present-value discounting.

As the market interest rate rose from 5% to 10%, the bond's price **fell** from \$1,000.00 to \$954.55.

This confirms the inverse relationship between interest rates and bond prices: the same fixed \$1,050 payment is discounted more heavily at a higher interest rate, so its present value today is lower.

Ví dụ mẫu · Worked example – Inferring the Interest Rate from a Bond's Price

A bond promises to pay \$1,050 in one year and currently sells for \$980. Find the market interest rate implied by this price.

$$\text{Price} = \frac{\text{payment}}{1 + i} \Rightarrow 980 = \frac{1,050}{1 + i} \Rightarrow 1 + i = \frac{1,050}{980} \approx 1.0714 \Rightarrow i \approx \textbf{7.14\%}.$$

A bond's price and its **implied interest rate (yield)** always move in opposite directions by construction: solving $\text{Price} = \text{payment}/(1+i)$ for i shows that a *lower* price for the same fixed future payment mathematically requires a *higher* i , and vice versa – price and yield are just two ways of describing the same bond.

This chapter's simple 1-period bond examples isolate the pure **interest-rate effect** on price. In practice, a bond's price and yield also reflect other financial-asset characteristics beyond the general level of market interest rates: **default (credit) risk** (the chance the borrower fails to pay – riskier issuers must offer a higher yield, i.e., sell at a lower price, to compensate lenders) and **time to maturity** (longer-maturity bonds are typically more sensitive to interest-rate changes, since their fixed payments are locked in for longer). These are standard properties of financial assets generally, alongside the liquidity and risk-return trade-offs introduced in Section 4.1.

GIẢI THÍCH TIẾNG VIỆT

VN

Trái phiếu hứa trả một số tiền **CỐ ĐỊNH** trong tương lai. Khi lãi suất thị trường **TĂNG**, các khoản trả cố định của trái phiếu cũ trở nên **KÉM** hấp dẫn hơn so với trái phiếu mới → giá trái phiếu cũ phải **GIẢM** để mang lại lợi suất cạnh tranh (và ngược lại). Ví dụ: trái phiếu trả \$1.050 sau 1 năm; ở lãi suất 5%, giá = $1050/1.05 = \$1.000$; ở lãi suất 10%, giá = $1050/1.10 \approx \$954,55$ – giá **GIẢM** khi lãi suất **TĂNG**.

4.12 Monetary Policy Transmission: From the Money Market to AD

Khái niệm cốt lõi

Monetary policy affects real GDP and the price level through a specific chain of cause and effect, linking the money market to the **AD-AS model** (Unit 3), where $AD = C + I + G + NX$:

Expansionary OMO $\Rightarrow MS \uparrow \Rightarrow i \downarrow \Rightarrow r \downarrow$ (π^e roughly fixed) $\Rightarrow I \uparrow, C_{\text{durables}} \uparrow \Rightarrow AD$ shifts right.

Because investment (I) and interest-sensitive durable-goods consumption are financed largely with borrowed funds, a lower real interest rate makes more projects and big-ticket purchases profitable/affordable, directly raising two of the four components of AD.

The **contractionary** chain runs in exact reverse:

Contractionary OMO $\Rightarrow MS \downarrow \Rightarrow i \uparrow \Rightarrow r \uparrow$ (π^e roughly fixed) $\Rightarrow I \downarrow, C_{\text{durables}} \downarrow \Rightarrow AD$ shifts left.

This is the key structural difference between monetary and fiscal policy (Unit 3): fiscal policy changes G or T *directly*; monetary policy works *indirectly*, through the interest-rate channel into I (and interest-sensitive C).

Ví dụ mẫu · Worked example – Tracing an Expansionary OMO Through to AD

The economy is in a **recessionary gap** (real GDP below potential). The Fed responds with an expansionary open market purchase of government bonds. Trace the complete chain of effects to the AD-AS model.

The Fed buys bonds $\rightarrow$ bank reserves increase $\rightarrow$ the vertical MS curve shifts **right** $\rightarrow$ the equilibrium **nominal** interest rate falls (money-market equilibrium moves down the MD curve) $\rightarrow$ with expected inflation roughly unchanged, the **real** interest rate falls by the same amount (Fisher equation) $\rightarrow$ borrowing is now cheaper, so **investment** spending rises and interest-

sensitive **durable-goods consumption** rises → **AD shifts right** → in the AD-AS model, this moves the economy from $Y_1 < Y_p$ toward potential output Y_p , raising both real GDP and the price level, closing (part of) the recessionary gap.

Ví dụ mẫu · Worked example — Tracing a Contractionary OMO Through to AD

The economy is in an **inflationary gap** (real GDP above potential, an overheating economy). The Fed responds with a contractionary open market **sale** of government bonds. Trace the complete chain of effects to the AD-AS model.

The Fed sells bonds → bank reserves fall → the vertical MS curve shifts **left** → the equilibrium nominal interest rate rises → with expected inflation roughly unchanged, the real interest rate rises by the same amount → borrowing is now more expensive, so investment spending falls and interest-sensitive durable-goods consumption falls → **AD shifts left** → in the AD-AS model, this moves the economy from $Y_1 > Y_p$ back toward potential output Y_p , lowering both real GDP and the price level, closing (part of) the inflationary gap.

Recall $AD = C + I + G + NX$ from Unit 3. Fiscal policy operates directly on G (and indirectly on C through T); monetary policy operates on I and interest-sensitive C through the interest-rate channel described above.

(!) Lỗi thường gặp: On a full AP free-response question, do not jump straight from “the Fed acts” to “AD shifts” – full credit requires showing *each* intermediate market. The complete, gradable chain is: (1) a money-market graph showing MS shift and the resulting change in i ; (2) a statement that r moves with i (Fisher equation, expected inflation roughly fixed); (3) a statement that I (and interest-sensitive C) respond to the change in r ; and only then (4) an AD-AS graph showing AD shift and the resulting change in real GDP and the price level. Skipping steps is one of the most common ways students lose partial credit on monetary-policy FRQs.

GIẢI THÍCH TIẾNG VIỆT

VN

Chuỗi truyền dẫn chính sách tiền tệ mở rộng: Fed mua trái phiếu → MS tăng → lãi suất danh nghĩa giảm → (lạm phát kỳ vọng gần như không đổi) lãi suất thực giảm → đầu tư (I) và tiêu dùng hàng bền (C) nhạy lãi suất tăng → AD dịch phải → đóng khoảng cách suy thoái, GDP thực và mức giá đều tăng. Chuỗi thắt chặt diễn ra ngược lại hoàn toàn. Khác với chính sách tài khoá (tác động trực tiếp lên G/T), chính sách tiền tệ tác động GIÁN TIẾP thông qua kênh lãi suất vào I và C .

4.13 The Quantity Theory of Money

Khái niệm cốt lõi

The **quantity theory of money** relates the money supply to nominal GDP through the **equation of exchange**:

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

where M is the money supply, V is the **velocity of money** (the average number of times each dollar is spent on final goods and services per year), P is the price level, and Q is real output, so $P \times Q$ is nominal GDP. If V and Q (real output) are relatively stable and predictable in the long run – as many economists believe – then any **sustained** growth in the money supply M must

eventually show up almost one-for-one as growth in the price level P , i.e., **inflation**. This is the classical, long-run link between money growth and inflation previewed here and developed fully in Unit 5.

$MV = PQ$. Rearranged for inflation intuition (with V and Q 's growth rates held roughly fixed): the long-run growth rate of M translates approximately one-for-one into the long-run inflation rate – a cornerstone of the classical view that “inflation is always and everywhere a monetary phenomenon.”

Ví dụ mẫu · Worked example – Solving the Equation of Exchange

- (a) The money supply is $M = \$2$ trillion and velocity is $V = 5$. Find nominal GDP ($P \times Q$).
 (b) Nominal GDP is \$21 trillion and the money supply is $M = \$3$ trillion. Find velocity V .
 (c) The money supply is $M = \$4$ trillion, velocity is $V = 6$, and the price index is $P = 1.2$. Find real output Q .
- (a) $M \times V = PQ \Rightarrow 2 \times 5 = \mathbf{\$10 \text{ trillion}}$.
 (b) $V = \frac{PQ}{M} = \frac{21}{3} = \mathbf{7}$ – each dollar of the money supply is, on average, spent 7 times per year on final goods and services.
 (c) First find nominal GDP: $PQ = M \times V = 4 \times 6 = \24 trillion.
 Then isolate real output: $Q = \frac{PQ}{P} = \frac{24}{1.2} = \mathbf{20}$ (real output measured in base-year dollars).

This preview of the quantity theory anticipates the **classical dichotomy**: in the long run, changes in the money supply affect only **nominal** variables (the price level, nominal wages, nominal GDP) and leave **real** variables (real GDP, the real interest rate, real wages) unchanged – a proposition often called the **long-run neutrality of money**.

Unit 5 develops this fully, alongside the short-run *non*-neutrality already seen in Section 4.12, where a monetary policy action does move real GDP and the real interest rate temporarily, before prices fully adjust.

GIẢI THÍCH TIẾNG VIỆT

VN

Thuyết số lượng tiền tệ: $MV = PQ$ (M : cung tiền; V : tốc độ lưu thông tiền tệ; P : mức giá; Q : sản lượng thực; PQ : GDP danh nghĩa). Nếu V và Q tương đối ổn định, tăng trưởng cung tiền BỀN VỮNG sẽ chuyển gần như 1:1 thành LẠM PHÁT trong dài hạn – nền tảng cho quan điểm cổ điển sẽ học kỹ ở Unit 5. Ví dụ: $M = \$2$ ngàn tỷ, $V = 5 \rightarrow PQ = \$10$ ngàn tỷ; hoặc $PQ = \$21$ ngàn tỷ, $M = \$3$ ngàn tỷ $\rightarrow V = 7$.

Ví dụ mẫu · Worked example – Putting It All Together: A Full Policy Scenario

The required reserve ratio is 10%. The Fed conducts an open market purchase that injects \$20,000 of new excess reserves into the banking system. Separately, the loanable funds market is given by $Q_s = 100 + 10r$ and $Q_d = 500 - 10r$ (before any government borrowing), and expected inflation is $\pi^e = 2\%$. (a) Find the maximum increase in the money supply from the OMO. (b) Find the initial equilibrium real interest rate, and the corresponding nominal interest rate implied by the Fisher equation. (c) The government then runs a new budget deficit, adding \$80 billion to demand for loanable funds at every interest rate; find the new real and nominal interest rates.

(a) Money multiplier = $1/RRR = 1/0.10 = 10$.

$\Delta MS_{\max} = \$20,000 \times 10 = \mathbf{\$200,000}$ (Sections 4.6–4.7).

(b) Loanable funds equilibrium: $100 + 10r = 500 - 10r \Rightarrow 20r = 400 \Rightarrow r^* = \mathbf{20\%}$ (Section 4.8).

By the Fisher equation, $i = r + \pi^e = 20\% + 2\% = \mathbf{22\%}$ (Section 4.10).

(c) New demand: $Q'_d = 580 - 10r$.

Setting $Q_s = Q'_d$: $100 + 10r = 580 - 10r \Rightarrow 20r = 480 \Rightarrow r^{*'} = \mathbf{24\%}$ (Section 4.9, crowding out).

The new nominal rate is $i' = r^{*'} + \pi^e = 24\% + 2\% = \mathbf{26\%}$.

This example shows how the chapter's separate pieces connect: the OMO and the money multiplier govern the money supply and (together with money demand) the nominal rate directly.

The loanable funds market, linked to the money market only through the Fisher equation, independently governs the real rate and any crowding out from fiscal deficits.

Unit 4 at a glance: the Fed's tools (Section 4.5) change bank reserves, which – filtered through fractional-reserve banking and the money multiplier (Sections 4.6–4.7) – change the money supply. The money supply then meets money demand in the money market (Sections 4.3–4.4) to set the **nominal** interest rate. The Fisher equation (Section 4.10) links this nominal rate to the **real** interest rate that clears the separate loanable funds market (Sections 4.8–4.9), where saving meets investment (and government borrowing can crowd out private investment). Bond prices (Section 4.11) move inversely with these interest rates. Finally, changes in the real interest rate feed into investment and interest-sensitive consumption, shifting AD and closing output gaps (Section 4.12) – the same AD–AS framework from Unit 3. The quantity theory of money (Section 4.13) previews how, if money growth persists, it becomes long-run inflation – the subject of Unit 5.

GIẢI THÍCH TIẾNG VIỆT

VN

Tổng kết Unit 4: công cụ của Fed (4.5) thay đổi dự trữ ngân hàng → qua hệ thống ngân hàng dự trữ một phần và số nhân tiền (4.6–4.7) → thay đổi cung tiền → gặp cầu tiền tại thị trường tiền tệ (4.3–4.4) để xác định lãi suất DANH NGHĨA. Phương trình Fisher (4.10) nối lãi suất danh nghĩa với lãi suất THỰC, được xác định ở thị trường vốn vay riêng biệt (4.8–4.9), nơi tiết kiệm gặp đầu tư (và thâm hụt ngân sách có thể gây lấn át). Giá trái phiếu (4.11) biến động ngược với các lãi suất này. Cuối cùng, lãi suất thực thay đổi tác động đến đầu tư và tiêu dùng nhạy lãi suất, làm dịch chuyển AD (4.12) – đúng mô hình AD–AS của Unit 3. Thuyết số lượng tiền tệ (4.13) hé lộ cách tăng trưởng cung tiền bền vững trở thành lạm phát dài hạn – nội dung Unit 5.

Practice Problems

Bài tập luyện tập – Câu 1

A museum posts every artwork's estimated value in a single currency so that a painting, a sculpture, and a photograph can all be compared on the same scale. This use of currency illustrates which function of money?

- | | |
|------------------------|--------------------|
| (A) Medium of exchange | (C) Store of value |
| (B) Unit of account | (D) Legal tender |

Lời giải chi tiết

Expressing and comparing the relative value of very different goods on a common scale is the **unit of account** function. No actual exchange of goods for money is occurring here, which rules out medium of exchange, and no purchasing power is being carried forward across time, which rules out store of value. **(B)**.

Bài tập luyện tập – Câu 2

During a period of severe hyperinflation, workers rush to spend their pay in cash within hours of receiving it, rather than holding it even briefly. This behavior most directly reflects a breakdown of money's function as a:

- | | |
|------------------------|--------------------------|
| (A) Medium of exchange | (C) Store of value |
| (B) Unit of account | (D) Factor of production |

Lời giải chi tiết

Rapid inflation erodes purchasing power so quickly that money fails as a **store of value**, pushing people to spend it immediately rather than hold it. Money still works as a medium of exchange (still accepted in transactions) and as a unit of account (prices are still quoted in it) even during hyperinflation – it is specifically the ability to hold value over even a short time horizon that collapses. **(C)**.

Bài tập luyện tập – Câu 3

Which of the following is most accurately classified as **wealth** rather than as money or income?

- | | |
|---------------------------------------|--|
| (A) A worker's monthly salary | (C) A household's total holdings of real estate, stocks, and bonds |
| (B) The balance in a checking account | (D) Currency in circulation |

Lời giải chi tiết

Wealth is the total stock of everything owned at a point in time. A worker's salary in (A) is a *flow of income*, not a stock. The currency and checking balance in (B) and (D) are themselves *money* – a small, highly liquid slice of wealth, not wealth in general. Only (C) describes the full stock of assets owned. **(C)**.

Bài tập luyện tập – Câu 4

Which of the following assets is part of M1?

- (A) A 6-month certificate of deposit posit) account
(B) Shares of a publicly-traded company (D) A retail money market mutual fund bal-
(C) The balance in a checking (demand de- ance

Lời giải chi tiết

Checkable/demand deposits are part of M1 (and, since M1 is a subset of M2, also part of M2). The CD in (A) and the money market fund in (D) belong to M2 but *not* M1; the stock in (B) belongs to neither M1 nor M2 at all. (C).

Bài tập luyện tập – Câu 5

Classify each of the following as (i) part of M1, (ii) part of M2 but not M1, or (iii) not part of the money supply: (a) \$300 in cash in a wallet; (b) a \$50,000 certificate of deposit maturing in 9 months; (c) 10 shares of stock; (d) a \$5,000 savings account balance; (e) a traveler's check.

Lời giải chi tiết

(a) M1 (currency). (b) M2 only (small-denomination time deposit, under \$100,000). (c) Neither – part of wealth, not money. (d) M2 only (savings deposit). (e) M1 (traveler's checks). Note that (a) and (e), being part of M1, are automatically also part of M2, since M1 is a strict subset of M2.

Bài tập luyện tập – Câu 6

An increase in the price level, holding real GDP constant, causes:

- (A) The money demand curve to shift right, mand curve
since more nominal money is needed for (C) The money demand curve to shift left
the same real transactions
(B) A movement up along a fixed money de- (D) No change in money demand

Lời giải chi tiết

A higher price level means the same real quantity of transactions requires more nominal dollars, shifting money demand right at every interest rate. This is a genuine *shift* of the whole curve rather than a movement along it, because the comparison holds the interest rate fixed and changes only the price level. (A).

Bài tập luyện tập – Câu 7

As the nominal interest rate on bonds rises, the quantity of money demanded:

- (A) Rises, because bonds are now more at- increased
tractive to hold as money
(B) Falls, because the opportunity cost of (C) Is unaffected, since money demand is a
holding non-interest-bearing money has vertical line
(D) Falls to exactly zero

Lời giải chi tiết

A higher nominal rate raises the forgone interest (opportunity cost) of holding money instead of bonds, reducing the quantity of money demanded – a movement along a downward-sloping MD curve, not a shift, since neither real GDP nor the price level has changed. **(B)**.

Bài tập luyện tập – Câu 8

Which of the following would shift the money demand curve to the **left**?

- (A) A recession that reduces real GDP (C) Real GDP growing rapidly
(B) A rise in the price level (D) Firms increasing the frequency of payroll transactions

Lời giải chi tiết

Lower real GDP means fewer transactions at every interest rate, reducing money demand at every interest rate – a leftward shift. The other three options all shift money demand right. **(A)**.

Bài tập luyện tập – Câu 9

Money demand is given by $Q_d = 2,200 - 40i$ (i in percent, Q in \$ billions). The Fed sets the money supply at \$1,800 billion. Find the equilibrium nominal interest rate.

Lời giải chi tiết

Money-market equilibrium occurs where the fixed money supply equals the quantity of money demanded.

Set $Q_s = Q_d$: $1,800 = 2,200 - 40i$.

Solving: $40i = 2,200 - 1,800 = 400$, so $i^* = 400/40 = 10\%$.

At this rate, the entire \$1,800 billion money supply is exactly willingly held.

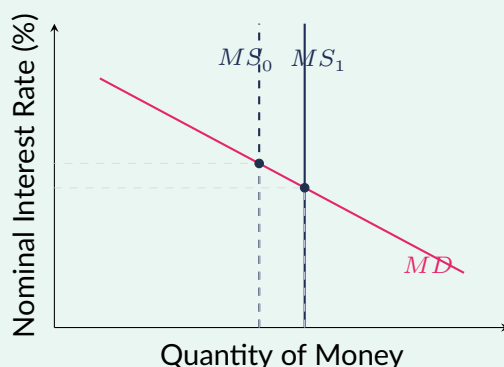
Bài tập luyện tập – Câu 10

Using the same money demand curve as the previous problem ($Q_d = 2,200 - 40i$), the Fed increases the money supply to \$2,000 billion via an open market purchase. Find the new equilibrium interest rate and state whether this is expansionary or contractionary.

Lời giải chi tiết

Set the new supply equal to demand: $2,000 = 2,200 - 40i \Rightarrow 40i = 200 \Rightarrow i^* = 5\%$.

The interest rate fell from 10% to 5% as the money supply rose from \$1,800 to \$2,000 billion – this is **expansionary** monetary policy, consistent with an OMO bond purchase that increases the money supply and lowers the equilibrium interest rate.

**Bài tập luyện tập – Câu 11**

To conduct **expansionary** monetary policy using open market operations, the Federal Reserve should:

- (A) Sell government bonds to commercial banks
(B) Buy government bonds from commercial banks
(C) Raise the reserve requirement
(D) Raise the discount rate

Lời giải chi tiết

Buying bonds injects new reserves into the banking system, increasing the money supply and shifting MS right – expansionary. Selling bonds (A), raising the reserve requirement (C), and raising the discount rate (D) are all contractionary actions that would push the money supply and interest rates in the opposite direction. (B).

Bài tập luyện tập – Câu 12

A decrease in the discount rate is best described as:

- (A) Contractionary, because it discourages bank borrowing
(B) Expansionary, because banks can now borrow reserves from the Fed more cheaply, increasing reserves and the money supply
(C) Having no effect on the money supply
(D) Equivalent to selling bonds on the open market

Lời giải chi tiết

A lower discount rate makes direct borrowing from the Fed cheaper, encouraging banks to borrow and lend more reserves, which increases the money supply – expansionary, the opposite of choice (A). (B).

Bài tập luyện tập – Câu 13

If the Federal Reserve lowers the required reserve ratio, the money multiplier will ____, and the money supply will ____, all else equal.

- (A) Increase; increase
(B) Increase; decrease
(C) Decrease; increase
(D) Decrease; decrease

Lời giải chi tiết

Money multiplier = $1/RRR$; a lower RRR raises the multiplier (dividing by a smaller number gives a larger result), letting banks lend a larger share of every deposit, which expands the money supply. Both blanks move in the *same* direction as each other, which rules out (B) and (C). (A).

Bài tập luyện tập – Câu 14

An increase in the interest rate the Fed pays on reserves (IOR) will most likely lead banks to:

- (A) Lend out a larger share of their reserves, money supply
expanding the money supply
- (B) Hold more reserves rather than lending them out, contracting the effective
- (C) Immediately lower the discount rate
- (D) Have no effect on lending behavior

Lời giải chi tiết

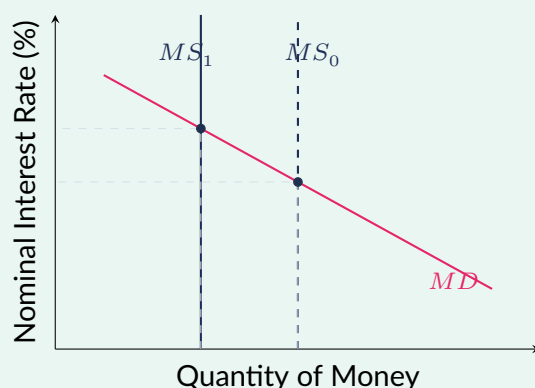
A higher IOR raises the opportunity cost of lending reserves out instead of simply holding them and earning IOR risk-free, so banks choose to hold more reserves – contractionary, since fewer reserves circulate as new loans and new deposits. (B).

Bài tập luyện tập – Câu 15 (Graph FRQ)

Draw a correctly labeled money market graph showing the effect of the Federal Reserve **selling** government bonds on the open market. Label the initial and new equilibrium interest rates.

Lời giải chi tiết

Selling bonds drains reserves from the banking system, shifting the vertical MS curve **left**; along the fixed downward-sloping MD curve, the equilibrium nominal interest rate **ris**es from i_0 to i_1 .



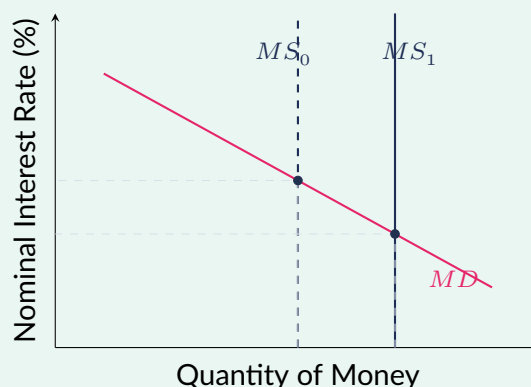
For full AP credit, label both axes (Quantity of Money; Nominal Interest Rate), label both money-supply lines MS_0 and MS_1 and the money-demand curve MD , and mark both equilibrium interest rates i_0 and i_1 on the vertical axis.

Bài tập luyện tập – Câu 16 (Graph FRQ)

Draw a correctly labeled money market graph showing the effect of a **decrease** in the required reserve ratio. Explain the direction of the resulting change in the equilibrium nominal interest rate.

Lời giải chi tiết

A lower RRR raises the money multiplier ($1/RRR$), so banks can lend a larger share of every deposit – the money supply increases and MS shifts **right**. Along the fixed MD curve, the equilibrium nominal interest rate **falls** from i_0 to i_1 .



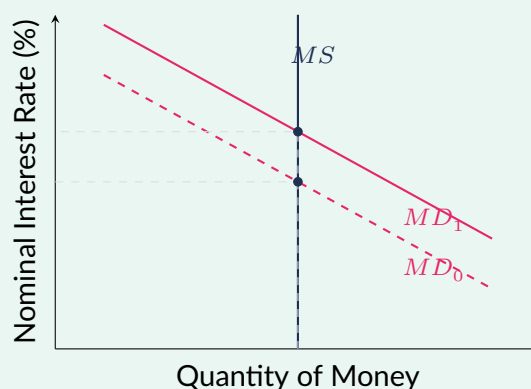
Full credit requires labeling both MS_0 and MS_1 with an explicit rightward arrow between them, labeling MD , and marking $i_0 > i_1$ on the vertical axis to show the fall in the equilibrium rate.

Bài tập luyện tập – Câu 17 (Graph FRQ)

The economy experiences strong real GDP growth while the Fed leaves the money supply unchanged. Draw a correctly labeled money market graph showing the effect on the equilibrium nominal interest rate.

Lời giải chi tiết

Higher real GDP raises money demand at every interest rate, shifting $MD_0 \rightarrow MD_1$ right. Along the fixed vertical MS , the equilibrium nominal interest rate **risers** from i_0 to i_1 at the unchanged quantity of money.



Note that the vertical MS curve itself does *not* move – only MD shifts. A common error is to shift MS instead when real GDP changes; only a deliberate Fed policy action moves MS .

Bài tập luyện tập – Câu 18

First Trust Bank receives a new checkable deposit of \$25,000. The required reserve ratio is 12%. (a) Find required reserves. (b) Find excess reserves. (c) Describe the bank's T-account immediately after the deposit, and after it lends out all of its excess reserves.

Lời giải chi tiết

(a) Required reserves = $0.12 \times \$25,000 = \$3,000$.

(b) Excess reserves = $\$25,000 - \$3,000 = \$22,000$.

(c) T-accounts immediately after the deposit, and after the loan is made:

First Trust Bank – after the deposit	
Assets	Liabilities
Reserves: \$25,000	Deposits: \$25,000

First Trust Bank – after the loan	
Assets	Liabilities
Reserves: \$3,000	Deposits: \$25,000
Loans: \$22,000	

The T-account still balances in both cases: \$25,000 in assets equals \$25,000 in liabilities, both before and after the loan is made.

Bài tập luyện tập – Câu 19

If the required reserve ratio is 25%, what is the value of the money multiplier?

Lời giải chi tiết

Money multiplier = $1/RRR = 1/0.25 = 4$.

A reserve requirement of 25% means every dollar of new excess reserves can ultimately support up to four dollars of new checkable deposits system-wide.

Bài tập luyện tập – Câu 20

Using the multiplier from the previous problem ($RRR = 25\%$), if the banking system receives \$6,000 in new excess reserves, what is the maximum possible increase in the money supply?

Lời giải chi tiết

$\Delta MS_{\max} = (\text{new excess reserves}) \times (\text{multiplier})$.

$\Delta MS_{\max} = \$6,000 \times 4 = \$24,000$.

This is the theoretical maximum, assuming every bank in the chain lends out all of its excess reserves with no leakage into currency holdings.

Round	New deposit	Required reserve (25%)	New loan
1	\$6,000.00	\$1,500.00	\$4,500.00
2	\$4,500.00	\$1,125.00	\$3,375.00
3	\$3,375.00	\$843.75	\$2,531.25
...total, to infinity		$6,000 \times \frac{1}{1 - 0.75} = \mathbf{\$24,000.00}$	

Bài tập luyện tập – Câu 21

An initial injection of \$2,000 in new excess reserves ultimately supports a maximum increase of \$16,000 in the money supply. Find the required reserve ratio.

Lời giải chi tiết

$$\text{Multiplier} = \frac{\Delta MS}{\text{excess reserves}} = \frac{16,000}{2,000} = 8.$$

Since multiplier = $1/RRR$, solving gives $RRR = 1/8 = \mathbf{12.5\%}$.

This is a relatively low reserve requirement, consistent with the large multiplier of 8.

Bài tập luyện tập – Câu 22

A bank's excess reserves are best defined as:

- (A) Total reserves minus required reserves (C) Total deposits minus total loans
(B) Required reserves minus total reserves (D) The reserve requirement ratio multiplied by total loans

Lời giải chi tiết

Excess reserves = actual (total) reserves – required reserves; only this portion may legally be lent out. Choice (B) reverses the subtraction (and would typically be negative for a sound bank), while (C) and (D) describe unrelated balance-sheet quantities. **(A)**.

Bài tập luyện tập – Câu 23

Supply of loanable funds: $Q_s = 150 + 15r$. Demand for loanable funds: $Q_d = 750 - 15r$ (r in percent, Q in \$ billions). Find the equilibrium real interest rate and quantity of loanable funds.

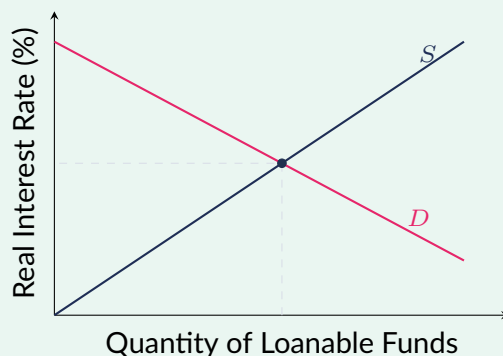
Lời giải chi tiết

Set $Q_s = Q_d$: $150 + 15r = 750 - 15r$.

Combining like terms: $15r + 15r = 750 - 150 \Rightarrow 30r = 600$, so $r^* = \mathbf{20\%}$.

Substituting back into supply: $Q^* = 150 + 15(20) = \mathbf{\$450 \text{ billion}}$.

Check against demand: $750 - 15(20) = 750 - 300 = 450$ ✓.

**Bài tập luyện tập – Câu 24**

An increase in business optimism about future profitability will most likely:

- (A) Shift the demand for loanable funds right, raising the equilibrium real interest rate
(B) Shift the supply of loanable funds right, lowering the equilibrium real interest rate
(C) Shift the demand for loanable funds left
(D) Have no effect on the loanable funds market

Lời giải chi tiết

Greater optimism about investment returns raises firms' desired borrowing at every interest rate – demand for loanable funds shifts right, raising r^* and, moving along the upward-sloping supply curve, also raising the equilibrium quantity of funds loaned. (A).

Bài tập luyện tập – Câu 25

A new government policy gives generous tax incentives for private household saving. This will most likely:

- (A) Shift the supply of loanable funds right, lowering the equilibrium real interest rate
(B) Shift the demand for loanable funds right
(C) Shift the supply of loanable funds left, raising the real interest rate
(D) Have no effect on the loanable funds market

Lời giải chi tiết

Incentives to save more raise the quantity of loanable funds supplied at every interest rate – supply shifts right, lowering r^* and, moving along the downward-sloping demand curve, raising the equilibrium quantity of funds loaned (more saving is now available to borrowers at a lower cost). (A).

Bài tập luyện tập – Câu 26

The market for loanable funds is given by: Supply $Q_s = 300 + 20r$; Demand (private investment only, before any deficit) $Q_d = 900 - 20r$. (a) Find the initial equilibrium real interest rate and quantity. (b) The government then runs a budget deficit, borrowing an additional \$100 billion at every interest rate. Find the new equilibrium. (c) Calculate the dollar amount of private investment crowded out.

Lời giải chi tiết

(a) Set $Q_s = Q_d$: $300 + 20r = 900 - 20r \Rightarrow 40r = 600 \Rightarrow r^* = 15\%$.

$Q^* = 300 + 20(15) = \$600$ billion (check: $900 - 300 = 600$ ✓), all private investment.

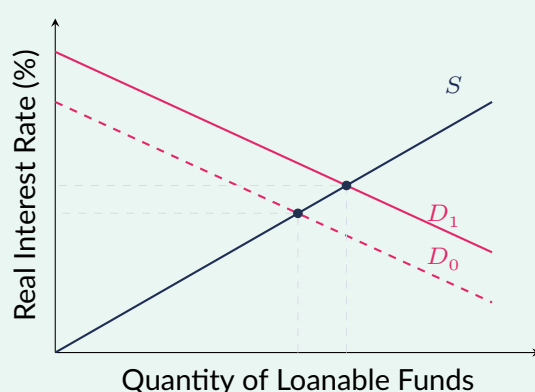
(b) New demand: $Q'_d = 1,000 - 20r$.

$300 + 20r = 1,000 - 20r \Rightarrow 40r = 700 \Rightarrow r^{*'} = 17.5\%$; $Q^{*'} = 300 + 20(17.5) = \650 billion (check: $1,000 - 350 = 650$ ✓).

(c) Private investment at $r = 17.5\%$, read off the *original* demand curve: $900 - 20(17.5) = \$550$ billion.

Crowded out = $600 - 550 = \$50$ billion (check: 50 crowded out + 50 additional saving induced = \$100 billion deficit ✓).

Overall, of the \$100 billion increase in government borrowing, \$50 billion is financed by additional saving drawn out by the higher interest rate, and the remaining \$50 billion comes directly at the expense of (crowds out) private investment.

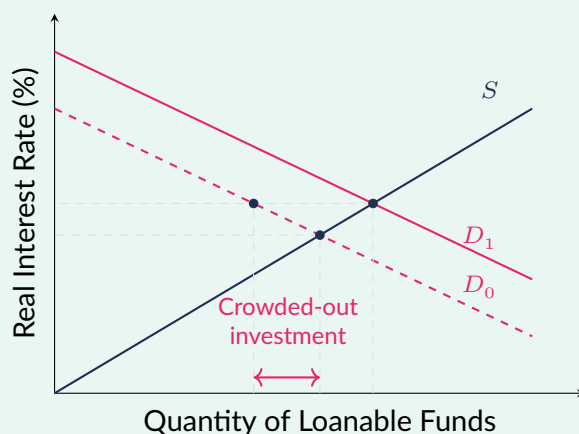


Bài tập luyện tập – Câu 27 (Graph FRQ)

Draw a correctly labeled loanable funds graph showing the effect of a rise in the government budget deficit. Label the initial equilibrium, the new equilibrium, and the quantity of private investment that is crowded out.

Lời giải chi tiết

The deficit adds to borrowing at every real interest rate, shifting demand $D_0 \rightarrow D_1$ right; the equilibrium real interest rate rises from r_0 to r_1 and quantity from Q_0 to Q_1 . Reading the *original* demand curve D_0 at the new rate r_1 shows private investment has fallen below Q_0 – the crowded-out amount is the labeled bracket.



Full AP credit requires labeling both axes, labeling S , D_0 , and D_1 with an explicit rightward arrow on demand, marking $r_0 < r_1$ and Q_0, Q_1 , and explicitly bracketing/labeling the crowded-out private investment as the gap between Q_0 and where D_0 (not D_1) sits at r_1 .

Bài tập luyện tập – Câu 28

If the nominal interest rate is 7% and expected inflation is 3%, what is the (approximate) real interest rate?

Lời giải chi tiết

Using the Fisher equation: $r = i - \pi^e$.

$$r = 7\% - 3\% = 4\%.$$

This is the (ex-ante) real interest rate a lender expects to earn in terms of actual purchasing power, after accounting for the anticipated erosion from expected inflation.

Check using the other form of the equation: $i = r + \pi^e = 4\% + 3\% = 7\%$ , matching the given nominal rate.

Bài tập luyện tập – Câu 29

The real interest rate determined in the loanable funds market is 2.5%. If expected inflation rises from 1.5% to 4%, what happens to the nominal interest rate, holding the real rate fixed?

Lời giải chi tiết

Nominal rate before = $r + \pi^e = 2.5\% + 1.5\% = 4\%$.

Nominal rate after = $r + \pi^e = 2.5\% + 4\% = 6.5\%$.

The nominal rate rises by exactly 2.5 percentage points, matching the 2.5-point rise in expected inflation one-for-one, since by assumption the real interest rate itself does not change.

	Real rate (r)	Expected inflation (π^e)	Nominal rate (i)
Before	2.5%	1.5%	4.0%
After	2.5%	4.0%	6.5%

Bài tập luyện tập – Câu 30

Which of the following correctly describes the relationship between the money market and the loanable funds market?

- (A) The money market determines the real interest rate; the loanable funds market determines the nominal interest rate
- (B) The loanable funds market determines the real interest rate; the money market determines the nominal interest rate; the two are linked by the Fisher equation
- (C) Both markets determine exactly the same interest rate, with no distinction
- (D) Neither market determines any interest rate; rates are set only by Congress

Lời giải chi tiết

The loanable funds market aggregates saving and investment decisions to determine the real interest rate r ; the money market aggregates money supply and demand decisions to determine the nominal interest rate i . The Fisher equation $i = r + \pi^e$ is exactly what links the two

together. **(B)**.

Bài tập luyện tập – Câu 31

A zero-coupon-style bond with a face value of \$2,000 promises to pay \$2,100 in exactly one year. **(a)** If the market interest rate is 5%, find the bond's price today. **(b)** If the market interest rate rises to 8%, find the new price. Did the price rise or fall?

Lời giải chi tiết

$$\text{(a) Price} = \frac{2,100}{1.05} = \$2,000.00.$$

$$\text{(b) Price} = \frac{2,100}{1.08} \approx \$1,944.44.$$

The price **fell** from \$2,000.00 to \$1,944.44 – a \$55.56 decline – as the market interest rate rose from 5% to 8%.

This confirms the inverse relationship: the bond's fixed \$2,100 payment became relatively less competitive once new alternatives began offering an 8% return instead of 5%.

Bài tập luyện tập – Câu 32

A bond will pay \$1,300 in one year. Its current market price is \$1,250. What interest rate does this price imply?

Lời giải chi tiết

$$\text{Set up the present-value relationship: } 1,250 = \frac{1,300}{1+i}.$$

$$\text{Solve for } 1+i: 1+i = \frac{1,300}{1,250} = 1.04.$$

So $i = 4\%$.

Equivalently, the bond earns \$50 of interest on a \$1,250 investment: $50/1,250 = 0.04$, directly confirming the same 4% yield.

Bài tập luyện tập – Câu 33

When the Federal Reserve conducts contractionary monetary policy and market interest rates rise, the market price of previously-issued fixed-payment bonds will:

- | | |
|--|--|
| (A) Rise, because bonds are considered safer during a contraction | higher-yielding bonds |
| (B) Fall, because their fixed future payments are now less competitive relative to new, | (C) Stay the same, since bond prices never depend on interest rates |
| | (D) Fall all the way to zero |

Lời giải chi tiết

Higher market rates make an old bond's fixed payments relatively less attractive next to newly issued, higher-yielding alternatives, so its price must fall to remain competitive – exactly the inverse relationship established in Section 4.11. **(B)**.

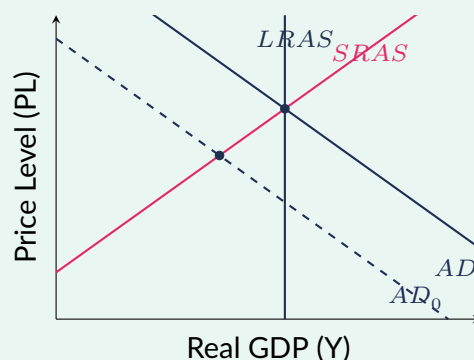
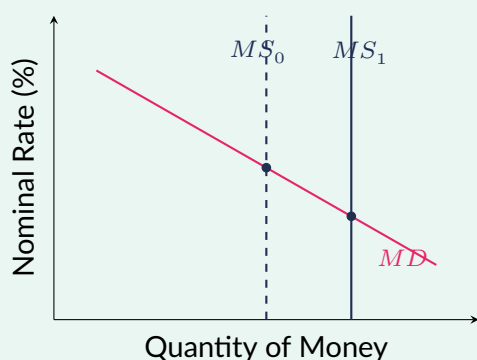
Bài tập luyện tập – Câu 34

The economy is in a recessionary gap. Starting from an expansionary open market bond purchase by the Fed, trace the complete chain of effects through the money market, the real interest rate, the investment channel, and the AD–AS model, ending with the effects on real GDP and the price level.

Lời giải chi tiết

Fed buys bonds → bank reserves rise → MS shifts right → equilibrium nominal interest rate falls → with expected inflation roughly unchanged, the real interest rate falls as well (Fisher equation) → borrowing is cheaper, so investment spending and interest-sensitive consumption rise → AD shifts right → in the AD–AS model, real GDP rises toward potential Y_p and the price level rises, closing (part of) the recessionary gap.

Graphically, this corresponds to MS shifting right in the money market graph, and then AD shifting right in the AD–AS graph, moving the short-run equilibrium from $Y_1 < Y_p$ toward Y_p , as shown below.



Left: expansionary OMO shifts $MS_0 \rightarrow MS_1$, lowering i . Right: the resulting rise in investment shifts $AD_0 \rightarrow AD_1$, moving output from Y_1 toward potential Y_p .

Bài tập luyện tập – Câu 35

The money supply is \$4 trillion and the velocity of money is 3. Find nominal GDP ($P \times Q$).

Lời giải chi tiết

Equation of exchange: $M \times V = P \times Q$.

$4 \times 3 = \mathbf{\$12 \text{ trillion}}$.

This nominal GDP figure combines both the price level and real output together; the equation of exchange alone does not tell us how much of the \$12 trillion reflects real growth versus inflation.

Bài tập luyện tập – Câu 36

Nominal GDP ($P \times Q$) is \$18 trillion and the velocity of money is 6. Find the money supply M .

Lời giải chi tiết

Rearranging $MV = PQ$ to isolate M : $M = \frac{PQ}{V}$.

$M = \frac{18}{6} = \mathbf{\$3 \text{ trillion}}$.

Check: $M \times V = 3 \times 6 = \18 trillion $\square$, matching the given nominal GDP.

Long-Run Consequences of Stabilization Policies

Mục tiêu Unit: Tổng hợp tác động ngắn hạn của chính sách tài khoá và tiền tệ; đường Phillips ngắn hạn và dài hạn; mối liên hệ giữa tăng trưởng cung tiền và lạm phát dài hạn; các yếu tố quyết định tăng trưởng kinh tế dài hạn; tác động dài hạn của chính sách tài khoá/tiền tệ lên tăng trưởng; thâm hụt ngân sách và nợ công; độ trễ chính sách và tranh luận giữa trường phái Keynes và trường phái tiền tệ (Monetarist).

5.1 Recap: Short-Run Effects of Fiscal and Monetary Policy

Units 3 and 4 built two complementary tools for the short run: the **AD-AS model** (Unit 3) shows how spending decisions determine real GDP and the price level against a given short-run aggregate supply curve; the **money market** and **loanable funds market** (Unit 4) show how the central bank and the government's borrowing needs determine, respectively, the nominal and real interest rate. This chapter asks a different question: what happens *after* the short run – once wages, prices, and expectations have had time to adjust? Before moving forward, the table below re-anchors the short-run story from Units 3–4 exactly as it was developed there.

Khái niệm cốt lõi

All four rows describe a **movement of AD along a fixed, upward-sloping SRAS** – none of these tools, by themselves, shifts SRAS or LRAS. **Expansionary** policy (fiscal or monetary) shifts AD **right**; **contractionary** policy shifts AD **left**. Fiscal policy works through G and T directly; monetary policy works indirectly, through the money market's nominal interest rate and its effect on interest-sensitive investment (I) and durable-goods consumption.

Policy	Tool	AD	Short-run PL	Short-run Real GDP
Expansionary fiscal	$\uparrow G$ and/or $\downarrow T$	Right	Rises	Rises (toward/above Y_p)
Contractionary fiscal	$\downarrow G$ and/or $\uparrow T$	Left	Falls	Falls (toward/below Y_p)
Expansionary monetary	Fed buys bonds; $\downarrow$ reserve requirement; $\downarrow$ discount rate $\Rightarrow MS \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow$	Right	Rises	Rises
Contractionary monetary	Fed sells bonds; $\uparrow$ reserve requirement; $\uparrow$ discount rate $\Rightarrow MS \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow$	Left	Falls	Falls

GIẢI THÍCH TIẾNG VIỆT

VN

Cả bốn dòng trong bảng đều là sự **di chuyển của AD dọc theo một đường SRAS cố định** – KHÔNG có công cụ nào trong số này tự làm dịch chuyển SRAS hay LRAS. Chính sách mở rộng (tài khoá hoặc tiền tệ) đẩy AD sang phải; chính sách thắt chặt đẩy AD sang trái. Tài khoá tác

động trực tiếp qua G, T ; tiền tệ tác động gián tiếp qua lãi suất danh nghĩa trên thị trường tiền tệ, từ đó ảnh hưởng đến đầu tư I và tiêu dùng hàng bền.

(!) Lỗi thường gặp: Every effect in the table above is **short-run** and assumes a *fixed* SRAS. The rest of this chapter asks what happens once nominal wages, prices, and inflation expectations are given time to adjust – the answers turn out to be strikingly different from the short-run story, and in several cases (money's effect on real GDP, deficit-driven crowding out) reverse or substantially weaken the short-run conclusion.

Ví dụ mẫu · Worked example – Identifying the Policy from Its Effects

An economy is in a recessionary gap. Policymakers respond, and in the following quarters both real GDP and the price level rise, while the nominal interest rate set by the central bank is left completely unchanged throughout. Which category of tool from the table above was most likely used, and why can you rule out the other category?

Rising Y and rising PL together are consistent with *either* expansionary fiscal or expansionary monetary policy (both shift AD right). But since the nominal interest rate never changed, the tool cannot have worked through the money market – ruling out expansionary monetary policy. The tool was most likely **expansionary fiscal policy** ($\uparrow G$ and/or $\downarrow T$), which shifts AD directly without requiring any change in the interest rate.

5.2 The Short-Run Phillips Curve (SRPC)

The AD-AS model and Okun's law (Unit 2) can be recombined into an alternative short-run picture that focuses on two variables policymakers and voters care about directly: the inflation rate and the unemployment rate.

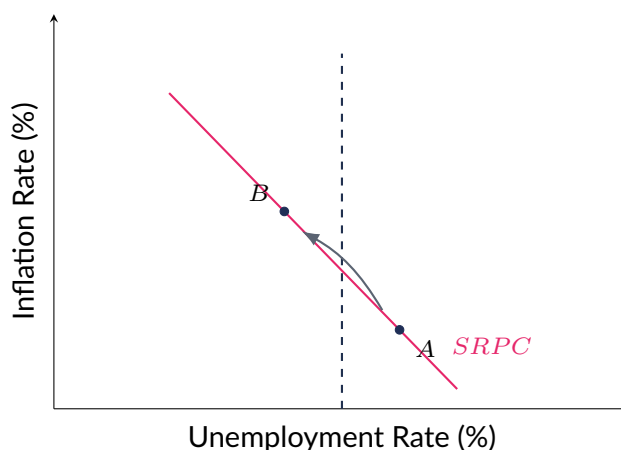
Khái niệm cốt lõi

The **short-run Phillips curve (SRPC)** plots the **inflation rate** π (vertical axis) against the **unemployment rate** u (horizontal axis) and slopes **downward**: in the short run, lower unemployment tends to come packaged with higher inflation, and vice versa. This is not a new, independent fact about the economy – it is the *same* AD-AS story, viewed from a different angle:

- A **rightward** shift of AD along a fixed, upward-sloping SRAS raises the price level (higher inflation, $\pi \uparrow$) and raises real GDP above potential (via Okun's law, unemployment falls below the natural rate, $u \downarrow$). In Phillips space, this is a movement **up and to the left** along a fixed SRPC.
- A **leftward** shift of AD along the same fixed SRAS lowers the price level (lower inflation, $\pi \downarrow$) and lowers real GDP below potential ($u \uparrow$, above the natural rate). In Phillips space, this is a movement **down and to the right** along the same fixed SRPC.

A movement *along* a single, fixed SRPC therefore always represents a **demand-side (AD) disturbance**, holding the position of SRAS and inflation expectations unchanged.

AD shifts right along fixed SRAS $\Leftrightarrow PL \uparrow, Y \uparrow \Leftrightarrow$ movement **up-left** along SRPC ($\pi \uparrow, u \downarrow$).
 AD shifts left along fixed SRAS $\Leftrightarrow PL \downarrow, Y \downarrow \Leftrightarrow$ movement **down-right** along SRPC ($\pi \downarrow, u \uparrow$).



A rightward AD shift moves the economy up and to the left along a single, fixed SRPC, from *A* to *B*.

GIẢI THÍCH TIẾNG VIỆT

VN

Đường Phillips ngắn hạn (SRPC) thể hiện quan hệ NGƯỢC giữa lạm phát và thất nghiệp trong ngắn hạn – đây chính là câu chuyện AD-AS nhìn từ góc khác. AD dịch phải dọc theo SRAS cố định $\Rightarrow$ giá và sản lượng tăng $\Rightarrow$ trên SRPC là di chuyển lên-trái (lạm phát tăng, thất nghiệp giảm). AD dịch trái $\Rightarrow$ di chuyển xuống-phải (lạm phát giảm, thất nghiệp tăng). Di chuyển DỌC THEO một SRPC cố định luôn phản ánh một biến động phía CẦU.

Ví dụ mẫu · Worked example – Reading a Movement Along the SRPC

The economy sits at point *A* on a fixed SRPC with unemployment $u = 6\%$ and inflation $\pi = 2\%$. Expansionary fiscal and monetary policy shift AD to the right along the existing SRAS. As a result, inflation rises to 5% and unemployment falls to 4% (point *B*). Confirm that *A* and *B* lie on the same downward-sloping SRPC, and state the underlying AD-AS story.

Slope of the line through $A(6, 2)$ and $B(4, 5)$: $\frac{\Delta\pi}{\Delta u} = \frac{5 - 2}{4 - 6} = \frac{3}{-2} = -1.5$. A constant negative slope confirms *A* and *B* lie on one fixed, downward-sloping SRPC (equation $\pi = 11 - 1.5u$; check: $11 - 1.5(6) = 2$ and $11 - 1.5(4) = 5$, both correct). Underlying story: the expansionary policy shifted **AD right**, and moving right along the fixed, upward-sloping SRAS raised the price level (captured here as rising inflation) and pushed real GDP above potential, which by Okun's law corresponds to unemployment falling below the natural rate of 5% shown by the dashed reference line.

(!) Lỗi thường gặp: A movement along the SRPC only ever trades *lower unemployment for higher inflation*, or the reverse – it can never show both variables rising or both falling together, because the curve is a single downward-sloping function. Any AP scenario in which inflation and unemployment move in the **same** direction cannot be a movement along one fixed SRPC; it must involve a **shift** of the entire curve, taken up next.

The same logic runs equally well in reverse: **contractionary** policy shifts AD **left** along a fixed SRAS, lowering both PL and Y – a movement **down and to the right** along the SRPC (lower inflation, higher unemployment). This is the disinflation case: a central bank deliberately accepts higher short-run unemployment in exchange for lower inflation.

Ví dụ mẫu · Worked example – Reading a Movement Down-Right Along the SRPC

An economy is overheated, sitting at ($u = 3\%$, $\pi = 8\%$) on a fixed SRPC. The central bank raises the discount rate and sells bonds on the open market, shifting AD left along the existing SRAS. As a result, unemployment rises to 5% and inflation falls to 4%. Confirm this is a single movement along one fixed SRPC, and state the AD-AS story.

Slope through (3, 8) and (5, 4): $\frac{4-8}{5-3} = \frac{-4}{2} = -2$, a single constant negative slope – consistent with one fixed curve, $\pi = 14 - 2u$ (check: $14 - 2(3) = 8$; $14 - 2(5) = 4$). AD-AS story: contractionary monetary policy shifted **AD left** along the existing SRAS, lowering the price level (captured as falling inflation) and lowering real GDP toward potential (via Okun's law, unemployment rising back toward the natural rate). This is a textbook central-bank disinflation: unemployment rises *temporarily* as the cost of bringing inflation down.

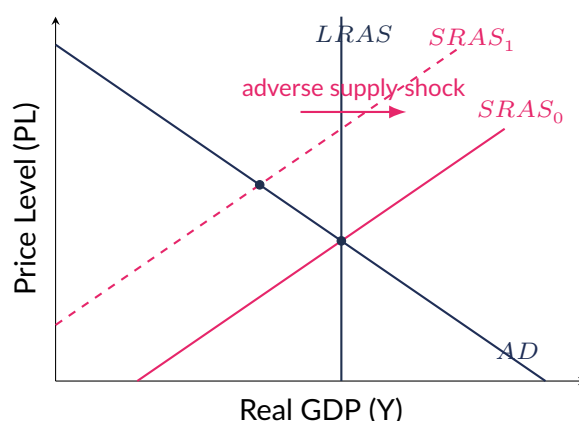
5.3 Shifts of the Short-Run Phillips Curve

Khái niệm cốt lõi

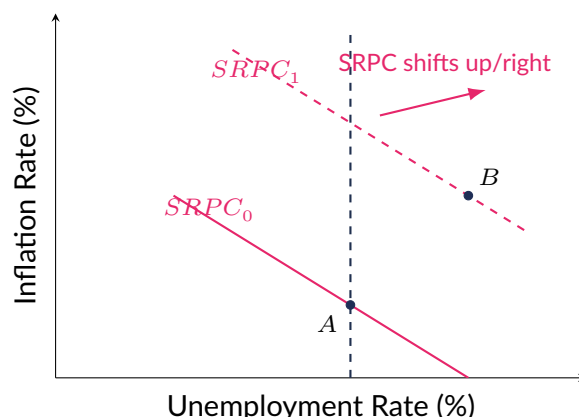
Two forces shift the *entire* SRPC, producing a different (better or worse) inflation-unemployment combination at **every** unemployment rate, not just a movement along a fixed trade-off:

- **A change in expected inflation (π^e).** If workers and firms come to expect higher inflation, they build that expectation into wage contracts and posted prices at every level of unemployment – the SRPC shifts **up and to the right** (a worse combination: higher inflation at any given u). A fall in expected inflation shifts the SRPC **down and to the left** (a better combination).
- **An adverse (negative) supply shock** – e.g., a sharp, sudden rise in oil or other key input prices. In the AD-AS model this shifts **SRAS left**: at every level of real GDP, firms now require a higher price to be willing to produce, so the new short-run equilibrium combines a *lower Y* (recessionary, unemployment rises) with a *higher PL* (inflationary). Translated into Phillips space, this is exactly a shift of the SRPC **up and to the right** – a **leftward shift of SRAS in the AD-AS diagram is the mirror image of a rightward/upward shift of the SRPC in the inflation-unemployment diagram**.

The simultaneous rise in *both* inflation and unemployment that results from an adverse supply shock is called **stagflation**. Stagflation is diagnostic of a curve **shift**, because – as noted above – a movement along one fixed, downward-sloping SRPC could never produce that combination.



AD-AS: an adverse supply shock shifts $SRAS_0 \rightarrow SRAS_1$ with AD unchanged. Output falls below potential ($Y_p \rightarrow Y_1$, recessionary) while the price level rises – the classic stagflation signature.



Phillips diagram, same event: the adverse supply shock shifts the entire curve $SRPC_0 \rightarrow SRPC_1$. The economy lands at B – higher inflation *and* higher unemployment than A – which no movement along $SRPC_0$ could ever reach.

Ví dụ mẫu · Worked example – Numerically Tracing Stagflation

Before a shock, the economy sits at potential output with unemployment at its natural rate of 5% and inflation of 2% (point A). A sharp rise in world oil prices shifts SRAS left. Suppose the resulting output shortfall corresponds, via Okun's law (coefficient of 2 from Unit 2), to unemployment rising by 2 percentage points, to 7%; simultaneously, the price-level jump corresponds to inflation rising to 5% (point B). Show that B cannot lie on the original SRPC (which passes through A with a downward slope), and state what curve B must lie on instead. Suppose $SRPC_0$ has the (downward-sloping) equation $\pi = 7 - u$, verified at A : $7 - 5 = 2$. If the economy were simply moving *along* $SRPC_0$, then at $u = 7\%$ we would need $\pi = 7 - 7 = 0\%$ – i.e., inflation should have **fallen**, not risen to 5%. Since actual inflation at $u = 7\%$ is $5\% \neq 0\%$, point B is not on $SRPC_0$. It must instead lie on a new curve, $SRPC_1$, that has shifted up and to the right: verifying $SRPC_1 : \pi = 12 - u$ gives $12 - 7 = 5$, matching B exactly, and $SRPC_1$ lies uniformly 5 percentage points above $SRPC_0$ at every unemployment rate. This vertical shift of 5 points is the Phillips-diagram counterpart of the leftward shift of SRAS in the AD-AS diagram above.

GIẢI THÍCH TIẾNG VIỆT

VN

Hai yếu tố làm SRPC dịch chuyển: (1) lạm phát KỶ VỌNG thay đổi – kỳ vọng tăng làm SRPC dịch lên-phải (tệ hơn ở mọi mức thất nghiệp); (2) cú sốc cung bất lợi (giá dầu/đầu vào tăng mạnh) làm SRAS dịch trái trong mô hình AD-AS, tương ứng với SRPC dịch lên-phải trong mô hình Phillips – đây chính là **lạm phát đình đốn (stagflation)**: lạm phát VÀ thất nghiệp cùng tăng, điều KHÔNG thể xảy ra nếu chỉ di chuyển dọc theo một SRPC cố định.

(!) Lỗi thường gặp: Do not confuse a leftward shift of **AD** (which moves PL and Y in *opposite* directions from a demand contraction: both fall together, a disinflationary recession) with a leftward shift of **SRAS** (which moves PL and Y in opposite directions from each other – PL rises while Y falls). Only the SRAS-shift case produces the simultaneous inflation-and-unemployment rise of stagflation.

Khái niệm cốt lõi

A **favorable (positive) supply shock** – a broad productivity improvement, or a sharp *fall* in a key input price – shifts **SRAS right**: firms are willing to supply more output at every price level, so the new short-run equilibrium combines a *higher* Y (lower unemployment) with a *lower* PL (lower inflation). This is the mirror image of an adverse supply shock in every respect: in Phillips space, the entire SRPC shifts **down and to the left**, offering a **better** inflation-unemployment combination at every u – sometimes informally called a “disinflationary boom,” since inflation and unemployment can fall *together*, again something no movement along one fixed SRPC could produce.

Ví dụ mẫu · Worked example – A Favorable Supply Shock

The economy sits at $A = (u=5\%, \pi=2\%)$ on $SRPC_0 : \pi = 7 - u$ (check: $7 - 5 = 2$). A sharp, broad improvement in productivity shifts SRAS right, and the SRPC shifts down by 3 points to $SRPC'_0 : \pi = 4 - u$. Find the new point if unemployment falls to 3%, and confirm both inflation and unemployment fall together.

Reading $SRPC'_0$ at $u = 3\%$: $\pi = 4 - 3 = 1\%$. New point $B' = (3\%, 1\%)$: compared to $A = (5\%, 2\%)$, unemployment fell ($5\% \rightarrow 3\%$) *and* inflation fell ($2\% \rightarrow 1\%$) simultaneously – only possible because the entire curve shifted down/left; no movement along $SRPC_0$ alone could lower both at once.

Sections 5.2–5.3 cover four possible disturbances in total; the table below collects all four in one place as a quick reference.

Disturbance	AD-AS effect	SRPC effect	Mechanism
AD shifts right (expansionary policy)	$PL \uparrow, Y \uparrow$	Movement up-left	Along SRPC one
AD shifts left (contractionary policy)	$PL \downarrow, Y \downarrow$	Movement down-right	Along SRPC one
SRAS shifts left (adverse supply shock)	$PL \uparrow, Y \downarrow$ (stagflation)	Shifts up/right	Entire curve shifts
SRAS shifts right (favorable supply shock)	$PL \downarrow, Y \uparrow$	Shifts down/left	Entire curve shifts

GIẢI THÍCH TIẾNG VIỆT

VN

Bốn trường hợp trong Sections 5.2–5.3: AD dịch phải/trái $\Rightarrow$ di chuyển DỌC THEO một SRPC cố định; SRAS dịch trái (cú sốc cung bất lợi, stagflation)/dịch phải (cú sốc cung tốt) $\Rightarrow$ TOÀN BỘ đường SRPC dịch chuyển. Đây là bảng tham chiếu nhanh cho cả hai loại biến động.

5.4 The Long-Run Phillips Curve (LRPC) and the Natural Rate of Unemployment**Khái niệm cốt lõi**

The **long-run Phillips curve (LRPC)** is **vertical** at the **natural rate of unemployment**, u_n : in the long run, there is **no permanent trade-off** between inflation and unemployment. The mechanism is **adaptive expectations**:

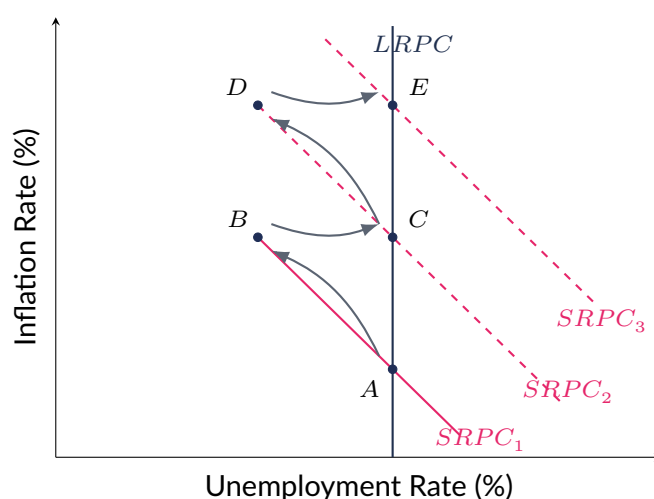
1. The economy starts in long-run equilibrium at (u_n, π_0) , on both the LRPC and a short-run curve $SRPC_1$ built on an expected inflation rate $\pi^e = \pi_0$.
2. Unanticipated expansionary policy shifts AD right, moving the economy *along* $SRPC_1$ to a

point with $u < u_n$ and $\pi > \pi_0$ – unemployment is temporarily below its natural rate.

- Over time, workers and firms observe the higher *actual* inflation and revise their *expected* inflation upward to match it. This raises wage demands and costs at every unemployment rate, shifting the entire curve up to a new $SRPC_2$ (built on the new, higher π^e).
- As expected inflation catches up with actual inflation, the temporary stimulus fades (real wages and relative prices return to their original levels) and unemployment drifts back to u_n – but now on $SRPC_2$, at a **permanently higher** inflation rate.

A simple way to summarize steps 2–4 is the **expectations-augmented Phillips curve**: $\pi = \pi^e - h(u - u_n)$, where $h > 0$. At $u = u_n$, actual inflation always equals expected inflation ($\pi = \pi^e$) – exactly what defines a point on the vertical LRPC. If policymakers repeat this cycle – always trying to hold u below u_n – expected inflation keeps chasing actual inflation upward, and the economy can spiral toward ever-higher sustained inflation without ever achieving a permanently lower unemployment rate.

$\pi = \pi^e - h(u - u_n)$. Setting $u = u_n$ gives $\pi = \pi^e$ on every SRPC: the vertical LRPC is the locus of points where each SRPC crosses $u = u_n$, for whatever value of π^e that curve was built on.



The adaptive-expectations spiral: $A \rightarrow B$ (policy stimulus, along $SRPC_1$), $B \rightarrow C$ (expectations catch up, u returns to u_n on new $SRPC_2$), $C \rightarrow D$ (a second stimulus attempt, along $SRPC_2$), $D \rightarrow E$ (expectations catch up again, on $SRPC_3$). Every long-run point (A, C, E) sits on the vertical $LRPC$ at $u_n = 5\%$, at successively higher inflation.

Ví dụ mẫu · Worked example – Tracing the Adaptive-Expectations Spiral

The natural rate of unemployment is $u_n = 5\%$. The economy begins in long-run equilibrium at $A = (5\%, 2\%)$, with expected inflation $\pi^e = 2\%$ built into $SRPC_1$. Policymakers use expansionary policy, moving the economy along $SRPC_1$ to $B = (3\%, 5\%)$. Trace the economy's path back to long-run equilibrium, and find the new long-run inflation rate.

Step 1 (movement along $SRPC_1$): $A \rightarrow B$: unemployment falls from 5% to 3% while inflation rises from 2% to 5%, entirely a movement along the fixed curve $SRPC_1$ (slope = $(5 - 2)/(3 - 5) = -1.5$).

Step 2 (expectations adjust): Workers and firms observe the actual 5% inflation and revise π^e upward from 2% to 5% – a rise of 3 percentage points. This shifts the entire curve up by 3 points, to $SRPC_2$.

Step 3 (return to the natural rate): Since $u_n = 5\%$ is structural, unemployment drifts back to 5%

once the unanticipated boost fades. Reading the new curve $SRPC_2$ at $u = 5\%$ (which is 3 points above where $SRPC_1$ stood at $u = 5\%$, namely 2%) gives $\pi = 2\% + 3\% = 5\%$.

Result: the economy settles at $C = (5\%, 5\%)$ – back at the natural rate of unemployment, but at a permanently higher, sustained inflation rate of 5% instead of the original 2% . If policymakers try the trick again (moving along $SRPC_2$ to $D = (3\%, 8\%)$), the same adjustment repeats, landing at $E = (5\%, 8\%)$ – inflation has now spiraled to 8% with no lasting reduction in unemployment.

(!) Lỗi thường gặp: It is tempting to think a central bank can simply “choose” a permanently lower unemployment rate by tolerating a bit more inflation. The spiral above shows why this fails: any inflation rate is consistent with $u = u_n$ once expectations catch up, but *no* inflation rate – however high – is consistent with u permanently below u_n . This is the modern rationale for a central bank’s independent, credible commitment to low and stable inflation: it anchors π^e , which keeps the SRPC from drifting upward in the first place.

Khái niệm cốt lõi

The adaptive-expectations story above assumes π^e adjusts only *gradually*, after workers and firms observe actual inflation. A more classical alternative, **rational expectations** (associated with New Classical economists such as Robert Lucas), assumes people use *all* available information – including a correct understanding of how policymakers tend to behave – to form expectations that are right on average, *immediately*, not just after the fact. Under rational expectations, a policy change that is **announced in advance and fully believed (credible)** gets built into wage- and price-setting *before* it even takes effect: the SRPC shifts up right away, and the temporary $u < u_n$ phase from Step 2 of the adaptive-expectations story may not occur at all, even briefly. This is the **policy ineffectiveness proposition**: only *unanticipated* (surprise) policy moves can shift u away from u_n , even temporarily – fully anticipated, credible policy changes are absorbed into expectations immediately and have essentially no real effect.

Ví dụ mẫu · Worked example – Adaptive vs. Rational Expectations

An economy starts at $(u_n, \pi_0) = (5\%, 2\%)$. Contrast the predicted short-run path if the central bank raises money growth (i) as a complete surprise, versus (ii) after announcing the change well in advance, with the announcement fully believed.

(i) *Surprise (adaptive expectations, as in the worked example above):* wage- and price-setters are caught off guard; the economy moves along the existing SRPC to $u < 5\%$ temporarily, with π^e catching up only gradually afterward.

(ii) *Announced and credible (rational expectations):* wage- and price-setters build the anticipated higher inflation into contracts and prices *before* the change takes effect, so the SRPC shifts up essentially immediately, with little or no decline in u below 5% even in the short run – the same long-run inflation outcome is reached, but *without* the temporary employment/output boost (or the later unwind) that surprise policy would have produced.

GIẢI THÍCH TIẾNG VIỆT

VN

Kỳ vọng hợp lý (rational expectations, gắn với trường phái Tân cổ điển) cho rằng con người dùng TOÀN BỘ thông tin sẵn có, kể cả hiểu biết về cách nhà điều hành chính sách hành xử, để hình thành kỳ vọng đúng ngay lập tức – không cần đợi quan sát thực tế như kỳ vọng thích nghi (adaptive). Nếu chính sách được CÔNG BỐ TRƯỚC và ĐÁNG TIN, kỳ vọng lạm phát

điều chỉnh NGAY, SRPC dịch lên ngay lập tức, và pha tạm thời $u < u_n$ có thể KHÔNG xảy ra. Đây là “mệnh đề chính sách không hiệu quả”: chỉ chính sách BẤT NGỜ mới tác động thực (dù chỉ tạm thời) đến thất nghiệp.

GIẢI THÍCH TIẾNG VIỆT

VN

Đường Phillips dài hạn (LRPC) thẳng đứng tại tỉ lệ thất nghiệp tự nhiên u_n – KHÔNG có đánh đổi lâu dài giữa lạm phát và thất nghiệp. Cơ chế: chính sách mở rộng đẩy u xuống dưới u_n tạm thời (di chuyển dọc theo SRPC); kỳ vọng lạm phát điều chỉnh tăng theo lạm phát thực tế $\Rightarrow$ SRPC dịch lên $\Rightarrow$ thất nghiệp quay về u_n nhưng với lạm phát cao hơn VĨNH VIỄN. Lặp lại nhiều lần có thể tạo ra vòng xoáy lạm phát ngày càng cao mà không giảm được thất nghiệp lâu dài.

Because the natural rate of unemployment is exactly where the LRPC sits, economists sometimes call it the **NAIRU** – the **Non-Accelerating Inflation Rate of Unemployment**: the unique unemployment rate at which inflation is stable (neither accelerating nor decelerating), i.e., $u = u_n \Leftrightarrow \pi = \pi^e$. The NAIRU is not a fixed constant carved into the economy forever – estimates of u_n itself can drift over time as frictional and structural factors change (demographic shifts in the labor force, the pace of technological displacement, the generosity of unemployment insurance, or the efficiency of job-matching platforms). If the true u_n rises (say, from 5% to 6%) but a central bank keeps treating 5% as the target, it will unknowingly run policy that holds u below the (now higher) true natural rate – triggering exactly the same accelerating-inflation spiral described above, even though the central bank believes it is merely maintaining full employment.

GIẢI THÍCH TIẾNG VIỆT

VN

NAIRU (Non-Accelerating Inflation Rate of Unemployment) là tên gọi khác của tỉ lệ thất nghiệp tự nhiên, xét trong bối cảnh đường Phillips: đây là mức thất nghiệp duy nhất mà lạm phát ổn định ($u = u_n \Leftrightarrow \pi = \pi^e$). NAIRU không cố định vĩnh viễn – có thể thay đổi theo thời gian do yếu tố nhân khẩu học, công nghệ, chính sách trợ cấp thất nghiệp. Nếu NHTW áp dụng sai mức NAIRU (dùng số cũ đã lỗi thời, thấp hơn NAIRU thực), chính sách của họ vô tình đẩy lạm phát tăng liên tục mà không hề biết.

Khái niệm cốt lõi

Disinflation – deliberately using contractionary policy to bring inflation down (Section 5.2's down-right movement, repeated period after period as expectations catch down) – is not free: it requires tolerating unemployment *above* the natural rate for some period of time. Economists summarize this cost with the **sacrifice ratio**: the cumulative number of percentage-point-years of excess unemployment (unemployment above u_n , summed over however many years it persists) required to permanently reduce inflation by one percentage point.

$$\text{Sacrifice ratio} = \frac{\text{cumulative percentage-point-years of } (u - u_n)}{\text{percentage-point reduction in } \pi}.$$

Ví dụ mẫu · Worked example – The Sacrifice Ratio

A central bank wants to reduce inflation from 8% to 4% (a 4-point reduction). Achieving this requires unemployment to run 2 percentage points above the natural rate for 3 years. Find the sacrifice ratio, and state what it measures.

Cumulative excess unemployment = $2 \times 3 = 6$ percentage-point-years. Sacrifice ratio

$= 6 \div 4 = 1.5$ percentage-point-years of excess unemployment for every 1 percentage point of disinflation achieved. A lower sacrifice ratio means disinflation is less costly; a central bank with strong, credible commitment to low inflation can lower its sacrifice ratio, because expectations (π^e) adjust downward faster when the public believes the disinflation will actually happen – shifting the SRPC down/left sooner, and shortening how long unemployment must stay above u_n .

GIẢI THÍCH TIẾNG VIỆT

VN

Tỉ lệ hy sinh (sacrifice ratio) đo chi phí của việc giảm lạm phát: tổng số điểm phần trăm-năm thất nghiệp VƯỢT mức tự nhiên cần để giảm lạm phát 1 điểm phần trăm. Một NHTW có uy tín cao (cam kết đáng tin) có thể giảm tỉ lệ hy sinh này vì kỳ vọng lạm phát điều chỉnh nhanh hơn, làm SRPC dịch xuống sớm hơn, rút ngắn thời gian thất nghiệp phải ở trên mức tự nhiên.

5.5 Money Growth and Inflation in the Long Run

Khái niệm cốt lõi

Recall the **quantity theory of money** from Unit 4: $MV = PQ$, where M is the money supply, V is the **velocity of money** (the average number of times a dollar is spent on final goods and services per year), P is the price level, and Q is real output. Taking approximate growth rates of both sides:

$$\% \Delta M + \% \Delta V \approx \% \Delta P + \% \Delta Q.$$

Velocity tends to be relatively stable over long periods (it changes only slowly, as payment technology and financial habits evolve), and real output growth is bounded by the economy's productive capacity (LRAS growth, Section 5.6). It follows that **sustained excess money-supply growth, above and beyond real output growth, is – in the long run – the primary driver of persistent inflation**: $\% \Delta M \approx \% \Delta P + \% \Delta Q$ when $\% \Delta V \approx 0$, so $\% \Delta P \approx \% \Delta M - \% \Delta Q$.

$$\% \Delta M + \% \Delta V \approx \% \Delta P + \% \Delta Q \implies (\text{holding } V \text{ roughly fixed}) \quad \pi \approx \% \Delta M - \% \Delta Q_{\text{real}}.$$

Ví dụ mẫu · Worked example – Basic Quantity-Theory Inflation

The money supply grows 8% per year, velocity is roughly constant, and real GDP grows 2% per year. Find the approximate long-run inflation rate.

With $\% \Delta V \approx 0$: $\pi \approx \% \Delta M - \% \Delta Q = 8\% - 2\% = 6\%$.

Ví dụ mẫu · Worked example – Solving for an Unknown with Changing Velocity

A central bank wants to keep inflation at a 2% target. Velocity is projected to *fall* by 1% per year (people hold relatively more cash as digital payment fees rise), and the money supply is set to grow 6% per year. What rate of real GDP growth is required to hit the 2% inflation target exactly?

$\% \Delta M + \% \Delta V \approx \% \Delta P + \% \Delta Q$: substituting, $6\% + (-1\%) = 2\% + \% \Delta Q \Rightarrow 5\% = 2\% + \% \Delta Q \Rightarrow \% \Delta Q = 3\%$. Real GDP would need to grow 3% per year for 6% money growth (net of falling velocity) to translate into only 2% inflation.

(!) **Lỗi thường gặp:** $\% \Delta M$ is a **growth rate** (how fast the money supply is expanding), not the *level* of the money supply. A large but *stable* money supply (constant M , $\% \Delta M = 0$) generates no ongoing inflation by itself; it is persistent excess *growth* in M , relative to real output growth, that drives a persistently rising price level.

GIẢI THÍCH TIẾNG VIỆT

VN

Thuyết số lượng tiền tệ: $MV = PQ \Rightarrow \% \Delta M + \% \Delta V \approx \% \Delta P + \% \Delta Q$. Nếu V ổn định, tăng trưởng cung tiền vượt tăng trưởng sản lượng thực sẽ tạo ra lạm phát: $\pi \approx \% \Delta M - \% \Delta Q$. Đây là nguyên nhân CHÍNH của lạm phát kéo dài trong dài hạn – không phải mức cung tiền, mà là TỐC ĐỘ tăng cung tiền vượt quá tốc độ tăng sản lượng.

Extreme, sustained money-supply growth can produce **hyperinflation**. The mechanism is a self-reinforcing spiral rather than a single shock: a government facing very large budget deficits, and unable or unwilling to finance them fully through taxation or borrowing, resorts to financing spending by having the central bank create new money (**seigniorage**). The resulting surge in $\% \Delta M$, far in excess of $\% \Delta Q$, drives prices up rapidly. As prices rise, the *real* value of the government's tax revenue (often collected with a lag, e.g., taxes assessed on last year's incomes) erodes, widening the real deficit and pressuring the government to print even *more* money to cover it – accelerating $\% \Delta M$ further, which accelerates inflation further, and so on. Once households and firms come to expect ongoing rapid inflation, they try to spend money as fast as possible (velocity V itself tends to rise sharply as people avoid holding a rapidly depreciating currency), which by the quantity-theory identity pushes P up even faster for a given M – reinforcing the spiral from a second direction. This historically recurring pattern is why credible, independent central banks and constraints on deficit monetization are widely viewed as important safeguards against runaway inflation.

GIẢI THÍCH TIẾNG VIỆT

VN

Siêu lạm phát (hyperinflation) xảy ra khi chính phủ thâm hụt ngân sách quá lớn và tài trợ bằng cách in tiền (seigniorage) với tốc độ vượt xa tăng trưởng sản lượng thực. Giá tăng nhanh làm giá trị thực của thu ngân sách giảm, buộc chính phủ in tiền nhiều hơn nữa – tạo vòng xoáy tự củng cố. Khi công chúng dự đoán lạm phát cao, họ tiêu tiền nhanh hơn (tốc độ lưu thông V tăng), càng đẩy giá lên nhanh hơn.

Khái niệm cốt lõi

Long-run money growth also feeds back into the **money market** and the **Fisher equation** from Unit 4: nominal rate $\approx$ real rate + expected inflation. Because sustained, fully-anticipated money growth is neutral in the long run (Section 5.7) – it does not change the long-run *real* interest rate, which is instead pinned down by loanable-funds fundamentals (national saving and investment demand) – any rise in long-run expected inflation driven by faster money growth passes through into a roughly **equal** rise in the long-run **nominal** interest rate. This one-for-one pass-through of expected inflation into nominal rates is known as the **Fisher effect**.

Ví dụ mẫu · Worked example — The Fisher Effect

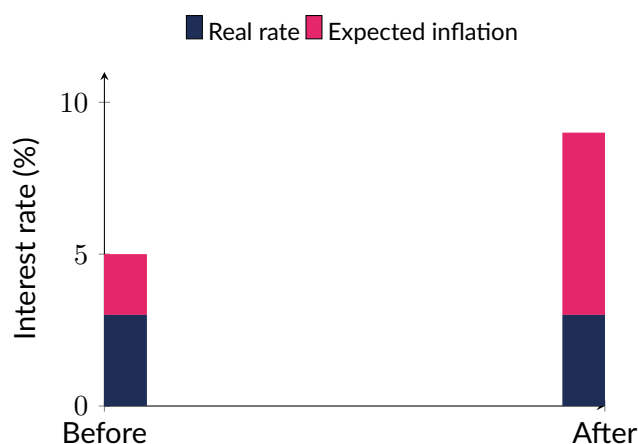
A country's real interest rate is anchored at 3% by loanable-funds fundamentals. Sustained money-supply growth permanently rises, lifting long-run expected inflation from 2% to 6%. Find the nominal interest rate before and after, and state the Fisher effect illustrated.

Before: nominal $\approx$ real + expected inflation = 3% + 2% = 5%. After: nominal $\approx$ 3% + 6% = 9%. The nominal rate rises by 4 points – exactly matching the 4-point rise in expected inflation, one-for-one – while the real rate stays at 3% throughout: the Fisher effect.

GIẢI THÍCH TIẾNG VIỆT

VN

Hiệu ứng Fisher: vì tiền trung lập trong dài hạn nên lãi suất THỰC không đổi (do cung-cầu vốn vay quyết định); khi lạm phát kỳ vọng tăng do cung tiền tăng trưởng nhanh hơn, lãi suất DANH NGHĨA tăng tương ứng 1-1 theo lạm phát kỳ vọng (lãi suất danh nghĩa $\approx$ lãi suất thực + lạm phát kỳ vọng, công thức Fisher từ Unit 4).

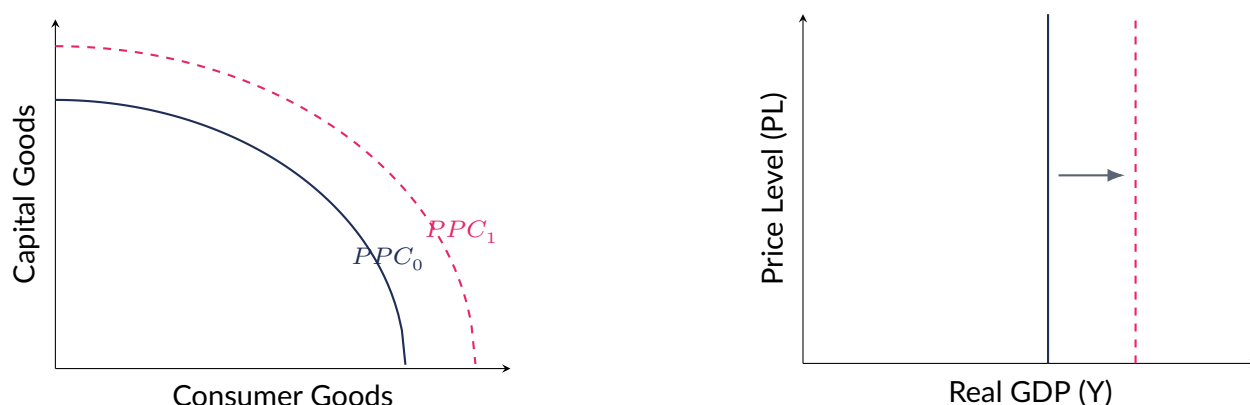


The Fisher effect from the example above: the real rate (3%) stays constant while expected inflation rises from 2% to 6%, carrying the nominal rate up one-for-one from 5% to 9%.

5.6 Economic Growth in the Long Run: Sources and Determinants**Khái niệm cốt lõi**

Long-run economic growth is the same underlying process examined from two different models already introduced: an **outward shift of the PPC** (Unit 1) and a **rightward shift of LRAS** (Unit 3). Both come from increases in the **quantity or quality** of an economy's productive resources, or from **technological progress**:

- **Physical capital investment** – new machinery, factories, and infrastructure – which must be financed out of **national saving** (via the loanable funds market, Unit 4): higher saving supplies more loanable funds, supporting more investment at a lower real interest rate.
- **Human capital** – the skills, knowledge, and health embodied in the labor force, built through education, on-the-job training, and public health.
- **Technological progress and innovation** – new methods that raise output obtainable from a given bundle of resources (total factor productivity).
- **Sound institutions** – secure property rights, enforceable contracts and the rule of law, political stability, and a well-developed financial system that can channel savers' funds to productive investment. Institutions matter because they determine whether the *incentive* to invest, innovate, and accumulate capital exists at all; identical resources can produce very different growth outcomes depending on whether institutions reward or expropriate productive effort.



The same growth event, in two model spaces: more/better resources, capital, and technology shift the PPC outward (left) exactly as they shift LRAS right (right) – neither is possible without the other.

Ví dụ mẫu · Worked example – Classifying Sources of Growth

Classify each policy by its primary channel of long-run growth: (a) a national apprenticeship program pairing young workers with skilled tradespeople; (b) a tax credit for firms that purchase new automated manufacturing equipment; (c) government-funded basic research into semiconductor materials; (d) judicial reform that shortens contract-dispute resolution from five years to six months.

(a) **Human capital** (skills training). (b) **Physical capital** (new machinery/equipment). (c) **Technological progress** (basic research expanding the technology frontier). (d) **Institutions** (faster, more reliable contract enforcement lowers the risk and cost of doing business, encouraging investment).

GIẢI THÍCH TIẾNG VIỆT

VN

Tăng trưởng dài hạn = PPC dịch ra ngoài = LRAS dịch phải – cùng một quá trình nhìn theo hai mô hình. Bốn nguồn tăng trưởng: (1) vốn vật chất (đầu tư, cần tiết kiệm quốc gia – liên kết thị trường vốn vay Unit 4); (2) vốn nhân lực (giáo dục, đào tạo, y tế); (3) tiến bộ công nghệ; (4) thể chế tốt (quyền sở hữu, pháp quyền, ổn định chính trị, hệ thống tài chính phát triển) – quyết định liệu nguồn lực có được sử dụng hiệu quả hay không.

Khái niệm cốt lõi

Physical capital accumulation is subject to **diminishing marginal returns**: each additional unit of capital added to an economy's existing capital stock raises output by *less* than the previous unit did, because it must be combined with a relatively fixed quantity of labor and other resources. A practical consequence is a tendency toward **growth convergence**: a capital-*poor* economy, all else (institutions, human capital, technology) equal, tends to get a *larger* percentage boost to output from the same investment than an already capital-*rich* economy does – so capital-poor economies have the *potential* to grow faster and gradually catch up, provided their institutions and human capital are also adequate to put the new capital to productive use.

Ví dụ mẫu · Worked example – Diminishing Returns and Convergence

A simplified production function gives output per worker as $10\sqrt{K}$, where K is capital per worker. Compare the percentage gain in output per worker from one extra unit of capital, starting from $K = 4$ versus starting from $K = 25$.

At $K = 4$: output = $10\sqrt{4} = 20$. At $K = 5$: output = $10\sqrt{5} \approx 22.36$. Gain ≈ 2.36 , a

$2.36/20 \approx 11.8\%$ increase.

At $K = 25$: output = $10\sqrt{25} = 50$. At $K = 26$: output = $10\sqrt{26} \approx 50.99$. Gain ≈ 0.99 , a $0.99/50 \approx 2.0\%$ increase.

The identical one-unit increase in capital per worker raises output by nearly $6\times$ as large a percentage at the low-capital starting point – diminishing marginal returns to capital, and the source of the convergence tendency.

GIẢI THÍCH TIẾNG VIỆT

VN

Vốn vật chất chịu quy luật LỢI SUẤT GIẢM DẦN: mỗi đơn vị vốn thêm vào làm tăng sản lượng ít hơn đơn vị trước. Do đó, nền kinh tế còn ÍT vốn (nghèo vốn) thường nhận được mức tăng sản lượng theo TỈ LỆ PHẦN TRĂM lớn hơn từ cùng một khoản đầu tư so với nền kinh tế đã NHIỀU vốn – tạo xu hướng **hội tụ tăng trưởng** (convergence), miễn là thể chế và vốn nhân lực đủ tốt để sử dụng vốn mới hiệu quả.

Khái niệm cốt lõi

Economists often decompose an economy's overall real GDP growth rate into the separate contributions of its underlying sources – a simple form of **growth accounting**: the contribution of a growing **capital stock**, the contribution of a growing (or more skilled) **labor force**, and a residual usually attributed to **total factor productivity (TFP)** – technological progress, better institutions, and more efficient use of existing resources combined. TFP is typically the least directly measurable of the three, computed as “whatever growth is left over” once the measurable contributions of capital and labor are subtracted – but it is frequently found to be the largest single source of long-run growth differences across countries and time periods, which is exactly why institutions and innovation (Section 5.6) receive so much attention in growth policy.

Ví dụ mẫu · Worked example – A Simple Growth Accounting Breakdown

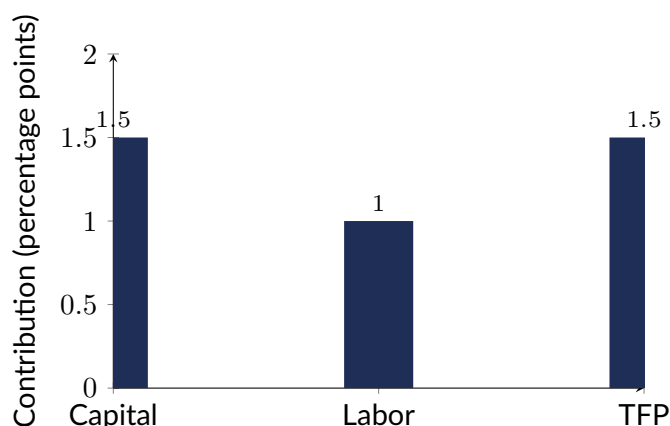
An economy's real GDP grows 4% this year. Economists estimate that growth in the capital stock contributed 1.5 percentage points, and growth in the labor force (adjusted for skill) contributed 1.0 percentage point. Find the implied contribution of total factor productivity.

$4\% = 1.5\%(\text{capital}) + 1.0\%(\text{labor}) + \text{TFP} \Rightarrow \text{TFP} = 4\% - 1.5\% - 1.0\% = 1.5\%$. In this breakdown, TFP – technology and institutions – accounts for 1.5 of the 4 percentage points of growth, the largest single contributor.

GIẢI THÍCH TIẾNG VIỆT

VN

Growth accounting phân tách tăng trưởng GDP thực thành ba phần: đóng góp của vốn, đóng góp của lao động, và phần dư gọi là năng suất yếu tố tổng hợp (TFP – công nghệ, thể chế, hiệu quả sử dụng nguồn lực). TFP thường là phần khó đo trực tiếp nhất nhưng lại thường là nguồn tăng trưởng lớn nhất giữa các quốc gia/thời kỳ – lý do công nghệ và thể chế được chú trọng trong chính sách tăng trưởng.



The growth-accounting breakdown from the example above: capital and TFP contribute equally (1.5 points each), labor contributes 1.0 point, summing to the 4% total growth rate.

Growth-source comparisons across countries make the four determinants from this section concrete.

Ví dụ mẫu · Worked example — Comparing Two Countries' Growth Prospects

Country *A* saves and invests 25% of GDP each year, has an average of 12 years of schooling in its workforce, and has strong, reliably enforced property rights. Country *B* saves and invests only 10% of GDP, has an average of 6 years of schooling, and suffers from weak property rights and high corruption. Predict which country is likely to grow faster over the next two decades, and identify which of the four determinants from this section support your prediction.

Country *A* is favored on **all four** determinants relative to Country *B*: (1) a much higher investment rate builds **physical capital** faster; (2) more years of schooling builds **human capital**; (3) higher investment typically accompanies faster adoption of new **technology**; and (4) strong property rights and low corruption are exactly the **sound institutions** that make investment and innovation worthwhile in the first place. Country *A* is very likely to grow faster, and the gap may widen further since weak institutions in Country *B* can also discourage the human-capital and technology investments that would otherwise help it catch up (Section 5.6's convergence tendency requires adequate institutions to operate).

5.7 Fiscal and Monetary Policy Effects on Long-Run Growth

Khái niệm cốt lõi

Fiscal policy and growth. Deficit-financed government spending increases the demand for loanable funds (Unit 4), raising the real interest rate r and **crowding out** some private investment. Whether this slows long-run growth depends on *what the spending buys*:

- If the deficit finances **pure transfers or current consumption** with no direct effect on future productive capacity, crowding out is close to a pure cost: less private capital accumulation with no offsetting gain to LRAS.
- If the deficit finances **productive public investment** – infrastructure, basic research, education – the spending itself directly adds to the economy's future capital stock (physical or human), potentially shifting LRAS right *despite* the higher interest rate and reduced private investment. The net effect on long-run growth then depends on whether the public investment's productivity gain exceeds the private investment lost to crowding out.

Monetary policy and growth. In the long run, money is considered approximately **neutral**: because LRAS is vertical at potential GDP, a sustained, fully-anticipated change in the money

supply changes the price level roughly proportionally (Section 5.5) but leaves real GDP, real growth, and employment unaffected in the long run. This is a sharp contrast with monetary policy's genuine short-run real effects (Units 3–4): $MS \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow$ temporarily, until self-correction (or a policy reversal) restores $Y = Y_p$ at a permanently higher price level.

Ví dụ mẫu · Worked example — Transfers vs. Productive Infrastructure

Two countries each run an identical \$200 billion annual deficit, raising the real interest rate from 3% to 7%. Suppose every 1-percentage-point rise in r reduces private investment by \$15 billion, and the spending multiplier is 3. Country X spends its entire deficit on one-time transfer payments; Country Y spends its entire deficit on productive infrastructure (roads, ports, broadband). (a) Find the crowding-out effect on real GDP common to both countries. (b) Explain why the two countries' long-run growth outcomes are still likely to differ sharply despite an identical crowding-out effect.

(a) $\Delta r = 7\% - 3\% = 4$ points. $\Delta I = -15 \times 4 = -\60 billion. Multiplied effect: $\Delta Y = -60 \times 3 = -\180 billion – identical for both countries, since the interest-rate and multiplier mechanics don't depend on *what* the deficit spending buys.

(b) In Country X , the transfer spending adds nothing to future productive capacity, so the \$180 billion crowding-out drag is close to a pure loss for long-run growth. In Country Y , the infrastructure itself becomes part of the economy's capital stock, directly raising future LRAS – an effect entirely separate from (and potentially much larger than) the temporary demand-side multiplier calculation in (a). Country Y 's long-run growth outcome can therefore be positive even though its short-run crowding-out arithmetic is identical to Country X 's.

(!) Lỗi thường gặp: “Crowding out reduces growth” is only reliably true when the deficit-financed spending itself does *not* raise future productive capacity. An AP question that specifies the deficit funds **infrastructure, education, or R&D** is signaling that the long-run LRAS effect must be weighed against the loanable-funds/crowding-out effect – *not* that crowding out automatically dominates.

GIẢI THÍCH TIẾNG VIỆT

VN

Chi tiêu tài trợ bằng thâm hụt làm tăng cầu vốn vay $\Rightarrow$ lãi suất thực tăng $\Rightarrow$ lấn át đầu tư tư nhân. Nếu là chi chuyển nhượng/tiêu dùng thuần, lấn át gần như là một tổn thất thuần cho tăng trưởng dài hạn; nếu là đầu tư công có tính SẢN XUẤT (hạ tầng, giáo dục, R&D), khoản chi đó trực tiếp làm LRAS dịch phải, có thể bù đắp hoặc vượt qua chi phí lấn át. Tiền tệ TRUNG LẬP trong dài hạn (chỉ ảnh hưởng mức giá, không ảnh hưởng sản lượng thực) – khác với tác động thực sự trong ngắn hạn (Unit 3–4).

A classical counterpoint: Ricardian equivalence. Some economists argue the basic crowding-out story overstates how much a deficit raises r . If households are fully rational and forward-looking, they may recognize that a deficit financed today implies higher taxes later (to service or repay the resulting debt) and respond by **saving more today** in anticipation – shifting the *supply* of loanable funds right by roughly the same amount that government borrowing shifts *demand* right, leaving r (and crowding out) little changed. Most economists treat Ricardian equivalence as a useful theoretical benchmark rather than a literal description of behavior – many households are credit-constrained, short-horizoned, or simply unaware of the future tax implications of today's deficit – but it is an important qualification: the *size* of crowding out in practice depends on how forward-looking private saving behavior actually is.

GIẢI THÍCH TIẾNG VIỆT

VN

Ricardian equivalence: nếu người dân có tầm nhìn dài hạn và biết thâm hụt hôm nay đồng nghĩa thuế cao hơn trong tương lai, họ có thể tự động tiết kiệm nhiều hơn ngay bây giờ, làm cung vốn vay dịch phải bù lại phần cầu tăng từ chính phủ – khiến lãi suất thực và hiệu ứng lấn át nhỏ hơn dự đoán của mô hình cơ bản. Đây là quan điểm bổ sung, không phải mô tả hành vi thực tế tuyệt đối (nhiều người bị giới hạn tín dụng hoặc không tính đến thuế tương lai).

The material in Sections 5.1–5.7 now lets us complete the picture first sketched in the recap table of Section 5.1: every short-run tool has a genuinely **different** character once the long run is allowed to unfold.

Tool / mechanism	Short run	Long run
Monetary policy (MS)	Changes $i \Rightarrow I \Rightarrow$ real Y and PL both move (Units 3–4)	Neutral: changes PL roughly proportionally; real Y and growth unaffected (Section 5.7)
Expansionary AD policy at $u < u_n$	Lower u , higher π – movement along SRPC (Section 5.2)	u returns to u_n ; only π^e (and π) end up permanently higher (Section 5.4)
Deficit-financed spending	Raises AD, raises Y toward/above Y_p (Unit 3 multiplier)	Raises r via loanable funds; crowds out private investment – net LRAS effect depends on <i>what</i> was purchased (Section 5.7)

GIẢI THÍCH TIẾNG VIỆT

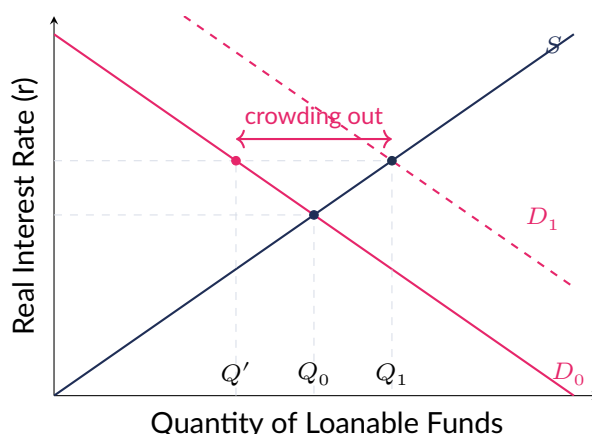
VN

Bảng tổng hợp: mọi công cụ chính sách ngắn hạn đều có một câu chuyện KHÁC trong dài hạn. Tiền tệ: trung lập dài hạn (chỉ đổi giá, không đổi sản lượng thực). Chính sách mở rộng giữ u dưới u_n : chỉ tạm thời, dài hạn u về lại u_n với lạm phát cao hơn vĩnh viễn. Chi tiêu thâm hụt: tác động dài hạn lên LRAS phụ thuộc vào khoản chi đó có nâng năng lực sản xuất tương lai hay không.

5.8 Government Budget Deficits and the National Debt

Khái niệm cốt lõi

A **budget deficit** is the shortfall of government revenue below government spending in a **single year** ($G + \text{transfers} > T$); a **budget surplus** is the reverse. The **national debt** is the **cumulative stock** of all past deficits, net of any surpluses, typically financed by issuing government bonds. A deficit **adds** to the debt; a surplus **reduces** it. Because the size of the debt only makes sense relative to the economy's capacity to service it, economists commonly track the **debt-to-GDP ratio** as a sustainability measure, rather than the dollar debt level alone.

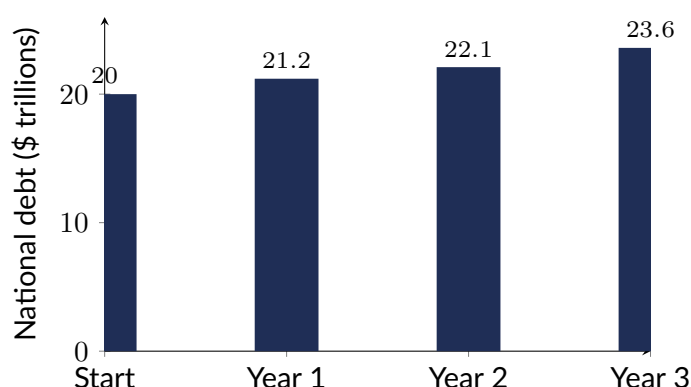


A larger government deficit shifts total demand for loanable funds $D_0 \rightarrow D_1$: the real interest rate rises $r_0 \rightarrow r_1$, and private investment (read off the original, private-only demand D_0 at the new rate) falls from Q_0 to Q' – crowded out by government borrowing, even as total borrowing rises to Q_1 .

Ví dụ mẫu · Worked example – Accumulating Debt from a Sequence of Deficits

The national debt stands at \$20 trillion at the start of Year 1. The government runs deficits of \$1.2 trillion, \$0.9 trillion, and \$1.5 trillion in Years 1, 2, and 3, respectively (no surpluses). Find the national debt at the end of Year 3, and describe the loanable-funds implication.

Each year's deficit *adds* to the debt: total added over three years = $1.2 + 0.9 + 1.5 = \$3.6$ trillion. Ending debt = $20 + 3.6 = \mathbf{\$23.6 \text{ trillion}}$. Loanable-funds implication (Unit 4): larger annual deficits mean the government must borrow more in each of these years, adding to the demand for loanable funds; all else equal, this raises the equilibrium real interest rate and risks crowding out a larger amount of private investment than a smaller sequence of deficits would.



Debt accumulates every year a deficit is run: \$20tn → \$21.2tn → \$22.1tn → \$23.6tn, even though the annual deficit itself shrank in Year 2 before rising again in Year 3.

(!) Lỗi thường gặp: A **smaller deficit** is not the same as a **surplus**: shrinking the deficit from \$1.5 trillion to \$0.9 trillion still *adds* \$0.9 trillion to the debt – the debt keeps growing, just more slowly. The debt *shrinks* only in a year with an actual budget **surplus**.

GIẢI THÍCH TIẾNG VIỆT

VN

Thâm hụt ngân sách là khoản CHI vượt THU trong MỘT năm; nợ công là TỔNG TÍCH LŨY của mọi khoản thâm hụt trừ đi thặng dư qua thời gian. Thâm hụt làm TĂNG nợ; thặng dư làm GIẢM nợ. Tỷ lệ nợ/GDP là thước đo phổ biến về khả năng bền vững. Thâm hụt lớn hơn ⇒ cầu

vốn vay tăng $\Rightarrow$ lãi suất thực tăng (liên kết Unit 4).

Khái niệm cốt lõi

A rising real interest rate compounds a second concern beyond crowding out: the government's annual **debt service** (interest payment) equals the outstanding debt multiplied by the average interest rate it pays, $\text{Interest payment} = \text{Debt} \times r$. Because both the *debt level* and the *interest rate* can rise together (larger deficits raise both the debt and, through the loanable-funds mechanism, r itself), debt-service costs can grow especially quickly – squeezing room in future budgets for other priorities, or even requiring further borrowing just to cover the interest bill, adding still more to the debt.

Ví dụ mẫu · Worked example – Debt Service Costs

A country's national debt is \$24 trillion. The average interest rate it pays on that debt rises from 2% to 4% (say, because persistent large deficits have pushed up the real interest rate, per Unit 4's loanable-funds model). Find the resulting change in the government's annual interest payment.

At 2%: $\text{interest} = 24 \times 0.02 = \0.48 trillion . At 4%: $\text{interest} = 24 \times 0.04 = \0.96 trillion . Increase = $0.96 - 0.48 = \text{\$0.48 trillion (\$480 billion)}$ in additional annual interest payments – on an unchanged debt level, purely from the higher rate.

GIẢI THÍCH TIẾNG VIỆT

VN

Chi phí trả nợ (debt service) = Nợ $\times$ lãi suất. Khi cả nợ VÀ lãi suất cùng tăng (thậm hụt lớn kéo dài làm tăng cả hai), chi phí trả nợ có thể tăng rất nhanh, chiếm chỗ của các ưu tiên ngân sách khác hoặc buộc chính phủ vay thêm chỉ để trả lãi – càng làm nợ tăng thêm.

Khái niệm cốt lõi

Not all of a given year's deficit reflects a deliberate policy choice. The **cyclical component** of the deficit is the part caused automatically by where the economy sits in the business cycle – automatic stabilizers (Unit 3) mean tax revenue automatically falls and transfer payments automatically rise during a recession, widening the deficit even with no new legislation. The **structural (cyclically-adjusted) deficit** is what the deficit *would be* if the economy were operating at potential GDP – it isolates the portion of the deficit attributable to policy choices (tax rates, spending programs) rather than to the business cycle itself. This distinction matters because a large *actual* deficit during a recession does not necessarily mean fiscal policy is on an unsustainable path – much of it may simply be the automatic-stabilizer response that will shrink on its own once the economy recovers.

Ví dụ mẫu · Worked example – Structural vs. Cyclical Deficit

During a recession, a government runs an *actual* budget deficit of \$400 billion. Economists estimate that automatic stabilizers (lower tax collections and higher unemployment/transfer payments caused by the downturn itself) account for \$250 billion of that total. Find the structural (cyclically-adjusted) deficit, and interpret it.

Structural deficit = actual deficit – cyclical component = $400 - 250 = \text{\$150 billion}$. Once the economy returns to full employment and the cyclical component disappears, the deficit attributable to policy choices alone is only \$150 billion – far smaller than the headline \$400

billion figure, which is dominated by the temporary, self-reversing effect of the recession itself.

GIẢI THÍCH TIẾNG VIỆT

VN

Thâm hụt THỰC TẾ gồm hai phần: thâm hụt CHU KỲ (tự động do bộ ổn định tự động khi kinh tế suy thoái/tăng trưởng) và thâm hụt CƠ CẤU (cyclically-adjusted – phần còn lại nếu kinh tế ở mức tiềm năng, phản ánh đúng lựa chọn chính sách). Thâm hụt thực tế lớn trong suy thoái không hẳn là chính sách tài khoá không bền vững – phần lớn có thể chỉ là hiệu ứng chu kỳ, sẽ tự giảm khi kinh tế hồi phục.

5.9 Policy Lags and the Debate over Active Stabilization

Khái niệm cốt lõi

Using fiscal or monetary policy to actively manage the business cycle (**discretionary stabilization policy**) faces three distinct time lags:

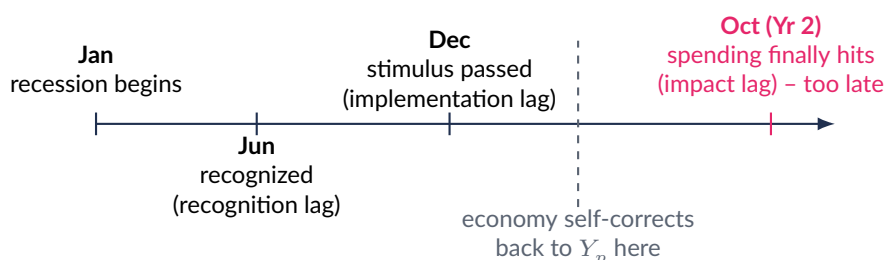
- **Recognition lag** – the time between when a problem begins and when policymakers realize it exists, since economic data (GDP, unemployment, inflation) is collected, compiled, and released only with a delay, and is often revised afterward.
- **Implementation (administrative) lag** – the time needed to enact a response once a problem is recognized. This lag is typically **longer for fiscal policy**, which requires new legislation to be drafted, debated, and passed (and often further delay before spending is actually disbursed), than for **monetary policy**, where a central bank's policy committee can vote to change interest-rate targets or reserve requirements within weeks.
- **Impact lag** – the time between a policy actually taking effect and its full effect being felt in the economy. This lag is often **longer for monetary policy**: an interest-rate change must first work through the money market to change the equilibrium interest rate, then change firms' and households' investment/durable-consumption decisions, before AD is affected – a multi-step chain that unfolds over quarters. Fiscal policy's direct increase in G (or immediate effect of a tax change on disposable income) hits AD more directly and quickly, though the multiplier process still takes further time to fully play out.

Because these lags are **long and variable** (their exact length is not known in advance and differs across episodes), a policy designed to fight today's recession may not take full effect until well after the economy has already turned around on its own – at which point the added stimulus arrives **pro-cyclically** rather than counter-cyclically, potentially pushing the economy into an *inflationary* gap instead of correcting the original recessionary one. This risk is central to the debate over whether discretionary stabilization policy is, on net, stabilizing or destabilizing.

Ví dụ mẫu · Worked example – A Lag-Driven Policy Mistake

A recession begins in January. GDP data confirming the downturn is not available until the second-quarter report in June (recognition lag ≈ 5 months). Congress debates and finally passes a stimulus package in December (implementation lag ≈ 6 more months). Because the package funds infrastructure projects requiring planning and contracting, meaningful new spending does not begin until the following October (impact lag ≈ 10 more months) – by which time the economy has already self-corrected back to potential GDP on its own. What happens when the stimulus finally arrives in October?

Since real GDP is already back at potential by October, the newly-arriving stimulus spending shifts AD to the *right* of potential output rather than back toward it – pushing the economy into an **inflationary gap** (unemployment below the natural rate, rising prices) instead of correcting the (already-resolved) recessionary gap it was designed to fix. The roughly 21-month total lag turned a well-intentioned counter-cyclical policy into a destabilizing, pro-cyclical one.



A 21-month round trip through all three lags: by the time the stimulus actually affects AD, the economy has already self-corrected, so the “late” stimulus instead pushes it into an inflationary gap.

The debate. **Keynesian** economists generally favor active discretionary stabilization: they argue that nominal wages are sticky and self-correction can be slow and costly (Unit 3), so well-timed policy – despite lag risk – can still shorten a painful gap on net. **Monetarist/Classical** economists, following **Milton Friedman’s** critique of “long and variable lags,” argue that policymakers cannot reliably time discretionary intervention and may end up destabilizing the economy rather than stabilizing it; they favor **rules-based** policy with minimal discretion – Friedman’s proposed **k-percent rule** (growing the money supply at a small, steady, publicly announced rate every year, regardless of the current state of the business cycle) is the classic example.

Dimension	Keynesian view	Monetarist/Classical view
Wage/price flexibility	Sticky, especially downward; self-correction slow (Unit 3)	Flexible enough, or lag risk outweighs any slowness
Preferred policy style	Active, discretionary fiscal and monetary policy	Rules-based (e.g., <i>k</i> -percent money growth), minimal discretion
View of expectations	Often adaptive; policy can have real short-run effects	Often rational/credibility-focused; anticipated policy has weaker real effects
Key risk emphasized	A prolonged, costly recessionary gap if policy is passive	A destabilizing, mistimed intervention due to long/variable lags

GIẢI THÍCH TIẾNG VIỆT

VN

Ba độ trễ của chính sách chủ động: (1) độ trễ nhận biết (recognition) – số liệu kinh tế công bố có trễ; (2) độ trễ thực thi (implementation) – tài khoá cần Quốc hội thông qua luật (thường LÂU hơn); (3) độ trễ tác động (impact) – tiền tệ thường LÂU hơn vì phải đi qua chuỗi: lãi suất → đầu tư/tiêu dùng → AD. Độ trễ dài và không ổn định có thể khiến chính sách đến TRỄ, sau khi kinh tế đã tự điều chỉnh, gây phản tác dụng (đẩy vào khoảng cách lạm phát). Trường phái Keynes vẫn ủng hộ chính sách chủ động; trường phái tiền tệ (Friedman) ủng hộ quy tắc cố định (ví dụ: tăng cung tiền *k*% mỗi năm) để tránh rủi ro can thiệp sai thời điểm.

One practical compromise between these two positions already appeared in Unit 3: **automatic stabilizers** (the progressive income tax, unemployment insurance) respond to the business cycle *without* needing to be recognized, debated, or separately enacted – so they carry essentially **no recognition lag and no implementation lag**, only the modest impact lag of the multiplier process working through the economy. This is a key reason many economists who are otherwise skeptical of *discretionary* intervention – precisely because of lag risk – still support strengthening *automatic* stabilizers as a lower-risk complement to (or partial substitute for) discretionary fiscal action.

(!) Lỗi thường gặp: Do not conflate “skepticism of discretionary policy” with “opposition to all stabilization tools.” A Monetarist can consistently favor *automatic* stabilizers and a fixed monetary rule while opposing *discretionary*, case-by-case fiscal or monetary intervention – the objection is specifically to relying on policymakers’ real-time judgment given long, variable, and unpredictable lags.

5.10 Putting It Together: A Full Short-Run-to-Long-Run Policy Scenario

Ví dụ mẫu · Worked example – Active Policy vs. Self-Correction After a Demand Shock

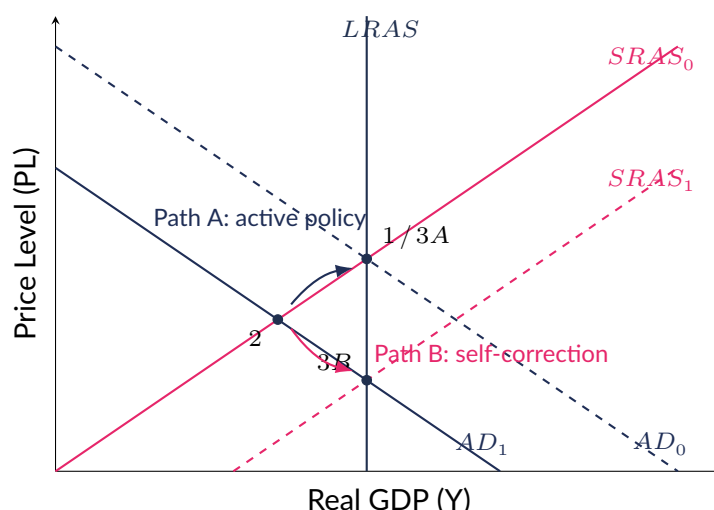
An economy is initially in long-run equilibrium at potential output $Y_p = 7$ and price level $PL_0 = 7$, where $AD_0 (PL = 14 - Y)$ intersects $SRAS_0 (PL = Y)$ exactly on the vertical $LRAS$ at $Y = 7$. A sudden drop in consumer and business confidence shifts aggregate demand left to $AD_1 (PL = 10 - Y)$. **(a)** Find the new short-run equilibrium and identify the gap. **(b)** Trace the outcome if policymakers use active expansionary policy to restore AD_0 . **(c)** Trace the outcome instead if policymakers take no action and the economy self-corrects, given that the new $SRAS_1$ (after nominal wages fall) is $PL = Y - 4$. **(d)** Compare the two paths.

(a) New short-run equilibrium: $AD_1 \cap SRAS_0$: $10 - Y = Y \Rightarrow Y = 5$, $PL = 5$. Since $Y_1 = 5 < Y_p = 7$, this is a **recessionary gap** (via Okun’s law, unemployment rises above the natural rate), and the price level has fallen from 7 to 5.

(b) Active policy path: Expansionary fiscal and/or monetary policy shifts AD back to the right, from AD_1 toward AD_0 . If policy fully restores AD_0 , the new equilibrium is $AD_0 \cap SRAS_0$ at $Y = 7$ (verify: $14 - 7 = 7$ and $SRAS_0(7) = 7$) – back at potential output, with the price level rising from 5 back up to 7.

(c) Self-correction path: With AD_1 left unchanged, persistent slack (unemployment above the natural rate) gradually pushes nominal wages down, shifting $SRAS_0 \rightarrow SRAS_1 (PL = Y - 4)$. New equilibrium: $AD_1 \cap SRAS_1$: $10 - Y = Y - 4 \Rightarrow Y = 7$, $PL = 3$ (verify: $10 - 7 = 3$ and $7 - 4 = 3$) – output returns to potential $Y_p = 7$, but the price level falls further, from 5 down to 3 (well below both the short-run recessionary level of 5 and the original level of 7).

(d) Comparison: Both paths return real GDP to potential $Y_p = 7$ and unemployment to the natural rate – the *real* outcome is identical. But the price-level outcome differs sharply: active policy ends at $PL = 7$ (higher), while self-correction ends at $PL = 3$ (lower). Active policy avoids the pain and duration of waiting for wages to fall, at the cost of a permanently higher price level than letting the economy self-correct; but (Section 5.9) it also carries the risk that, given long and variable lags, the stimulus could arrive after self-correction has already occurred, overshooting into an inflationary gap.



Point 1 (original long-run equilibrium) → Point 2 (short-run recessionary gap after the demand shock) → **Path A** back to Point 3A = Point 1 (active AD-restoring policy, PL rises to 7) or **Path B** to Point 3B (self-correction via falling wages, PL falls further to 3). Both paths restore $Y = Y_p$; only the price level differs.

(!) Lỗi thường gặp: A classic AP free-response synthesis question gives you a demand shock and asks you to compare “no policy response” with “active policy response.” The single most commonly missed point: **both** paths end at the *same* real GDP (Y_p) and the *same* unemployment rate (u_n) – they differ only in **how they got there** (speed/pain) and in the **resulting price level**, which is *higher* under active AD-restoring policy than under self-correction.

GIẢI THÍCH TIẾNG VIỆT

VN

Sau một cú sốc giảm tổng cầu tạo ra khoảng cách suy thoái, có hai con đường về lại Y_p : (A) chính sách chủ động đẩy AD trở lại bên phải – sản lượng hồi phục nhanh hơn nhưng MỨC GIÁ cuối cùng cao hơn; (B) tự điều chỉnh – lương danh nghĩa giảm dần, SRAS dịch phải, sản lượng cũng về lại Y_p nhưng chậm hơn và ở MỨC GIÁ thấp hơn. Cả hai con đường đều đưa sản lượng thực và thất nghiệp về cùng điểm dài hạn; chúng chỉ khác nhau về TỐC ĐỘ và MỨC GIÁ cuối cùng.

The mirror-image case – a **positive** demand shock creating an **inflationary** gap – reveals an important asymmetry that AP synthesis questions frequently test.

Ví dụ mẫu · Worked example – The Mirror Case: An Inflationary Gap

An economy is in long-run equilibrium at $Y_p = 6$, $PL = 6$, where AD_0 ($PL = 12 - Y$) intersects $SRAS_0$ ($PL = Y$) on the vertical $LRAS$. A surge in consumer and business confidence shifts AD right to AD_1 ($PL = 16 - Y$). **(a)** Find the new short-run equilibrium and identify the gap. **(b)** Trace the outcome of active contractionary policy restoring AD_0 . **(c)** Trace the outcome of self-correction, given the new $SRAS_1$ (after nominal wages rise) is $PL = Y + 4$. **(d)** Compare, and contrast with the recessionary-gap case above.

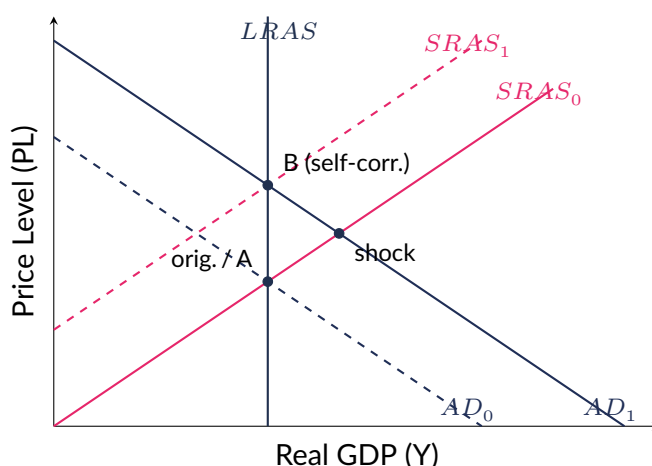
(a) $AD_1 \cap SRAS_0$: $16 - Y = Y \Rightarrow Y = 8$, $PL = 8$. Since $Y_1 = 8 > Y_p = 6$, this is an **inflationary gap** (unemployment below the natural rate); the price level has risen from 6 to 8.

(b) Active policy path: Contractionary fiscal/monetary policy shifts AD back left toward AD_0 . Fully restored, the new equilibrium is $AD_0 \cap SRAS_0$ at $Y = 6$ (verify: $12 - 6 = 6$) – back at potential, with PL **falling** from 8 back down to 6.

(c) Self-correction path: With AD_1 left unchanged, a persistently tight labor market pushes nominal wages up, shifting $SRAS_0 \rightarrow SRAS_1$ ($PL = Y + 4$). New equilibrium: $AD_1 \cap SRAS_1$:

$16 - Y = Y + 4 \Rightarrow Y = 6$, $PL = 10$ (verify: $16 - 6 = 10$ and $6 + 4 = 10$) – output returns to $Y_p = 6$, but PL rises even further, from 8 up to 10.

(d) Comparison and asymmetry: Both paths again return real GDP to Y_p . But now active (contractionary) policy ends at the **lower** price level (6) while self-correction ends at the **higher** one (10) – exactly the **opposite** ranking from the recessionary-gap case. The general principle: policy that fully restores the original AD always lands back at the **original** long-run price level; self-correction instead leaves the shocked AD in place and adjusts SRAS to meet it, ending at a price level displaced further in the same direction as the original shock – further down for a negative demand shock, further up for a positive one.



The inflationary-gap mirror case: a positive demand shock moves the economy from the original equilibrium to the “shock” point ($Y > Y_p$). Active contractionary policy (Path A, not drawn) returns AD to AD_0 , landing back at the original point; self-correction (Path B) instead lets $SRAS_0 \rightarrow SRAS_1$, landing at an *even higher* price level than the short-run shock itself.

General principle. Active policy that fully restores the original AD always returns the economy to the **original** long-run price level. Self-correction (SRAS adjusting to meet the *new*, shocked AD) instead ends at a price level shifted **further in the direction of the original shock** than even the initial short-run equilibrium: further down after a negative demand shock, further up after a positive one.

GIẢI THÍCH TIẾNG VIỆT

VN

Trường hợp đối xứng: sốc cầu DƯƠNG tạo khoảng cách lạm phát. Chính sách thắt chặt chủ động đưa AD về lại ban đầu $\Rightarrow$ MỨC GIÁ cuối cùng THẤP hơn (ngược với trường hợp suy thoái). Tự điều chỉnh (lương tăng, SRAS dịch trái) $\Rightarrow$ MỨC GIÁ cuối cùng còn CAO hơn cả mức giá ngắn hạn ngay sau sốc. Nguyên lý chung: chính sách khôi phục AD ban đầu luôn đưa mức giá về lại mức giá dài hạn BAN ĐẦU; tự điều chỉnh luôn đẩy mức giá xa hơn theo CÙNG HƯỚNG với cú sốc ban đầu.

Tổng kết Unit 5 · Chapter Review

- Every short-run fiscal/monetary tool (Section 5.1) shifts AD along a *fixed* SRAS; nothing about it, by itself, shifts SRAS or LRAS.
- The SRPC (Section 5.2) is the AD-AS story viewed in inflation-unemployment space: AD right $\rightarrow$ up-left movement; AD left $\rightarrow$ down-right movement, along one fixed curve.

- The SRPC *shifts* (Section 5.3) when expected inflation changes, or when SRAS itself shifts (supply shocks) – an adverse shock produces stagflation, a favorable shock produces simultaneous disinflation and lower unemployment.
- The LRPC (Section 5.4) is vertical at u_n (the NAIRU): no permanent inflation-unemployment trade-off; repeated attempts to hold $u < u_n$ spiral inflation upward. Disinflation has a real cost, measured by the sacrifice ratio.
- Sustained excess money growth over real output growth drives long-run inflation (Section 5.5, quantity theory); extreme cases produce hyperinflation, and the Fisher effect passes expected inflation one-for-one into nominal interest rates.
- Long-run growth (Section 5.6) comes from physical capital, human capital, technology, and institutions – decomposable via growth accounting, and subject to diminishing returns/-convergence for capital alone.
- Fiscal policy's long-run growth effect (Section 5.7) depends on what deficit spending buys (transfers vs. productive investment); monetary policy is neutral in the long run, unlike its genuine short-run real effects.
- Deficits add to the debt; surpluses subtract (Section 5.8); rising debt and rising interest rates both raise debt-service costs, and the structural deficit isolates the policy-driven portion from the cyclical portion.
- Recognition, implementation, and impact lags (Section 5.9) can make discretionary policy destabilizing; Keynesians favor active policy despite this risk, Monetarists favor rules (and automatic stabilizers largely avoid the lag problem).
- A demand shock's long-run resolution (Section 5.10) always restores Y_p and u_n either way – active policy and self-correction differ only in speed and in the resulting price level, with the price-level ranking flipping between recessionary and inflationary gaps.

Term	One-line definition
u_n / NAIRU	The unemployment rate at which actual inflation equals expected inflation ($\pi = \pi^e$); where the LRPC sits.
Sacrifice ratio	Percentage-point-years of excess unemployment needed per 1-point reduction in inflation.
Seigniorage	Government revenue raised by having the central bank create new money.
Fisher effect	A one-for-one pass-through of a change in expected inflation into the nominal interest rate.
Ricardian equivalence	The hypothesis that forward-looking saving offsets government borrowing, muting crowding out.
Structural deficit	The deficit that would exist if the economy were at potential GDP (excludes the cyclical component).
TFP	Total factor productivity: the growth residual left after accounting for capital and labor.
k -percent rule	Friedman's proposal to grow the money supply at a small, steady, pre-announced rate every year.

Practice Problems

Bài tập luyện tập – Câu 1

Which of the following is a tool of **expansionary** monetary policy?

- (A) Raising the reserve requirement
- (B) Selling government securities on the open market
- (C) Buying government securities on the open market
- (D) Raising the discount rate

Lời giải chi tiết

An open-market purchase of securities injects reserves into the banking system, increasing the money supply and lowering the nominal interest rate – the definition of expansionary monetary policy. (C).

Bài tập luyện tập – Câu 2

Contractionary fiscal policy (a decrease in G and/or an increase in T) shifts AD ____, causing the short-run price level to ____ and short-run real GDP to ____.

- (A) right; rise; rise
- (B) left; fall; fall
- (C) left; rise; fall
- (D) right; fall; rise

Lời giải chi tiết

Contractionary fiscal policy shifts AD left along a fixed SRAS, lowering both the equilibrium price level and real GDP. (B).

Bài tập luyện tập – Câu 3

In the AD-AS model, a rightward shift of AD along a fixed SRAS raises the price level and raises real GDP above potential. In the inflation-unemployment (Phillips) diagram, this corresponds to:

- (A) An upward shift of the entire SRPC
- (B) A downward shift of the entire SRPC
- (C) A movement up and to the left along a fixed SRPC
- (D) A movement down and to the right along a fixed SRPC

Lời giải chi tiết

Higher P and higher Y (via Okun's law, lower u) together correspond to a movement up-left along one fixed SRPC. (C).

Bài tập luyện tập – Câu 4

The economy sits on a fixed SRPC at $(u = 7\%, \pi = 1\%)$. Expansionary fiscal policy shifts AD right along the existing SRAS, moving the economy along the *same* SRPC to $u = 5\%$. If this SRPC has a constant slope of -1.5 (inflation points per percentage point of unemployment), find the new inflation rate.

Lời giải chi tiết

$\Delta u = 5 - 7 = -2$ points. $\Delta \pi = -1.5 \times (-2) = +3$ points. New $\pi = 1\% + 3\% = 4\%$. New point: (5%, 4%).

Bài tập luyện tập – Câu 5

Contractionary monetary policy that shifts AD left along a fixed SRAS corresponds to which movement in the inflation-unemployment (Phillips) diagram?

- (A) Up and to the left along a fixed SRPC (C) A rightward shift of the entire SRPC
(B) Down and to the right along the same fixed SRPC (D) A leftward shift of the entire SRPC

Lời giải chi tiết

Contractionary policy lowers both P and Y (raises u via Okun's law) along one fixed curve: a movement down and to the right. **(B)**.

Bài tập luyện tập – Câu 6

If workers and firms revise their expected inflation rate upward, the short-run Phillips curve will:

- (A) Shift down/left, offering a better inflation-unemployment combination at every unemployment rate employment rate
(B) Shift up/right, offering a worse inflation-unemployment combination at every un- (C) Not shift; only a movement along the curve occurs
(D) Become perfectly vertical

Lời giải chi tiết

Higher expected inflation is built into wages/prices at every unemployment rate, worsening the trade-off at every point: the curve shifts up/right. **(B)**.

Bài tập luyện tập – Câu 7

An economy simultaneously experiences a rise in the inflation rate **and** a rise in the unemployment rate. This combination is best explained by:

- (A) A rightward shift of AD (B) A leftward shift of AD (C) A leftward shift of SRAS (an adverse supply shock), shifting the SRPC up/right
(D) A movement along a fixed, downward-sloping SRPC

Lời giải chi tiết

Stagflation (both π and u rising) can never come from a movement along one downward-sloping curve; it requires a leftward SRAS shift, i.e., an upward/rightward SRPC shift. **(C)**.

Bài tập luyện tập – Câu 8

Before an adverse supply shock, the economy sits at $(u = 4\%, \pi = 3\%)$ on $SRPC_A$. After the shock, the new AD-AS equilibrium implies $u = 6\%$ and $\pi = 6\%$. Explain why this new point cannot lie on $SRPC_A$, and state what must have happened to the curve.

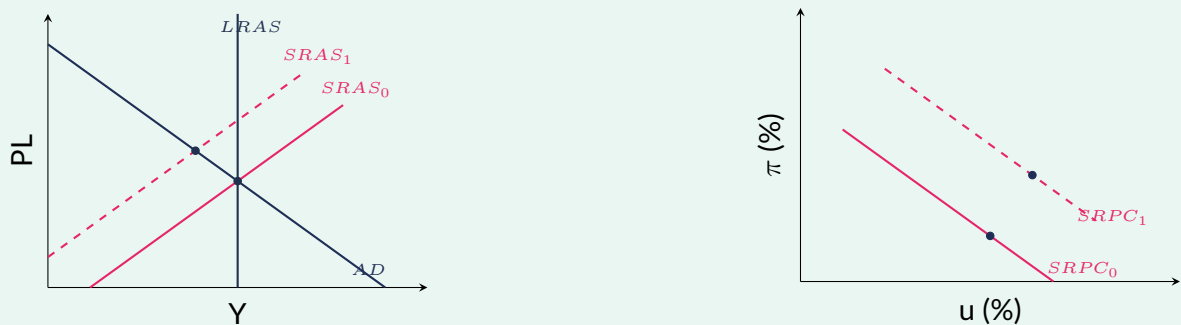
Lời giải chi tiết

On any downward-sloping curve through $(4\%, 3\%)$, a rise in u to 6% must correspond to a *fall* in π below 3% , not a rise to 6% . Since actual inflation rose instead of falling, the new point cannot lie on $SRPC_A$: the **entire curve must have shifted up and to the right** to a new $SRPC_B$, consistent with the adverse supply shock shifting SRAS left in the AD-AS diagram.

Bài tập luyện tập – Câu 9 – GRAPH FRQ

Draw a correctly labeled AD-AS graph **and** the corresponding SRPC diagram showing the short-run effect of a negative (adverse) supply shock, starting from long-run equilibrium. Label both diagrams fully.

Lời giải chi tiết



$SRAS_0 \rightarrow SRAS_1$ (left) raises PL and lowers Y below potential (recessionary gap, off $LRAS$). Equivalently, $SRPC_0 \rightarrow SRPC_1$ (up/right): both unemployment and inflation rise – stagflation.

Bài tập luyện tập – Câu 10

The long-run Phillips curve (LRPC) is vertical at the natural rate of unemployment because:

- | | |
|---|---|
| (A) In the long run, expected inflation always equals zero | tween inflation and unemployment |
| (B) In the long run, wages and prices fully adjust to any change in expected inflation, so there is no permanent trade-off between inflation and unemployment | (C) The natural rate of unemployment always equals the inflation rate |
| | (D) Monetary policy is always neutral, even in the short run |

Lời giải chi tiết

Full long-run adjustment of expectations means u returns to u_n regardless of the (eventual) inflation rate: no permanent trade-off, hence a vertical LRPC. (B).

Bài tập luyện tập – Câu 11

If policymakers repeatedly use expansionary policy to try to hold unemployment permanently below the natural rate, the most likely long-run outcome is:

- (A) A permanent reduction in the natural rate of unemployment (C) Unemployment keeps returning to the natural rate, but at a progressively higher (possibly spiraling) inflation rate
(B) Unemployment stays below the natural rate forever, with stable inflation (D) Deflation

Lời giải chi tiết

Each round of expectations catching up shifts the SRPC up further, so u keeps returning to u_n at ever-higher sustained inflation. (C).

Bài tập luyện tập – Câu 12

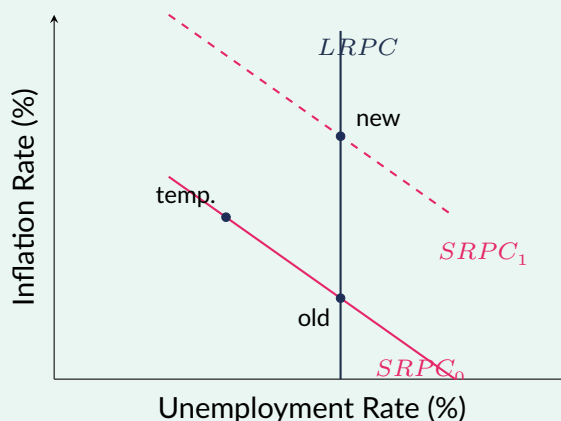
The natural rate of unemployment is $u_n = 6\%$. The economy is initially in long-run equilibrium at $(6\%, 3\%)$. Expansionary monetary policy moves the economy along the existing SRPC to $(4\%, 6\%)$. Over time, expected inflation rises from 3% to match the 6% actual inflation just experienced, shifting the entire SRPC up by an amount equal to this rise. Find the economy's new long-run position.

Lời giải chi tiết

Expected inflation rises by $6\% - 3\% = 3$ points, so the SRPC shifts up uniformly by 3 points. Unemployment returns to $u_n = 6\%$ (structural). Reading the shifted curve at $u = 6\%$: the original curve gave 3% there, so the new curve gives $3\% + 3\% = 6\%$. New long-run position: $(6\%, 6\%)$.

Bài tập luyện tập – Câu 13 – GRAPH FRQ

Draw a correctly labeled SRPC and LRPC diagram showing the long-run effect of a permanent increase in the money supply growth rate, starting from long-run equilibrium at $u_n = 5\%$, $\pi = 2\%$.

Lời giải chi tiết

A sustained rise in $\% \Delta M$ raises actual (and eventually expected) inflation. Short run: the

economy briefly dips below u_n along $SRPC_0$ ("temp." point) as money growth accelerates unexpectedly. Long run: once π^e catches up, unemployment returns to $u_n = 5\%$ on the new $SRPC_1$, but at a permanently higher inflation rate (here 6% instead of 2%) – the "new" point sits on both $SRPC_1$ and the vertical $LRPC$.

Bài tập luyện tập – Câu 14

The money supply grows 10% per year, velocity grows 2% per year, and real GDP grows 5% per year. Find the approximate long-run inflation rate.

Lời giải chi tiết

$$\% \Delta M + \% \Delta V \approx \% \Delta P + \% \Delta Q: 10\% + 2\% = \% \Delta P + 5\% \Rightarrow \% \Delta P = 12\% - 5\% = \mathbf{7\%}.$$

Bài tập luyện tập – Câu 15

A central bank targets 4% inflation. The money supply is projected to grow 7% per year, and velocity is projected to *fall* 2% per year. What real GDP growth rate is required to hit the target exactly?

Lời giải chi tiết

$$7\% + (-2\%) = 4\% + \% \Delta Q \Rightarrow 5\% = 4\% + \% \Delta Q \Rightarrow \% \Delta Q = \mathbf{1\%}.$$

Bài tập luyện tập – Câu 16

A central bank wants to keep inflation at 3%. Velocity is expected to rise 1% per year, and real GDP is expected to grow 4% per year. Find the required rate of money-supply growth.

Lời giải chi tiết

$$\% \Delta M + 1\% = 3\% + 4\% = 7\% \Rightarrow \% \Delta M = \mathbf{6\%}.$$

Bài tập luyện tập – Câu 17

Hyperinflation is most commonly triggered by:

- | | |
|---|---|
| (A) A central bank keeping money-supply growth strictly equal to real GDP growth | output growth, a process that can accelerate as inflation erodes real tax revenue |
| (B) A government financing very large budget deficits by having the central bank print money at a rate far exceeding real | (C) A sudden, large increase in national saving |
| | (D) A temporary, mild negative supply shock |

Lời giải chi tiết

Hyperinflation is the extreme case of excess money-supply growth financing deficits, often self-reinforcing as real tax revenue erodes and further money creation is needed. **(B).**

Bài tập luyện tập – Câu 18

A government program funds universal access to early-childhood education and vocational training. This most directly raises long-run growth through:

- (A) Physical capital accumulation (C) Institutional quality
(B) Human capital (D) A short-run AD shift only

Lời giải chi tiết

Education and training raise the skills embodied in the workforce: human capital. **(B)**.

Bài tập luyện tập – Câu 19

A country strengthens independent courts, enforces contracts reliably, and reduces corruption in business licensing. This most directly supports long-run growth through:

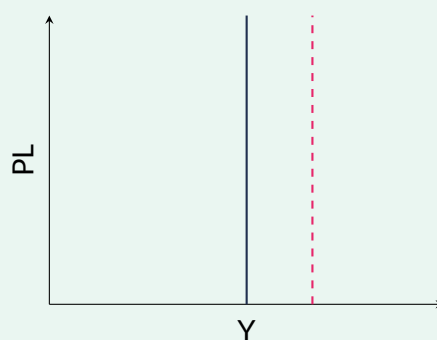
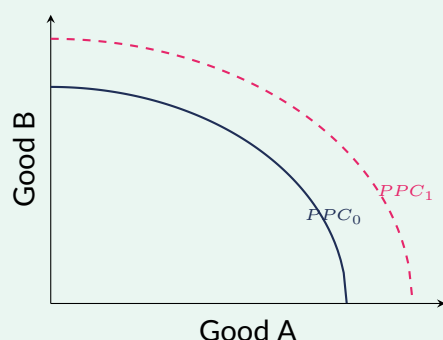
- (A) Technological progress (C) Sound institutions that make investment and innovation more attractive
(B) Human capital (D) An increase in the money supply

Lời giải chi tiết

Reliable courts, enforceable contracts, and low corruption are the defining features of sound institutions, which lower the risk of investing and innovating. **(C)**.

Bài tập luyện tập – Câu 20 – GRAPH FRQ

Draw a correctly labeled PPC graph and a correctly labeled LRAS graph, each showing the same underlying event: a country experiences a sustained increase in human capital and technological progress.

Lời giải chi tiết

Both diagrams show the identical event: growth in human capital and technology shifts the PPC outward from PPC_0 to PPC_1 , and equivalently shifts LRAS right from $LRAS_0$ to $LRAS_1$.

Bài tập luyện tập – Câu 21

Which deficit-financed government policy is most likely to raise long-run growth despite the crowding-out effect on private investment?

- (A) A one-time increase in unemployment transfer payments (C) Investment in productive infrastructure and basic research that directly raises future productive capacity
- (B) A permanent increase in public-sector salaries, unrelated to output (D) A temporary consumption tax rebate

Lời giải chi tiết

Only spending that directly raises future productive capacity (infrastructure, R&D) can offset the crowding-out cost with a genuine LRAS gain. (C).

Bài tập luyện tập – Câu 22

A newly enacted government deficit raises the real interest rate from 3% to 7%. Each 1-percentage-point rise in r reduces private investment by \$20 billion, and the economy's spending multiplier is 2.5. (a) Find the total crowding-out effect on equilibrium real GDP. (b) If the deficit spending is entirely transfer payments, what does this imply about the deficit's net long-run growth impact? (c) How would your answer to (b) differ if the same money had instead funded productive infrastructure?

Lời giải chi tiết

- (a) $\Delta r = 7\% - 3\% = 4$ points. $\Delta I = -20 \times 4 = -\80 billion. $\Delta GDP = -80 \times 2.5 = -\200 billion.
- (b) Transfer payments add nothing to future productive capacity, so this \$200 billion drag is close to a pure long-run cost, with little or no offsetting LRAS gain – net long-run growth impact is likely negative or negligible.
- (c) If spent on infrastructure instead, the spending directly raises future capital stock/LRAS, which can offset or exceed the \$200 billion crowding-out drag – making a net positive long-run growth effect plausible despite the identical short-run interest-rate mechanics.

Bài tập luyện tập – Câu 23

According to the long-run neutrality of money, a sustained, fully-anticipated doubling of the money supply will, in the long run:

- (A) Double real GDP (C) Permanently lower the natural rate of unemployment
- (B) Roughly double the price level, leaving real GDP essentially unchanged (D) Have no effect on the price level

Lời giải chi tiết

Money is neutral in the long run: it changes the price level roughly proportionally but not real GDP, since LRAS is vertical at potential output. (B).

Bài tập luyện tập – Câu 24

The national debt is \$18 trillion at the start of Year 1. The government runs a deficit of \$0.8 trillion in Year 1, a **surplus** of \$0.3 trillion in Year 2, and a deficit of \$1.4 trillion in Year 3. Find the national debt at the end of Year 3.

Lời giải chi tiết

$18 + 0.8 = 18.8$; $18.8 - 0.3 = 18.5$ (a surplus reduces the debt); $18.5 + 1.4 = \text{\$19.9 trillion}$.

Bài tập luyện tập – Câu 25

Which statement correctly distinguishes a budget deficit from the national debt?

- (A) The deficit is the accumulated stock of borrowing; the debt is a single year's shortfall
(B) The deficit is a single year's shortfall of revenue below spending; the debt is the accumulated stock of past deficits net of surpluses
(C) They are two names for the same concept
(D) A deficit always reduces the debt

Lời giải chi tiết

Deficit = one year's flow; debt = the cumulative stock. (B).

Bài tập luyện tập – Câu 26

Using the loanable funds model (Unit 4), explain why a persistently rising government debt-to-GDP ratio is likely to raise the equilibrium real interest rate, and identify one consequence for private investment and long-run growth.

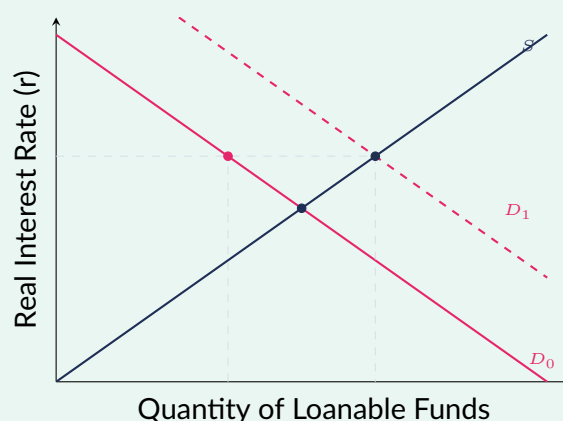
Lời giải chi tiết

Persistent large deficits require the government to borrow more each year, adding to (or keeping elevated) the demand for loanable funds; with the supply of loanable funds (national saving) unchanged, this raises the equilibrium real interest rate r . A higher r raises the cost of borrowing for private firms, reducing private investment (crowding out) and, if sustained, slowing capital accumulation and long-run LRAS growth.

Bài tập luyện tập – Câu 27 – GRAPH FRQ

Draw a correctly labeled loanable funds graph showing a government budget deficit of size 3 (a parallel rightward shift of total demand), given supply $S : r = Q$ and private-investment-only demand $D_0 : r = 10 - Q$. Label the new total-demand curve D_1 , find the new equilibrium, and find the amount of private investment crowded out.

Lời giải chi tiết



Original equilibrium (no deficit): $S \cap D_0: Q = 10 - Q \Rightarrow Q = 5, r = 5$ (all 5 units are private investment). With the deficit, $D_1: r = 13 - Q$; new equilibrium $S \cap D_1: Q = 13 - Q \Rightarrow Q = 6.5, r = 6.5$. Private investment specifically is read off D_0 at the new rate: $Q' = 10 - 6.5 = 3.5$. Crowding out = $5 - 3.5 = 1.5$ units, even though total borrowing rose from 5 to 6.5.

Bài tập luyện tập – Câu 28

Which type of policy typically has a **longer** implementation (administrative) lag?

- (A) Monetary policy, because the central bank must pass new legislation passed
 (B) Fiscal policy, because it generally requires new legislation to be debated and in practice
 (C) Both have identical implementation lags in practice
 (D) Neither policy has an implementation lag

Lời giải chi tiết

Fiscal policy requires new legislation; monetary policy can be adjusted by a vote of the central bank's policy committee, much faster. (B).

Bài tập luyện tập – Câu 29

Monetary policy's **impact** lag is often considered relatively long because:

- (A) The central bank must wait for Congress to approve interest-rate changes consumption decisions before AD is affected
 (B) A change in the money supply must first work through the money market to change interest rates, which then must change interest-sensitive investment/-
 (C) Monetary policy has no impact lag; it is instantaneous
 (D) Fiscal policy has a shorter recognition lag than monetary policy

Lời giải chi tiết

The chain money market → interest rate → investment/consumption → AD takes real time to unfold. (B).

Bài tập luyện tập – Câu 30

A recession begins in January but is not recognized until June (recognition lag). Stimulus legislation passes in December (implementation lag). Because funded projects take time to start, new spending does not begin until the following October (impact lag) – by which point the economy has already self-corrected back to potential GDP on its own. Explain what happens to the economy when the stimulus finally arrives in October.

Lời giải chi tiết

Since real GDP is already back at potential when the stimulus hits, the new spending shifts AD to the *right of* potential rather than back toward it – pushing the economy into an **inflationary gap** (unemployment below the natural rate, rising prices) instead of correcting the recessionary gap it was designed to address. The policy arrives pro-cyclically, illustrating Friedman’s “long and variable lags” critique.

Bài tập luyện tập – Câu 31

Milton Friedman’s critique of active discretionary stabilization policy centers on the idea that:

- | | |
|--|---|
| (A) Fiscal policy is always more effective than monetary policy | time discretionary policy correctly, so a fixed rule (e.g., steady k -percent money growth) is preferable |
| (B) Policy lags are short and predictable, so discretionary policy is reliably stabilizing | (D) The central bank should adjust the money supply daily in response to short-run output gaps |
| (C) Long and variable lags make it difficult to | |

Lời giải chi tiết

Friedman argued unpredictable lags undermine discretionary timing, favoring a steady, rules-based money growth rate instead. (C).

Bài tập luyện tập – Câu 32

Two economies experience identical negative demand shocks. Economy X relies entirely on wage/price self-correction; Economy Y uses well-timed expansionary fiscal and monetary policy to restore AD. In the long run, compared to Economy X , Economy Y will have:

- | | |
|---|---|
| (A) A higher real GDP and a higher price level | (C) The same real GDP but a lower price level |
| (B) The same real GDP (both return to potential) but a higher price level | (D) A permanently lower real GDP |

Lời giải chi tiết

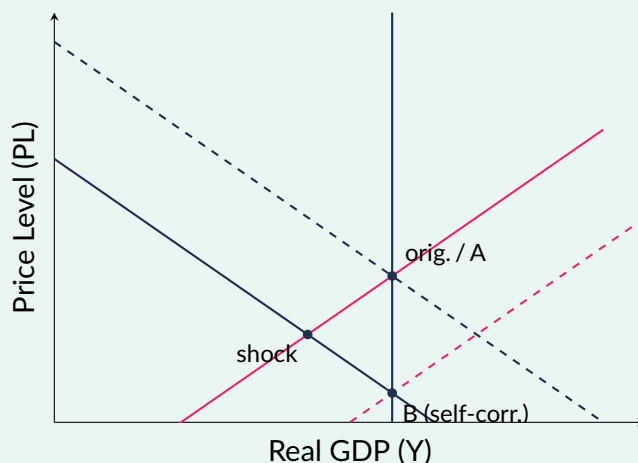
Both economies return to potential output/the natural rate; active AD-restoring policy ends at a higher price level than self-correction. (B).

Bài tập luyện tập – Câu 33 – GRAPH FRQ

An economy is in long-run equilibrium at $Y_p = 8$, $PL = 5$, where AD_0 ($PL = 13 - Y$) intersects $SRAS_0$ ($PL = Y - 3$) on the vertical $LRAS$. A negative demand shock shifts AD to AD_1 ($PL = 9 - Y$). Draw the AD-AS graph showing (i) the short-run equilibrium after the shock,

(ii) the outcome if AD is fully restored to AD_0 , and (iii) the outcome instead if $SRAS$ shifts to $SRAS_1$ ($PL = Y - 7$) via self-correction. Label all curves and equilibrium points.

Lời giải chi tiết



Shock: $AD_1 \cap SRAS_0$: $9 - Y = Y - 3 \Rightarrow Y = 6, PL = 3$ (recessionary). Path A (restore AD_0): back to $AD_0 \cap SRAS_0 = (8, 5)$, the original point. Path B (self-correct, $SRAS_1$): $AD_1 \cap SRAS_1$: $9 - Y = Y - 7 \Rightarrow Y = 8, PL = 1$. Both paths return Y to 8; Path A ends at the higher price level (5 vs. 1).

Bài tập luyện tập – Câu 34 – multi-part

Consider an economy hit by a negative demand shock, producing a recessionary gap.

- Using the AD-AS model, explain the long-run outcome if policymakers take no action.
- Using the AD-AS model, explain the long-run outcome if policymakers use expansionary fiscal/monetary policy to restore AD.
- Compare the price-level outcomes of (a) and (b).
- Given what you learned about policy lags (Section 5.9), state one risk of choosing the approach in (b).

Lời giải chi tiết

- With no policy action, persistent slack (unemployment above the natural rate) gradually pushes nominal wages down, shifting $SRAS$ right; output returns to potential Y_p at a lower price level than the initial post-shock level.
- Expansionary policy shifts AD back to the right (toward its original level); output returns to potential Y_p as $SRAS$ remains unchanged, at a price level that rises back up from the post-shock level.
- Both paths restore the same real GDP (Y_p) and the same unemployment rate (u_n), but the active-policy path (b) ends at a **higher** price level than the self-correction path (a).
- Because recognition, implementation, and impact lags are long and variable, the expansionary policy in (b) might not take full effect until *after* the economy has already self-corrected on its own – in which case the added stimulus would push the economy past potential output into an **inflationary gap** instead of correcting the original recessionary one.

Bài tập luyện tập – Câu 35

A Keynesian economist is most likely to argue that, despite the existence of policy lags, active stabilization policy is still justified because:

- (A) Wages and prices are perfectly flexible, so self-correction is instant
- (B) Nominal wages are sticky, especially downward, so self-correction from a recessionary gap can be slow and costly, and well-timed policy can shorten a costly gap despite lag risk
- (C) The money supply should grow at a constant rate regardless of the business cycle
- (D) Rules-based policy always dominates discretionary policy

Lời giải chi tiết

Keynesians emphasize sticky (especially downward-sticky) wages and slow self-correction, favoring active intervention despite lag risk – in contrast to the Monetarist/Classical preference for rules (choice C/D). **(B)**.

Bài tập luyện tập – Câu 36

The long-run real interest rate is anchored at 4% by loanable-funds fundamentals. Sustained money-supply growth rises, lifting long-run expected inflation from 3% to 7%. Using the Fisher equation, find the nominal interest rate before and after this change.

Lời giải chi tiết

Before: nominal $\approx 4\% + 3\% = 7\%$. After: nominal $\approx 4\% + 7\% = 11\%$. The nominal rate rises by 4 points, matching the 4-point rise in expected inflation one-for-one (the Fisher effect), while the real rate stays at 4% throughout.

Bài tập luyện tập – Câu 37

According to the Ricardian equivalence hypothesis, a government deficit financed by borrowing is likely to raise the equilibrium real interest rate by **less** than the basic loanable-funds model predicts because:

- (A) Government spending always crowds out private investment completely
- (B) Forward-looking households, anticipating future taxes needed to service the new debt, increase private saving today, shifting the supply of loanable funds right
- (C) The money supply automatically falls whenever the government borrows
- (D) Real interest rates are fixed by law and cannot change

Lời giải chi tiết

Ricardian equivalence: anticipated future taxes prompt more saving today, shifting loanable-funds supply right and partially offsetting the government's increased demand, muting the rise in r . **(B)**.

Bài tập luyện tập – Câu 38

A country's national debt is \$30 trillion. Persistently large deficits push the average interest rate the government pays on this debt from 2.5% up to 5%. Find the resulting increase in the government's annual debt-service (interest) payment.

Lời giải chi tiết

At 2.5%: interest = $30 \times 0.025 = \$0.75$ trillion. At 5%: interest = $30 \times 0.05 = \$1.5$ trillion. Increase = $1.5 - 0.75 = \$0.75$ trillion (**\$750 billion**) in additional annual interest payments, on an unchanged debt level.

Bài tập luyện tập – Câu 39

A central bank disinflates the economy from 9% inflation to 5%. Doing so requires unemployment to run 1.5 percentage points above the natural rate for 4 years. Find the sacrifice ratio, and state whether a *more credible* central bank would tend to raise or lower this ratio.

Lời giải chi tiết

Cumulative excess unemployment = $1.5 \times 4 = 6$ percentage-point-years. Inflation reduction = $9\% - 5\% = 4$ points. Sacrifice ratio = $6 \div 4 = \mathbf{1.5}$. A more credible central bank would tend to **lower** the sacrifice ratio: if the public believes the disinflation commitment, expected inflation falls faster, shifting the SRPC down/left sooner and shortening the period unemployment must stay above u_n .

Bài tập luyện tập – Câu 40

An economy's real GDP grows 5% this year. Growth accounting attributes 2% of this to a growing capital stock and 1.5% to growth in the (skill-adjusted) labor force. Find the implied contribution of total factor productivity (TFP), and state what TFP represents.

Lời giải chi tiết

$5\% = 2\% + 1.5\% + \text{TFP} \Rightarrow \text{TFP} = 5\% - 2\% - 1.5\% = \mathbf{1.5\%}$. TFP represents the growth left over once the measured contributions of capital and labor are removed – generally attributed to technological progress, institutional quality, and more efficient use of existing resources.

Bài tập luyện tập – Câu 41

During a recession, a government's actual budget deficit is \$500 billion, of which \$320 billion is attributable to automatic stabilizers responding to the downturn. Find the structural (cyclically-adjusted) deficit, and explain why it is a better gauge of the sustainability of current fiscal policy choices than the actual deficit.

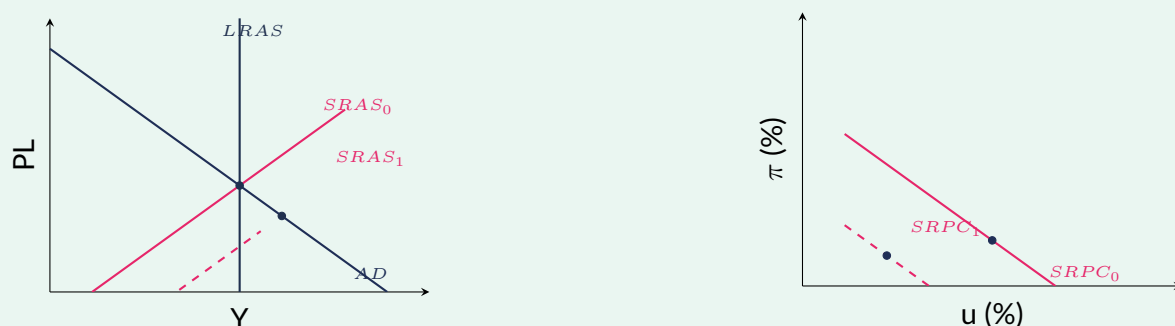
Lời giải chi tiết

Structural deficit = $500 - 320 = \mathbf{\$180 \text{ billion}}$. The cyclical component (\$320 billion) reflects automatic stabilizers responding to the recession and will shrink automatically as the economy recovers – it is not a discretionary policy choice. The \$180 billion structural deficit isolates the portion actually attributable to current tax and spending policy, making it the more relevant figure for judging whether fiscal policy is on a sustainable long-run path.

Bài tập luyện tập – Câu 42 – GRAPH FRQ

Draw a correctly labeled AD-AS graph **and** the corresponding SRPC diagram showing the short-run effect of a **favorable** (positive) supply shock, starting from long-run equilibrium. Label both diagrams fully.

Lời giải chi tiết

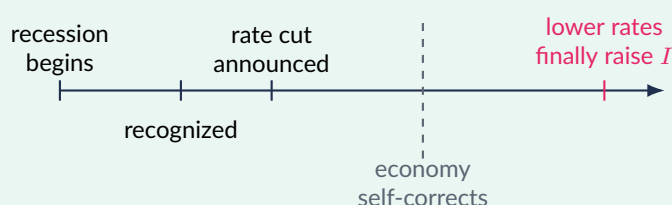


$SRAS_0 \rightarrow SRAS_1$ (right) lowers PL and raises Y above its original level, toward/above potential. Equivalently, $SRPC_0 \rightarrow SRPC_1$ (down/left): both unemployment and inflation fall together – the mirror image of stagflation.

Bài tập luyện tập – Câu 43 – GRAPH FRQ

Sketch a simple timeline diagram illustrating how the three policy lags (recognition, implementation, impact) could cause a monetary policy response to a recession to arrive *after* the economy has already self-corrected, and briefly explain the consequence.

Lời giải chi tiết



Even though monetary policy's *implementation* lag is short (the central bank can vote quickly), its *impact* lag is long (rate cut → money market → lower i → higher I → higher AD unfolds over quarters). If the economy self-corrects before this chain finishes, the eventual rise in AD overshoots potential output, creating an inflationary gap instead of correcting the original recessionary one.

Bài tập luyện tập – Câu 44

A central bank announces, well in advance, that it will raise money growth to hit a new inflation target, and the announcement is fully believed by workers and firms. Under **rational expectations**, the most likely short-run effect on unemployment is:

- (A) Unemployment falls well below the natural rate for several years below the natural rate, even temporarily, since the higher expected inflation is priced in before the policy takes effect
- (B) Unemployment rises permanently above the natural rate
- (C) Unemployment shows little or no decline (D) The natural rate of unemployment itself falls to zero

Lời giải chi tiết

Under rational expectations, a fully anticipated and credible policy change is built into expectations immediately, so the SRPC shifts up essentially in step with the policy – little or no temporary decline in u below u_n (the policy ineffectiveness proposition). (C).

Bài tập luyện tập – Câu 45 – multi-part

Using the Keynesian vs. Monetarist/Classical comparison table from Section 5.9, answer the following for an economy currently experiencing a mild recessionary gap.

- (a) State the policy response a Keynesian economist would most likely recommend, and the reasoning behind it.
- (b) State the policy response a Monetarist/Classical economist would most likely recommend, and the reasoning behind it.
- (c) Identify one specific risk that the Monetarist economist would point to as a downside of the Keynesian recommendation.

Lời giải chi tiết

- (a) A Keynesian economist would likely recommend active expansionary fiscal and/or monetary policy, reasoning that nominal wages are sticky (especially downward) so self-correction could be slow and needlessly costly – well-timed intervention can shorten the gap.
- (b) A Monetarist/Classical economist would likely recommend minimal discretionary action – relying on automatic stabilizers and a steady, rules-based monetary policy (e.g., a k -percent money growth rule) – reasoning that self-correction, while perhaps slower, avoids the risk of mistimed intervention.
- (c) The Monetarist would point to **long and variable policy lags**: by the time discretionary stimulus is recognized, enacted, and finally takes effect, the economy may have already self-corrected on its own, so the stimulus could arrive pro-cyclically and push the economy into an inflationary gap instead.

Open Economy --- International Trade and Finance

Mục tiêu Unit: Cán cân thanh toán: tài khoản vãng lai và tài khoản tài chính; thị trường ngoại hối, cung-cầu ngoại tệ và tỷ giá cân bằng; các yếu tố quyết định tỷ giá hối đoái; ngang giá sức mua (PPP); tác động của tỷ giá lên xuất khẩu ròng và tổng cầu; mối liên hệ giữa thị trường vốn vay, lãi suất và tỷ giá hối đoái (hiệu ứng lãi át qua thương mại); xuất khẩu ròng và dòng vốn ròng.

6.1 The Balance of Payments: Current Account and Financial Account

Every transaction between a country's residents (households, firms, and government) and the rest of the world is recorded in that country's **balance of payments (BOP)** – a systematic summary of all such international transactions over a period of time (typically a year or a quarter). The BOP is built from two main accounts that, taken together, must balance.

Khái niệm cốt lõi

The **current account (CA)** records flows of goods, services, income, and transfers that do *not*, by themselves, create a future repayment obligation:

- **Net exports** ($NX = \text{exports} - \text{imports of goods and services}$) – by far the largest component for most countries.
- **Net investment income** – interest and dividend income domestic residents earn on assets they hold abroad, minus income foreign residents earn on assets they hold domestically.
- **Net transfers** – one-way flows such as foreign aid, remittances, and gifts, received minus paid.

The **financial account (FA)** – sometimes called the *capital account* in introductory treatments – records net flows of *financial capital*: claims on future income or repayment.

$$FA = (\text{foreign purchases of domestic assets}) - (\text{domestic purchases of foreign assets}).$$

A foreign purchase of a domestic asset (a bond, a stock, a factory, a bank deposit) is a **capital inflow** (a credit, +); a domestic resident's purchase of a foreign asset is a **capital outflow** (a debit, –).

The fundamental BOP identity:

$$CA + FA \approx 0$$

(ignoring official reserve transactions and a small statistical discrepancy). Any **current account deficit** ($CA < 0$: the country buys more goods, services, income, and transfers from abroad than it sells) must be financed by an offsetting **financial account surplus** ($FA > 0$: a net capital inflow – the country borrows from, or sells assets to, the rest of the world). Symmetrically, a **current account surplus** ($CA > 0$) is matched by a **financial account deficit** ($FA < 0$: a net capital outflow – the country lends to, or buys assets from, the rest of the world).

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Cán cân thanh toán (BOP) gồm hai tài khoản chính. **Tài khoản vãng lai (CA)**: ghi nhận xuất khẩu ròng (NX – thành phần lớn nhất), thu nhập đầu tư ròng (lãi/cổ tức nhận từ nước ngoài trừ trả cho nước ngoài), và chuyển giao ròng (viện trợ, kiều hối). **Tài khoản tài chính (FA)**: ghi nhận dòng vốn ròng = nước ngoài mua tài sản trong nước (dòng vốn VÀO) trừ trong nước mua tài sản nước ngoài (dòng vốn RA). Đồng thức nền tảng: $CA + FA \approx 0$ – thâm hụt CA phải được tài trợ bởi thặng dư FA (vay ròng từ nước ngoài); thặng dư CA đi kèm thâm hụt FA (cho vay ròng ra nước ngoài).

Ví dụ mẫu · Worked example – Classifying Five International Transactions

From Vietnam's point of view, classify each transaction as belonging to the **current account (CA)** or **financial account (FA)**, and as a **credit (+)** or **debit (–)**.

Transaction	Account		Credit/Debit
(a) A Vietnamese firm exports coffee to the US.	Current account	ac-	Credit (+)
(b) A US investor buys Vietnamese government bonds.	Financial account	ac-	Credit (+)
(c) A Vietnamese company pays dividends to a foreign shareholder.	Current account	ac-	Debit (–)
(d) A Vietnamese tourist spends money in Thailand.	Current account	ac-	Debit (–)
(e) A US firm builds a factory in Vietnam.	Financial account	ac-	Credit (+)

(a) An export earns foreign currency for Vietnam – a current-account credit, and the largest recurring source of CA credits for most economies. (b) The foreign purchase of a Vietnamese *asset* (a bond, a claim on future repayment) is a capital *inflow* – a financial-account credit, *not* a current-account item, even though money physically enters the country. (c) Dividends are investment *income* paid to a foreigner – part of net investment income, a current-account outflow, hence a debit. (d) Tourism spending abroad is, from Vietnam's perspective, an **import of a service** (travel services): money leaves the country to pay a foreign hotel, restaurant, or tour operator, so it is a current-account debit. (e) Foreign direct investment (building a factory) is the foreign acquisition of a *new domestic asset* – a financial-account credit (capital inflow), just like (b).

(!) Lỗi thường gặp: Two frequent errors: (1) Foreign direct investment and portfolio investment (bonds, stocks) always belong to the **financial account**, never the current account, even though

large sums of money physically cross borders. (2) Tourist spending abroad is a current-account **debit** for the tourist's home country – it is functionally identical to importing a service, because the traveler purchases hotel, food, and transportation services produced by a foreign resident.

6.2 The Foreign Exchange (FX) Market: Demand and Supply of a Currency

Because a current account deficit must be financed by a financial account surplus (Section 6.1), international trade and investment ultimately require converting one currency into another. The **foreign exchange (FX) market** is the market in which currencies are bought and sold; the price that emerges is the **exchange rate** – the price of one currency stated in terms of another.

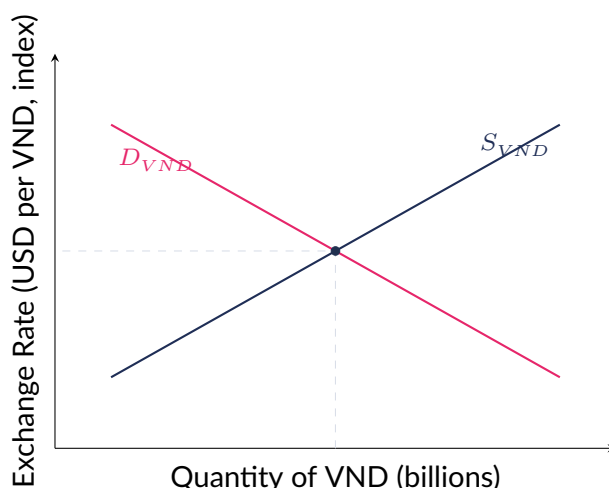
Khái niệm cốt lõi

Consider the market for the Vietnamese dong (VND), priced in US dollars (USD).

- **Demand for VND** comes from anyone who needs dong to acquire something Vietnamese: foreign buyers of Vietnamese exports, foreign investors buying Vietnamese assets (bonds, stocks, real estate, factories), foreign tourists visiting Vietnam, and any other foreign-currency holder converting into dong. Demand for VND slopes **downward**: at a higher price of the dong (more USD per VND), Vietnamese goods and assets become more expensive for foreigners, so a smaller quantity of dong is demanded.
- **Supply of VND** comes from anyone who holds dong and wants to convert it into foreign currency: Vietnamese importers paying foreign suppliers, Vietnamese investors buying foreign assets, Vietnamese tourists traveling abroad. Domestic residents *supply* their own currency to the FX market precisely because they want to acquire *foreign* currency in exchange for it. Supply of VND slopes **upward**: at a higher price of the dong, each dong buys more foreign currency/goods, so Vietnamese residents are willing to supply (convert) a larger quantity of dong.

The **equilibrium exchange rate** occurs where $Q_d = Q_s$ – the quantity of dong foreigners want to buy exactly equals the quantity domestic residents want to sell.

Appreciation: a *rise* in a currency's value/price relative to another currency – it takes *fewer* units of the currency to buy one unit of the foreign currency, or equivalently, one unit buys *more* foreign currency. **Depreciation**: a *fall* in a currency's value/price – it takes *more* units to buy one unit of the foreign currency. On a standard D – S graph with the exchange rate (the price of the currency) on the vertical axis, appreciation is a *rise* in the equilibrium point; depreciation is a *fall*.



Equilibrium in the market for the Vietnamese dong: D_{VND} slopes down, S_{VND} slopes up, and the exchange rate settles where $Q_d = Q_s$.

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Cầu VND đến từ người nước ngoài muốn mua hàng hoá/dịch vụ/tài sản Việt Nam – cầu dốc XUỐNG. Cung VND đến từ người Việt Nam muốn đổi sang ngoại tệ để mua hàng hoá/dịch vụ/tài sản nước ngoài – cung dốc LÊN (chính người trong nước “cung” đồng tiền của mình ra thị trường ngoại hối để lấy ngoại tệ). Tỷ giá cân bằng tại $Q_d = Q_s$. **Lên giá (appreciation)**: giá trị đồng tiền TĂNG (đổi được nhiều ngoại tệ hơn); **xuống giá (depreciation)**: giá trị đồng tiền GIẢM.

Ví dụ mẫu · Worked example – Solving for the Equilibrium Exchange Rate

In arbitrary index units, $Q_d^{VND} = 400 - 20E$ and $Q_s^{VND} = 100 + 10E$, where E is the exchange rate (USD per VND, index) and Q is in billions of dong. Find the equilibrium exchange rate and quantity.

Set $Q_d = Q_s$: $400 - 20E = 100 + 10E \Rightarrow 300 = 30E \Rightarrow E^* = 10$. Then $Q^* = 400 - 20(10) = 200$ (check: $Q_s = 100 + 10(10) = 200 \checkmark$).

(!) Lỗi thường gặp: “Supply of dong” does *not* mean the central bank printing more dong – in this chapter it refers strictly to the *flow of dong offered for sale on the FX market* by residents who want to acquire foreign currency (to import, invest abroad, or travel). Do not confuse it with the domestic money supply from the money market (Unit 4), which is a separate concept entirely.

6.3 Determinants of Exchange Rates

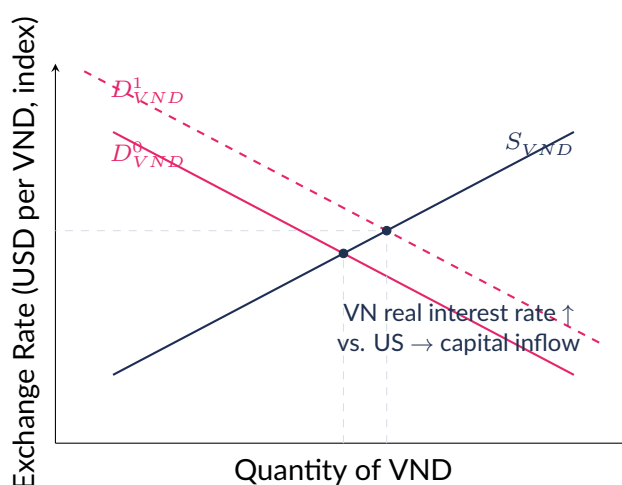
The demand and supply curves for a currency shift whenever a non-price factor changes. Because the FX market for the dong is fundamentally a two-country relationship, every determinant must be stated *relative to the partner country* (here, the United States).

Khái niệm cốt lõi

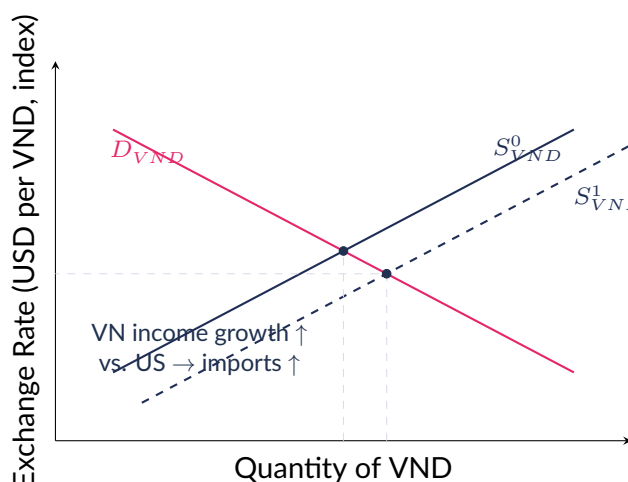
- **Relative real interest rates.** If Vietnam’s real interest rate rises relative to the US real interest rate, Vietnamese bonds and deposits offer a higher return, attracting foreign financial capital seeking that higher return. Foreigners must acquire dong to buy those Vietnamese assets, so **demand for VND increases** (shifts right) $\Rightarrow$ the **dong appreciates**.

- **Relative income/growth.** If Vietnamese income grows faster than US income, Vietnamese residents' rising incomes lead them to buy more of everything, including *imports*. To pay for those imports they must convert dong into foreign currency, so **supply of VND increases** (shifts right) ⇒ the **dong depreciates**. (Faster growth does *not* automatically strengthen a currency – through this import channel, it tends to weaken it.)
- **Relative price levels / inflation (the PPP intuition).** If Vietnam's inflation rate exceeds the US inflation rate, Vietnamese goods become relatively more expensive than American goods over time. Foreigners buy fewer Vietnamese exports (demand for VND falls) while Vietnamese residents buy more of the now relatively cheaper imports (supply of VND rises). Both effects push the same way: the **dong depreciates**.
- **Expectations/speculation.** If currency traders *expect* the dong to appreciate in the future, they buy dong now to profit from the anticipated rise, raising **current demand for VND** ⇒ the **dong tends to appreciate now** – a self-fulfilling expectation effect.
- **Changes in preferences for goods.** If foreign consumers develop a stronger taste for Vietnamese goods (e.g., Vietnamese furniture or seafood becomes more fashionable abroad), foreign demand for Vietnamese exports rises, raising **demand for VND** ⇒ the **dong appreciates**.

Determinant	Change (Vietnam relative to US)	Curve shift	Dong
Real interest rate	VN real r rises relative to US	D_{VND} right	Appreciates
Income / growth	VN income grows faster than US	S_{VND} right	Depreciates
Inflation / price level	VN inflation exceeds US inflation	D_{VND} left, S_{VND} right	Depreciates
Expectations	Traders expect future dong appreciation	D_{VND} right (now)	Appreciates
Preferences	Foreigners prefer VN goods more	D_{VND} right	Appreciates



A rise in Vietnam's real interest rate relative to the US shifts D_{VND} right ($D^0 \rightarrow D^1$): the dong appreciates ($E_0 \rightarrow E_1$) and quantity traded rises.



Faster Vietnamese income growth (relative to the US) raises import spending, shifting S_{VND} right ($S^0 \rightarrow S^1$): the dong depreciates ($E_0 \rightarrow E_1$) as quantity traded rises.

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Lãi suất thực VN tăng so với Mỹ → vốn nước ngoài đổ vào → CẦU VND tăng → VND LÊN GIÁ. Thu nhập/tăng trưởng VN nhanh hơn Mỹ → người VN nhập khẩu nhiều hơn → CUNG VND tăng → VND XUỐNG GIÁ (lưu ý: tăng trưởng nhanh KHÔNG tự động làm đồng tiền mạnh lên!). Lạm phát VN cao hơn Mỹ → hàng VN đắt hơn tương đối → cầu VND giảm và/hoặc cung VND tăng → VND XUỐNG GIÁ. Kỳ vọng VND lên giá trong tương lai → cầu VND tăng NGAY BÂY GIỜ → VND lên giá ngay. Người nước ngoài ưa chuộng hàng VN hơn → cầu VND tăng → VND LÊN GIÁ.

(!) **Lỗi thường gặp:** The single most common error on this topic: assuming that *faster domestic economic growth* automatically makes a currency stronger. It does not, through the directly testable channel – faster income growth raises *import* demand, which **increases the supply** of the domestic currency on the FX market and causes **depreciation**, all else equal. (A separate, indirect channel – faster growth may also raise domestic interest rates or attract investment – can offset this, but the direct import/supply mechanism is what the AP exam tests.)

6.4 Purchasing Power Parity (PPP)

Khái niệm cốt lõi

Purchasing power parity (PPP) is the idea that, in the long run, exchange rates should adjust so that an identical basket of goods costs the *same* amount in different countries once converted into a common currency. If a basket is cheaper in one country than another after conversion, **arbitrage** – buying where it is cheap, and the resulting shift in demand toward the cheap country's goods and currency – creates pressure that pushes the exchange rate toward the PPP-implied rate over time.

$$E_{PPP} = \frac{\text{price of the basket in the domestic currency}}{\text{price of the same basket in the foreign currency}}$$

Ví dụ mẫu · Worked example — A Hypothetical PPP Calculation

The following numbers are a simplified, hypothetical illustration only – they are not a claim about real current prices or exchange rates. Suppose an identical reference basket of goods costs 200,000 VND in Vietnam and \$9 in the United States. The actual (hypothetical) market exchange rate is 24,500 VND per USD. Is the dong over- or undervalued relative to PPP?

Step 1 – PPP-implied rate: $E_{PPP} = \frac{200,000 \text{ VND}}{\$9} \approx 22,222.2 \text{ VND per USD}$.

Step 2 – compare to the actual rate: the actual rate (24,500 VND/USD) requires *more* dong to buy one dollar than the PPP rate (22,222.2 VND/USD) does.

Step 3 – interpret: converting the Vietnamese basket's price at the *actual* rate gives $200,000/24,500 \approx \$8.16$ – *less* than the \$9 US price. The Vietnamese basket looks “too cheap” in dollar terms, so the **dong is undervalued** relative to PPP (equivalently, the dollar is overvalued against the dong). PPP logic predicts long-run pressure for the dong to **appreciate** (the rate should fall from 24,500 toward roughly 22,222 VND/USD) as arbitrage-driven demand for cheap Vietnamese goods (and dong) rises.

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PPP: về dài hạn, tỷ giá điều chỉnh để một giỏ hàng hoá giống nhau có giá quy đổi BẰNG NHAU ở các nước. Tính tỷ giá PPP = giá giỏ hàng bằng nội tệ chia giá giỏ hàng bằng ngoại tệ. Nếu tỷ giá THỊ TRƯỜNG THỰC TẾ cần NHIỀU nội tệ hơn để đổi 1 ngoại tệ so với tỷ giá PPP → nội tệ đang BỊ ĐỊNH GIÁ THẤP (undervalued) → áp lực LÊN GIÁ trong dài hạn. Ngược lại, nếu cần ÍT nội tệ hơn so với PPP → nội tệ ĐỊNH GIÁ CAO (overvalued) → áp lực XUỐNG GIÁ.

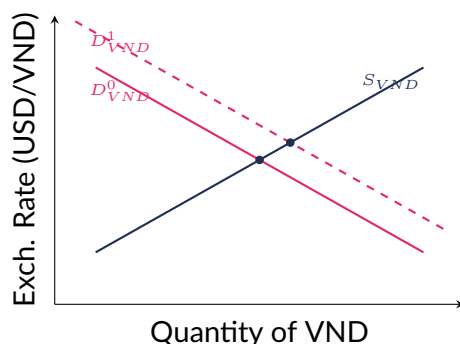
(!) Lỗi thường gặp: PPP describes a *long-run tendency*, not a short-run forecasting tool. Real-world exchange rates can deviate from PPP for years because of trade costs and barriers (tariffs, shipping), non-traded goods and services (haircuts, rent, local labor – which cannot be arbitrated across borders), capital flows driven by interest-rate differentials (Section 6.3), and speculation. Never treat a single PPP calculation as predicting *when* a currency will move – only *which direction* long-run pressure points.

6.5 Exchange Rates, Net Exports, and Aggregate Demand

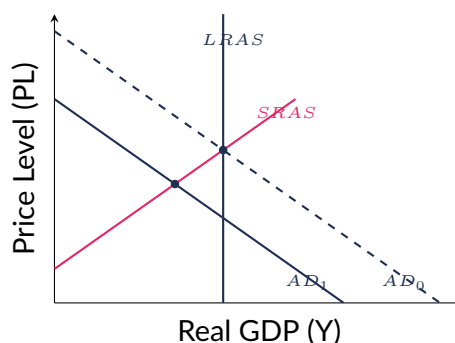
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A change in the exchange rate changes the relative price of domestic and foreign goods, which changes net exports and – because NX is a component of $AD = C + I + G + NX$ – shifts the entire aggregate demand curve.

- **Appreciation:** domestic goods become *more expensive* to foreign buyers (exports fall) and foreign goods become *cheaper* to domestic buyers (imports rise) ⇒ **net exports fall** ⇒ **AD shifts left** (a contractionary channel).
- **Depreciation:** domestic goods become *cheaper* to foreign buyers (exports rise) and foreign goods become *more expensive* to domestic buyers (imports fall) ⇒ **net exports rise** ⇒ **AD shifts right** (an expansionary channel).



Panel 1. Capital inflow shifts D_{VND} right: the dong appreciates.



Panel 2. The appreciation lowers NX : $AD_0 \rightarrow AD_1$, pushing the economy from potential ($Y=7$) into a recessionary gap ($Y=5$).

Ví dụ mẫu · Worked example – Quantifying the AD Effect of an Appreciation

The dong appreciates by 10%. Analysts estimate that net exports fall by \$5 billion for every 1% appreciation. If $MPC = 0.75$, find the resulting change in equilibrium real GDP (holding the price level fixed, as in the simple multiplier model of Unit 3).

Fall in net exports: $10 \times \$5b = \50 billion. Spending multiplier: $\frac{1}{1 - 0.75} = 4$. $\Delta \text{Real GDP} = -\$50b \times 4 = -\$200$ billion.

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Lên giá nội tệ → xuất khẩu đắt hơn với người nước ngoài, nhập khẩu rẻ hơn với người trong nước → NX GIẢM → AD dịch TRÁI (thu hẹp). Xuống giá nội tệ → NX TĂNG → AD dịch PHẢI (mở rộng). Áp dụng số nhân chi tiêu ($1/(1 - MPC)$) như Unit 3 để định lượng tác động lên GDP thực.

(!) Lỗi thường gặp: Do not confuse this with the *exchange-rate effect* already built into the *slope* of a single AD curve (Unit 3), where a *change in the domestic price level* makes domestic goods relatively cheaper/pricier and causes a *movement along* a fixed AD curve. Here, the exchange rate changes for reasons *unrelated* to the domestic price level (interest-rate differentials, growth, expectations, preferences – Section 6.3), so the entire AD curve **shifts**.

6.6 The Loanable Funds Market, Interest Rates, and Exchange Rates: “Crowding Out via Trade”

Sections 6.3–6.5 showed that a higher domestic real interest rate appreciates the currency, and that appreciation lowers net exports and AD. Chaining these results together with the loanable funds market (Unit 4) reveals a second channel through which government borrowing can crowd out part of its own stimulus.

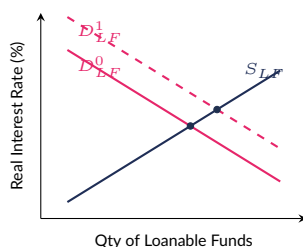
Khái niệm cốt lõi

The causal chain (“crowding out via trade”):

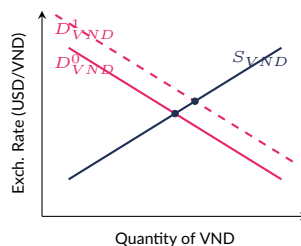
1. Expansionary fiscal policy financed by government borrowing increases the government’s demand for loanable funds $\Rightarrow$ the demand curve in the **loanable funds market shifts right** (Unit 4).
2. Higher demand for loanable funds, with supply (national saving) unchanged, raises the equilibrium **real interest rate**.

- The higher real interest rate offers foreign savers a more attractive return than before $\Rightarrow$ foreign financial capital flows in, raising **demand for the domestic currency** in the FX market (Section 6.3) $\Rightarrow$ the **currency appreciates**.
- The stronger currency makes exports more expensive and imports cheaper $\Rightarrow$ **net exports fall** (Section 6.5) $\Rightarrow$ **AD shifts left** via the *NX* channel.

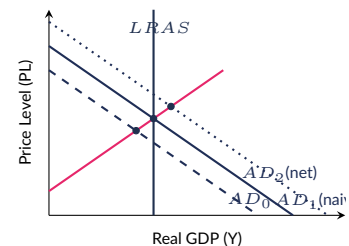
This left shift, driven entirely by the international/trade channel, works in the *opposite* direction of – and therefore **partially offsets** – the direct rightward shift of AD caused by the fiscal expansion itself. The *net* effect on AD is smaller than the naive closed-economy multiplier prediction (its exact size is an empirical question), but its *direction* is unambiguous: some of the intended stimulus leaks out through reduced net exports. This pattern is closely related to **twin deficits**: a larger government budget deficit tends to be associated with a larger trade (current account) deficit.



A. Loanable funds. Govt. borrowing shifts D_{LF} right: r rises.



B. FX market. Higher r pulls in capital: D_{VND} shifts right, dong appreciates.



C. AD-AS. AD_1 is the naive direct effect of $\uparrow G$; the trade-channel offset pulls it back to AD_2 .

Crowding out via trade / twin deficits: government deficit $\uparrow \Rightarrow$ loanable funds demand $\uparrow \Rightarrow$ real interest rate $\uparrow \Rightarrow$ capital inflow $\Rightarrow$ currency appreciates $\Rightarrow$ net exports $\downarrow \Rightarrow$ AD shifts left, partially offsetting the direct fiscal stimulus. This is a *second* crowding-out channel, distinct from – and additional to – the standard *domestic* crowding out of private investment via the higher real interest rate (Unit 4).

Ví dụ mẫu · Worked example – Tracing the Full Chain Numerically

The government increases spending by \$30 billion, financed entirely by new borrowing. $MPC = 0.75$. Government borrowing raises the real interest rate from 3% to 5%, while the US real interest rate stays at 2%. This attracts foreign capital, and the dong appreciates from 24,000 to 22,000 VND per USD. Analysts estimate the resulting appreciation reduces net exports by \$15 billion. Find (a) the naive closed-economy prediction for Δ Real GDP, (b) the trade-channel offset, and (c) the net effect.

$$\text{Multiplier} = \frac{1}{1 - 0.75} = 4.$$

(a) Naive direct effect: $\Delta \text{Real GDP} = \$30\text{b} \times 4 = +\$120 \text{ billion}$.

(b) Trade-channel offset: $\Delta \text{Real GDP} = -\$15\text{b} \times 4 = -\$60 \text{ billion}$.

(c) Net effect: $+\$120\text{b} - \$60\text{b} = +\$60 \text{ billion}$ – only *half* as large as the closed-economy multiplier alone would predict. The government's larger deficit is also associated with a weaker trade balance (a smaller *NX*) – the twin deficits pattern.

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Chuỗi nhân quả “lấn át qua thương mại”: thâm hụt ngân sách tăng $\rightarrow$ cầu vốn vay tăng (Unit

4) → lãi suất thực tăng → vốn nước ngoài đổ vào → cầu nội tệ tăng trên thị trường ngoại hối → nội tệ LÊN GIÁ → xuất khẩu ròng GIẢM → AD dịch TRÁI một phần, làm giảm bớt (nhưng không nhất thiết xoá bỏ hoàn toàn) tác động kích thích ban đầu của chính sách tài khoá. Đây liên quan đến hiện tượng “thâm hụt song sinh” (twin deficits): thâm hụt ngân sách lớn hơn thường đi kèm thâm hụt thương mại lớn hơn.

(!) **Lỗi thường gặp:** This trade-channel crowding out is **in addition to**, not instead of, the ordinary domestic crowding out of private investment spending covered in Unit 4 (a higher r directly discourages interest-sensitive private investment, *regardless* of any exchange-rate effect). A complete answer about the effects of a larger budget deficit should mention *both* channels.

6.7 Net Exports and Net Capital Flows: The Identity

Khái niệm cốt lõi

Because $CA + FA \approx 0$ (Section 6.1), and net exports are the dominant component of the current account, a useful simplified identity is:

$$NX \approx -(\text{Net Capital Outflow}).$$

A current account (net export) **surplus** ($NX > 0$) is matched by a **net outflow** of capital: the country is, on net, *lending* to the rest of the world and accumulating foreign assets. A current account (net export) **deficit** ($NX < 0$) is matched by a **net inflow** of capital: the country is, on net, *borrowing* from the rest of the world.

This connects directly to the national accounting identity linking saving, investment, and net exports. Starting from the expenditure approach to GDP, $Y = C + I + G + NX$, and defining national saving as $S \equiv Y - C - G$ (income not consumed by households or absorbed by government):

$$Y - C - G = I + NX \implies S - I = NX.$$

A country whose national saving exceeds its domestic investment ($S > I$) must be lending the difference abroad, which shows up as a net export **surplus** (capital outflow). A country whose domestic investment exceeds its national saving ($S < I$) must borrow the difference from abroad, which shows up as a net export **deficit** (capital inflow).

$$S - I = NX$$

Saving minus domestic investment equals net exports – equivalently, net exports equal net foreign lending.

Ví dụ mẫu · Worked example – Applying $S - I = NX$: the Deficit Case

National saving is \$4.2 trillion and domestic investment is \$4.6 trillion. Find net exports and describe the associated capital flow.

$NX = S - I = \$4.2\text{T} - \$4.6\text{T} = -\$0.4\text{ trillion}$ – a **trade deficit** of \$0.4 trillion, financed by a **net capital inflow** of \$0.4 trillion (net borrowing from the rest of the world).

Ví dụ mẫu · Worked example — Applying $S - I = NX$: the Surplus Case

National saving is \$5.3 trillion and domestic investment is \$5.0 trillion. Find net exports and describe the associated capital flow.

$NX = S - I = \$5.3T - \$5.0T = +\$0.3$ trillion – a **trade surplus**, matched by a **net capital outflow** of \$0.3 trillion: the country is a net lender, accumulating \$0.3 trillion of foreign assets.

GIẢI THÍCH TIẾNG VIỆT

VN

$NX \approx -$ (dòng vốn ra ròng). Thặng dư xuất khẩu ròng (CA thặng dư) $\Leftrightarrow$ dòng vốn RA ròng (quốc gia cho vay ra nước ngoài, tích lũy tài sản ngoài); thâm hụt xuất khẩu ròng $\Leftrightarrow$ dòng vốn VÀO ròng (quốc gia vay nợ nước ngoài). Đồng thức: Tiết kiệm quốc gia – Đầu tư trong nước = Xuất khẩu ròng ($S - I = NX$). Nếu $S > I$: dư tiết kiệm được cho vay ra nước ngoài $\rightarrow NX$ dương. Nếu $S < I$: thiếu hụt tiết kiệm phải vay từ nước ngoài $\rightarrow NX$ âm.

(!) Lỗi thường gặp: Sign direction is frequently reversed by students: a **trade DEFICIT** ($NX < 0$) means the country is a net **BORROWER** (capital **inflow**), not a lender. A trade **surplus** means the country is a net **lender** (capital **outflow**). Anchor this with intuition: a country buying more from the world than it sells ($NX < 0$) must pay for the difference somehow – by borrowing (selling assets/IOUs to, or taking loans from, foreigners), which is exactly a capital inflow.

6.8 Putting It Together: A Full Open-Economy Policy Scenario

Ví dụ mẫu · Worked example — Full Open-Economy Policy Scenario

Vietnam's government runs a larger budget deficit, increasing spending by \$50 billion, financed entirely by new borrowing. $MPC = 0.8$.

Step 1 – the direct fiscal effect (Unit 3). Spending multiplier $= \frac{1}{1 - 0.8} = 5$. Naively, ignoring any interest-rate or exchange-rate feedback: $\Delta \text{Real GDP} = \$50b \times 5 = +\$250$ billion.

Step 2 – the loanable funds market (Unit 4). The extra government borrowing shifts the demand for loanable funds right; the real interest rate rises from 4% to 7%. This higher r directly discourages private investment, crowding out \$20 billion of private domestic investment. Domestic crowding-out effect: $\Delta \text{Real GDP} = -\$20b \times 5 = -\$100$ billion.

Step 3 – the foreign exchange market (Sections 6.3, 6.6). Because Vietnam's real interest rate (7%) now exceeds the US/world real interest rate (assumed steady at 3%), foreign capital flows in seeking the higher return, raising demand for the dong. The dong appreciates from 25,000 to 23,000 VND per USD.

Step 4 – net exports and AD (Section 6.5). The stronger dong makes exports pricier and imports cheaper; analysts estimate net exports fall by \$25 billion. Trade-channel effect: $\Delta \text{Real GDP} = -\$25b \times 5 = -\$125$ billion.

Step 5 – the net effect. $+\$250b - \$100b - \$125b = +\25 billion – dramatically smaller than the naive \$250 billion prediction, because two distinct crowding-out channels are at work simultaneously: the domestic channel (higher r discourages private investment) and the trade channel (higher r appreciates the currency and lowers net exports).

Step 6 – twin deficits and the accounting identity (Section 6.7). The government budget deficit widened by \$50 billion, and the trade (current account) deficit widened alongside it, as NX fell by \$25 billion – the classic **twin deficits** pattern. This is exactly what the identity $S - I = NX$

predicts: a larger deficit lowers national saving S ; since domestic investment I falls only partially (crowded out by \$20 billion, not by the full saving shortfall), the remaining gap must show up as a smaller NX – precisely the decline the FX-market mechanism produced.

Conclusion: a fiscal deficit, a higher real interest rate, a stronger currency, and a larger trade deficit are not four separate stories – they are a single, internally consistent macroeconomic chain that runs through the loanable funds market (Unit 4), the aggregate demand model (Unit 3), and the open-economy FX market (Unit 6).

GIẢI THÍCH TIẾNG VIỆT

VN

Tổng hợp: thâm hụt ngân sách tăng \$50 tỷ, $MPC = 0.8$ (số nhân = 5) → hiệu ứng trực tiếp gây thối +\$250 tỷ. Nhưng lãi suất thực tăng (4%→7%) gây ra HAI hiệu ứng lấn át: (1) lấn át đầu tư tư nhân trong nước -\$100 tỷ; (2) lấn át qua thương mại (VND lên giá, NX giảm \$25 tỷ) -\$125 tỷ. Hiệu ứng NET chỉ còn +\$25 tỷ – minh chứng rõ ràng cho hiện tượng thâm hụt song sinh (twin deficits): thâm hụt ngân sách lớn hơn đi kèm thâm hụt thương mại lớn hơn, và đẳng thức $S - I = NX$ vẫn luôn đúng.

Practice Problems

Bài tập luyện tập – Câu 1

A Vietnamese firm exports rice to Japan. From Vietnam's perspective, this transaction is recorded as a:

- | | |
|----------------------------|------------------------------|
| (A) Current account credit | (C) Financial account credit |
| (B) Current account debit | (D) Financial account debit |

Lời giải chi tiết

An export earns foreign currency for Vietnam – a current-account credit. **(A)**.

Bài tập luyện tập – Câu 2

A foreign investor purchases Vietnamese corporate bonds. From Vietnam's perspective, this is a:

- | | |
|----------------------------|------------------------------|
| (A) Current account credit | (C) Financial account credit |
| (B) Current account debit | (D) Financial account debit |

Lời giải chi tiết

Foreign purchase of a domestic asset (a bond) is a capital inflow – a financial-account credit. **(C)**.

Bài tập luyện tập – Câu 3

A Vietnamese company pays dividends to a foreign shareholder. From Vietnam's perspective, this is a:

- | | |
|----------------------------|------------------------------|
| (A) Current account credit | (C) Financial account credit |
| (B) Current account debit | (D) Financial account debit |

Lời giải chi tiết

Dividends paid abroad are investment income leaving the country – part of the current account, and a debit. **(B)**.

Bài tập luyện tập – Câu 4

A Vietnamese resident travels to Thailand and spends money there. From Vietnam's perspective, this transaction is:

- | | |
|---|--|
| (A) A current account credit, since money is spent | (C) A financial account credit |
| (B) A current account debit, equivalent to importing a travel service | (D) Not recorded anywhere in the balance of payments |

Lời giải chi tiết

Tourism spending abroad is functionally an import of travel services – money leaves the country to pay a foreign provider, a current-account debit. **(B)**.

Bài tập luyện tập – Câu 5

A US firm builds a new factory in Vietnam (foreign direct investment). From Vietnam's perspective, this is a:

- | | |
|----------------------------|------------------------------|
| (A) Current account credit | (C) Financial account credit |
| (B) Current account debit | (D) Financial account debit |

Lời giải chi tiết

FDI is the foreign acquisition of a new domestic asset – a capital inflow, hence a financial-account credit. **(C)**.

Bài tập luyện tập – Câu 6

Vietnam's current account balance is –\$20 billion this year. What must be approximately true about its financial account balance, and what does this imply about the direction of net capital flow?

Lời giải chi tiết

Since $CA + FA \approx 0$, $FA \approx +\$20$ billion (a surplus). This represents a **net capital inflow** of \$20 billion: the current account deficit is financed by net borrowing from (or asset sales to) the rest of the world.

Bài tập luyện tập – Câu 7

Which of the following transactions would appear in the **financial account** rather than the current account?

- | | |
|---|---|
| (A) Vietnam importing crude oil | (C) A Vietnamese tourist's hotel bill in Singapore |
| (B) A Vietnamese bank buying shares of a US company | (D) Interest paid by Vietnam to foreign bondholders |

Lời giải chi tiết

A domestic purchase of a foreign financial asset (stock) is a capital outflow – financial account. The other three are all current-account items (an import, a service import, and investment income paid abroad). **(B)**.

Bài tập luyện tập – Câu 8 – multi-part

Classify each transaction, from Vietnam's perspective, as CA or FA, and as a credit (+) or debit (–):

- (a) Vietnam imports industrial machinery from Germany.

- (b) A Vietnamese pension fund buys US Treasury bonds.
- (c) A foreign airline pays landing fees to a Vietnamese airport.
- (d) Vietnam receives a foreign-aid grant from Japan.

Lời giải chi tiết

- (a) An import is a current-account **debit** (CA, –).
- (b) A domestic purchase of a foreign asset is a capital outflow: **financial account, debit** (FA, –).
- (c) The airport is selling a service (landing rights) to a foreigner – an export of services: **current account, credit** (CA, +).
- (d) A grant received is a transfer: **current account, credit** (CA, +).

Bài tập luyện tập – Câu 9

What creates **demand** for VND on the foreign exchange market?

- | | |
|--|--|
| (A) Vietnamese residents importing foreign cars | (C) Vietnamese tourists traveling to Japan |
| (B) Foreign buyers purchasing Vietnamese exports | (D) A Vietnamese firm investing in a Cambodian factory |

Lời giải chi tiết

Demand for VND comes from foreigners who need dong to buy Vietnamese goods, services, or assets. (B).

Bài tập luyện tập – Câu 10

What creates **supply** of VND on the foreign exchange market?

- | | |
|--|--|
| (A) Foreign demand for Vietnamese coffee | (C) Vietnamese residents purchasing imported electronics |
| (B) A US pension fund buying Vietnamese government bonds | (D) Rising foreign confidence in the Vietnamese economy |

Lời giải chi tiết

Vietnamese residents supply dong (converting it into foreign currency) to pay for imports. (C).

Bài tập luyện tập – Câu 11

The equilibrium exchange rate in the foreign exchange market for VND occurs where:

- | | |
|--|---|
| (A) Quantity of VND demanded equals quantity of VND supplied | (C) The government sets the official rate by decree |
| (B) The dong is at its historical average value | (D) Vietnam's current account equals exactly zero |

Lời giải chi tiết

As in any competitive market, equilibrium occurs at $Q_d = Q_s$. **(A)**.

Bài tập luyện tập – Câu 12

An increase in Vietnam's real interest rate relative to the US will cause the dong to:

- | | |
|---|--|
| (A) Appreciate, as demand for VND increases | (C) Appreciate, as supply of VND increases |
| (B) Depreciate, as demand for VND decreases | (D) Stay exactly the same |

Lời giải chi tiết

Higher relative real returns attract foreign capital, raising demand for VND. **(A)**.

Bài tập luyện tập – Câu 13

A decrease in Vietnam's real interest rate relative to the US will cause the dong to:

- | | |
|----------------|---------------------------------|
| (A) Appreciate | (C) Remain unchanged |
| (B) Depreciate | (D) The effect is indeterminate |

Lời giải chi tiết

Lower relative returns make Vietnamese assets less attractive, reducing demand for VND (D_{VND} shifts left) $\Rightarrow$ depreciation. **(B)**.

Bài tập luyện tập – Câu 14

Faster income growth in Vietnam relative to the US, all else equal, will cause the dong to:

- | | |
|---|---|
| (A) Appreciate, because higher income signals a stronger economy | (C) Appreciate, because the supply of VND falls |
| (B) Depreciate, because Vietnamese residents import more, raising the supply of VND | (D) Have no effect on the exchange rate |

Lời giải chi tiết

Faster growth raises import demand, increasing the supply of VND on the FX market and causing depreciation. **(B)**.

Bài tập luyện tập – Câu 15

If Vietnam's inflation rate rises above the US inflation rate, the dong will tend to:

- | | |
|----------------|--|
| (A) Appreciate | (C) Be unaffected, since inflation only changes the domestic price level |
| (B) Depreciate | (D) Immediately jump to its new PPP value |

Lời giải chi tiết

Relatively more expensive Vietnamese goods reduce export demand and raise import spending – both effects depreciate the dong. **(B)**.

Bài tập luyện tập – Câu 16

If currency traders widely expect the dong to appreciate over the next year, the dong will tend to:

- | | |
|---|---|
| (A) Depreciate immediately, as traders sell now to lock in profits | (C) Be unaffected until the expectation materializes |
| (B) Appreciate immediately, as traders buy dong now in anticipation | (D) Force the central bank to intervene to prevent any change |

Lời giải chi tiết

Expected future appreciation raises current demand for the currency, causing it to appreciate now – a self-fulfilling expectation. **(B)**.

Bài tập luyện tập – Câu 17

A surge in foreign demand for Vietnamese furniture exports (a shift in preferences toward Vietnamese goods) will cause the dong to:

- | | |
|----------------|--|
| (A) Appreciate | (C) Have no effect on the FX market |
| (B) Depreciate | (D) Affect only the financial account, not the exchange rate |

Lời giải chi tiết

Stronger foreign preferences for Vietnamese goods raise demand for VND. **(A)**.

Bài tập luyện tập – Câu 18

If the US real interest rate falls while Vietnam's real interest rate stays constant, the dong will tend to:

- | | |
|--|--|
| (A) Depreciate against the dollar | (C) Be unaffected, since only Vietnam's own rate matters |
| (B) Appreciate against the dollar, since Vietnam's relative return is now higher | (D) Immediately reach its PPP value |

Lời giải chi tiết

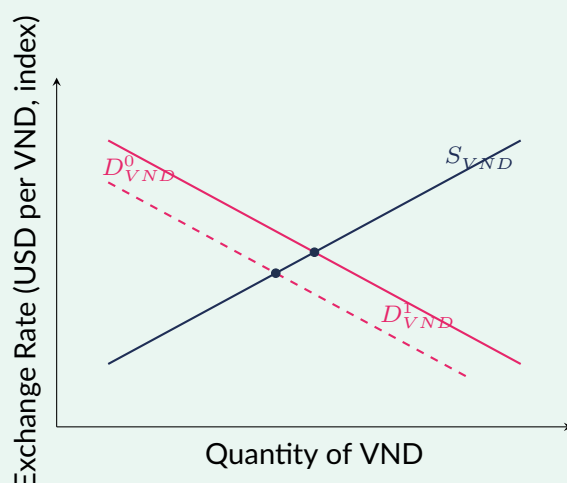
What matters is the *relative* interest rate. A fall in the US rate, with Vietnam's rate unchanged, still raises Vietnam's rate *relative* to the US, attracting capital toward Vietnam and appreciating the dong. **(B)**.

Bài tập luyện tập – Câu 19 – graph FRQ

Draw a correctly labeled foreign exchange market graph for the Vietnamese dong showing the effect of a **decrease** in Vietnam's real interest rate relative to other countries. Explain the shift

and the resulting change in the exchange rate.

Lời giải chi tiết



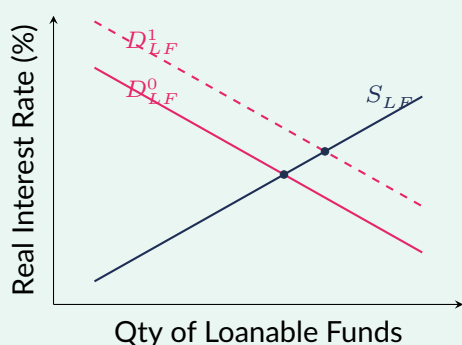
A lower VN real interest rate makes dong-denominated assets less attractive: D_{VND} shifts left, the dong depreciates ($E_0=5 \rightarrow E_1=4.4$), and quantity traded falls.

A lower real return on Vietnamese assets discourages foreign capital inflow, reducing demand for dong ($D_{VND}^0 \rightarrow D_{VND}^1$, a leftward shift). With supply unchanged, the equilibrium exchange rate falls – the dong **depreciates** – and the quantity of dong traded falls.

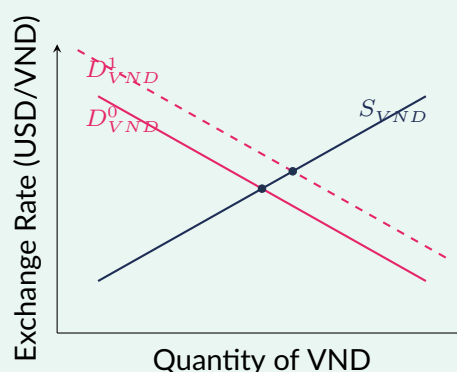
Bài tập luyện tập – Câu 20 – graph FRQ

Draw a correctly labeled loanable funds graph **and** a correctly labeled foreign exchange graph showing the full effect of a rise in the government budget deficit.

Lời giải chi tiết



Government borrowing shifts D_{LF} right: r rises from r_0 to r_1 .



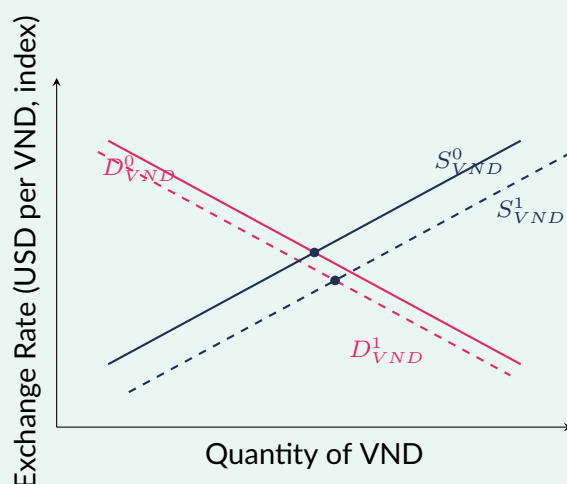
The higher r attracts capital inflow: D_{VND} shifts right, the dong appreciates.

A larger deficit shifts the demand for loanable funds right, raising the real interest rate. The higher return attracts foreign financial capital, raising demand for the dong and causing it to appreciate. (A complete answer would also note that the stronger dong then reduces net exports, shifting AD left and partially offsetting the direct fiscal stimulus – “crowding out via trade.”)

Bài tập luyện tập – Câu 21 – graph FRQ

Draw a correctly labeled foreign exchange market graph for the dong showing the effect of an **increase** in Vietnam's inflation rate relative to the US.

Lời giải chi tiết



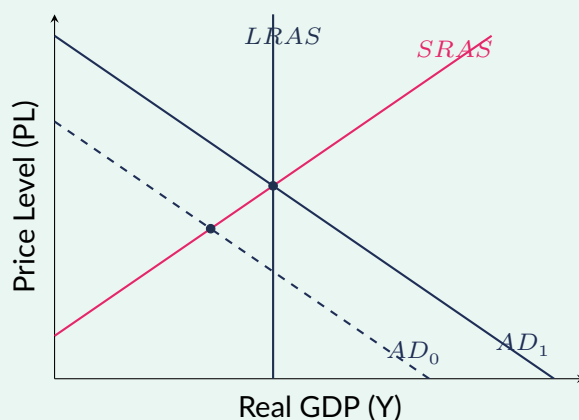
Higher relative VN inflation shifts D_{VND} left (fewer exports demanded) and S_{VND} right (more imports bought): the dong depreciates ($E_0=5 \rightarrow E_1=4.2$).

Higher relative Vietnamese inflation makes Vietnamese goods relatively more expensive: foreigners buy fewer Vietnamese exports (D_{VND} shifts left) while Vietnamese residents buy more of the relatively cheaper imports (S_{VND} shifts right). Both effects **depreciate** the dong (exchange rate falls unambiguously). The effect on the equilibrium *quantity* of dong traded is, in general, **ambiguous** – it depends on the relative size of the two shifts; in this illustration the supply shift dominates and quantity rises.

Bài tập luyện tập – Câu 22 – graph FRQ

Draw a correctly labeled AD–AS graph showing the effect of a **depreciation** of the dong via the net export channel, assuming the economy starts in a recessionary gap.

Lời giải chi tiết



Depreciation raises NX : $AD_0 \rightarrow AD_1$, closing the recessionary gap ($Y_1 \rightarrow Y_p$) at a higher price level.

A depreciation makes exports cheaper and imports more expensive, raising net exports and

shifting AD right ($AD_0 \rightarrow AD_1$). Starting from a recessionary gap ($Y_1 < Y_p$), this expansionary shift raises real GDP back toward potential Y_p , at the cost of a higher price level.

Bài tập luyện tập – Câu 23

A reference basket costs 150,000 VND in Vietnam and \$7 in the United States (a hypothetical illustration). Find the PPP-implied exchange rate.

Lời giải chi tiết

$$E_{PPP} = \frac{150,000}{7} \approx \mathbf{21,428.6 \text{ VND per USD.}}$$

Bài tập luyện tập – Câu 24

Using the PPP rate from Câu 23 ($\approx 21,428.6$ VND/USD), suppose the actual market exchange rate is 20,000 VND per USD. Is the dong over- or undervalued relative to PPP? Explain, and state the predicted long-run pressure on the exchange rate.

Lời giải chi tiết

The actual rate (20,000) is *lower* than the PPP rate ($\approx 21,428.6$) – fewer dong are needed to buy \$1 than parity would require, meaning the dong is *stronger* than its PPP fair value. The dong is **overvalued** relative to PPP. Long-run PPP pressure would push the rate **up** (more VND per USD), i.e., the dong should **depreciate** toward $\approx 21,428.6$.

Bài tập luyện tập – Câu 25

The same reference basket costs \$12 in the US. The actual exchange rate is 24,000 VND per USD, and the identical basket is observed to cost 310,000 VND in Vietnam. Find the PPP-implied exchange rate (using the local basket price), and determine whether the dong is over- or undervalued at the current market rate.

Lời giải chi tiết

$E_{PPP} = \frac{310,000}{12} \approx \mathbf{25,833.3 \text{ VND per USD.}}$ Since the actual rate (24,000) is *lower* than the PPP rate ($\approx 25,833.3$), the dong is currently **overvalued** relative to PPP – fewer dong are needed to buy \$1 in the actual market than parity would require. PPP logic predicts pressure for the dong to **depreciate** (the rate should rise toward $\approx 25,833.3$ VND/USD).

Bài tập luyện tập – Câu 26

The dong appreciates by 8%. Analysts estimate net exports fall by \$4 billion for every 1% appreciation. If $MPC = 0.8$, find $\Delta \text{Real GDP}$.

Lời giải chi tiết

$\Delta NX = -8 \times \$4\text{b} = -\32 billion. Multiplier $= \frac{1}{1 - 0.8} = 5.$ $\Delta \text{Real GDP} = -32 \times 5 = \mathbf{-\$160 \text{ billion.}}$

Bài tập luyện tập – Câu 27

The dong depreciates by 6%. Net exports rise by \$3 billion for every 1% depreciation. $MPC = 0.75$. Find $\Delta \text{Real GDP}$.

Lời giải chi tiết

$\Delta NX = 6 \times \$3\text{b} = +\18 billion . Multiplier $= \frac{1}{1 - 0.75} = 4$. $\Delta \text{Real GDP} = 18 \times 4 = +\72 billion .

Bài tập luyện tập – Câu 28

A stronger dong (appreciation) will most directly cause aggregate demand to _____ because net exports _____.

- | | |
|-----------------------|-----------------------|
| (A) shift right; rise | (C) shift right; fall |
| (B) shift left; fall | (D) shift left; rise |

Lời giải chi tiết

Appreciation raises the relative price of domestic goods, lowering NX and shifting AD left. (B).

Bài tập luyện tập – Câu 29

Which of the following would shift AD to the right via the exchange-rate/net-export channel?

- | | |
|--|--|
| (A) An appreciation of the domestic currency | (C) A rise in the domestic price level alone |
| (B) A depreciation of the domestic currency | (D) A fall in domestic real GDP |

Lời giải chi tiết

Depreciation raises net exports, shifting AD right. (B).

Bài tập luyện tập – Câu 30 – multi-part

The government increases spending by \$40 billion, financed by borrowing. $MPC = 0.8$. Government borrowing raises Vietnam's real interest rate from 4% to 6%, while the US real rate stays at 2%. The dong appreciates from 23,500 to 21,800 VND/USD, and analysts estimate net exports fall by \$20 billion as a result.

- Find the spending multiplier.
- Find the naive (closed-economy) prediction for $\Delta \text{Real GDP}$.
- Find the trade-channel offset to $\Delta \text{Real GDP}$.
- Find the net effect on real GDP.
- Explain in one or two sentences why the actual effect is smaller than the naive prediction.

Lời giải chi tiết

(a) Multiplier = $\frac{1}{1 - 0.8} = 5$.

(b) $\Delta \text{Real GDP (naive)} = 40 \times 5 = \text{+\$200 billion}$.

(c) $\Delta \text{Real GDP (trade channel)} = -20 \times 5 = \text{-\$100 billion}$.

(d) Net effect = $200 - 100 = \text{+\$100 billion}$.

(e) The deficit-financed spending raises the real interest rate, which attracts foreign capital and appreciates the dong; the stronger dong reduces net exports, partially offsetting the direct AD-boosting effect of the higher government spending – crowding out via trade.

Bài tập luyện tập – Câu 31

The sequence in which a fiscal expansion raises the interest rate, appreciates the currency, and reduces net exports – partially offsetting the initial increase in aggregate demand – is known as:

(A) The wealth effect

(C) The multiplier effect

(B) Crowding out via trade / the twin deficits mechanism

(D) Purchasing power parity

Lời giải chi tiết

This is precisely the definition of crowding out via trade, linked to the twin deficits pattern. (B).

Bài tập luyện tập – Câu 32

National saving is \$3.8 trillion and domestic investment is \$4.5 trillion. Find net exports, and state whether the country experiences a net capital inflow or outflow.

Lời giải chi tiết

$NX = S - I = 3.8 - 4.5 = \text{-\$0.7 trillion}$ (a trade deficit), financed by a **net capital inflow** of \$0.7 trillion.

Bài tập luyện tập – Câu 33

Net exports are +\$0.6 trillion and domestic investment is \$5.4 trillion. Find national saving, and state whether the country is a net lender or a net borrower.

Lời giải chi tiết

$S = NX + I = 0.6 + 5.4 = \text{\$6.0 trillion}$. Since $NX > 0$, the country is a **net lender** to the rest of the world (a net capital outflow of \$0.6 trillion).

Bài tập luyện tập – Câu 34

Using the identity $S - I = NX$, explain why a current account surplus must be matched by a net capital outflow.

Lời giải chi tiết

If $NX > 0$, then $S > I$: national saving exceeds what is needed to fund domestic investment. That saving surplus does not disappear – it is lent abroad (buying foreign assets, extending loans to foreigners), which is by definition a net **capital outflow**. The two sides of the identity describe the same underlying transactions: goods and services sold abroad (generating the NX surplus) are paid for with foreign IOUs or assets that domestic residents accumulate (the capital outflow).

Bài tập luyện tập – Câu 35

According to the twin deficits hypothesis, an increase in the government budget deficit tends to be associated with an _____ in the trade deficit, primarily because _____.

- (A) increase; higher borrowing directly funds import purchases (C) decrease; higher government spending directly substitutes for imports
(B) increase; higher real interest rates attract foreign capital, appreciating the currency and reducing net exports (D) decrease; deficits automatically raise national saving

Lời giải chi tiết

The full mechanism runs through the loanable funds market and the FX market, exactly as in Section 6.6. (B).

Bài tập luyện tập – Câu 36 – multi-part comprehensive FRQ

Vietnam's government raises spending by \$60 billion, entirely deficit-financed. $MPC = 0.8$. The resulting increase in loanable-funds demand raises the real interest rate from 3% to 6%, which crowds out \$15 billion of private domestic investment directly. The higher real interest rate also attracts foreign capital, appreciating the dong from 24,800 to 22,600 VND per USD; analysts estimate this reduces net exports by \$25 billion.

- (a) Find the spending multiplier.
(b) Find the naive/direct effect on real GDP from the \$60 billion spending increase alone.
(c) Find the domestic crowding-out effect on real GDP (via lower private investment).
(d) Find the trade-channel crowding-out effect on real GDP (via lower net exports).
(e) Find the net effect on real GDP.
(f) Is this result consistent with the “twin deficits” pattern? Explain.

Lời giải chi tiết

- (a) Multiplier = $\frac{1}{1 - 0.8} = 5$.
(b) $60 \times 5 = +\$300$ billion.
(c) $-15 \times 5 = -\$75$ billion.
(d) $-25 \times 5 = -\$125$ billion.
(e) Net effect = $300 - 75 - 125 = +\$100$ billion – far smaller than the naive \$300 billion prediction.
(f) Yes. The larger budget deficit (\$60 billion) is accompanied by a larger trade deficit (NX falls

\$25 billion) – exactly the twin deficits pattern – and total real GDP rises by much less (\$100 billion) than the naive multiplier alone would predict (\$300 billion), because of two distinct, simultaneous crowding-out channels: the domestic channel (higher r discourages private investment) and the trade channel (higher r appreciates the currency and lowers net exports).

Ôn tập nhanh

- **Unit 1:** Khan hiếm buộc phải lựa chọn; đường giới hạn khả năng sản xuất (PPC) và lợi thế so sánh giải thích vì sao chuyên môn hoá và trao đổi làm tổng sản lượng tăng.
- **Unit 2:** Đo lường sức khoẻ nền kinh tế bằng GDP (thực/danh nghĩa), tỷ lệ thất nghiệp (theo loại), và CPI/lạm phát – nền tảng để nhận diện vị trí của chu kỳ kinh tế.
- **Unit 3:** Mô hình AD-AS: tổng cầu dốc xuống (hiệu ứng của cải, lãi suất, tỷ giá), SRAS dốc lên (lương cứng nhắc), LRAS thẳng đứng tại Y_p ; số nhân chi tiêu/thuế và chính sách tài khoá dùng để đóng khoảng cách sản lượng.
- **Unit 4:** Thị trường tiền tệ (cung tiền cố định do NHTW, cầu tiền dốc xuống) xác định lãi suất danh nghĩa trong ngắn hạn; thị trường vốn vay (tiết kiệm là cung, đầu tư/vay chính phủ là cầu) xác định lãi suất thực và hiện tượng lấn át đầu tư tư nhân.
- **Unit 5:** Đường Phillips ngắn hạn (đánh đổi lạm phát–thất nghiệp) dịch chuyển khi kỳ vọng lạm phát thay đổi, trở thành thẳng đứng tại tỷ lệ thất nghiệp tự nhiên trong dài hạn; tăng trưởng dài hạn đến từ vốn, lao động, công nghệ (dịch chuyển PPC/LRAS).
- **Unit 6:** Thị trường ngoại hối (cung–cầu ngoại tệ) xác định tỷ giá; lãi suất thực, tăng trưởng, lạm phát, kỳ vọng và thị hiếu làm dịch chuyển tỷ giá; tỷ giá tác động đến NX và AD; đẳng thức $S - I = NX$ nối liền vốn vay, cán cân thương mại và dòng vốn quốc tế.
- **Mẹo thi:** luôn ghi rõ tên và nhãn hai trục trên MỌI đồ thị FRQ; luôn trình bày từng bước đại số khi tính số nhân hoặc lãi suất cân bằng, đừng chỉ ghi đáp số cuối cùng.

Đồng hành cùng 8020 English

Cảm ơn bạn đã học cùng bộ giáo trình quốc tế 8020. **Điểm thật · Thầy thật · Kết quả thật** — nhiều học viên chỉ cần 1–2 khoá để đạt kết quả mong muốn.

Chương trình đào tạo tại 8020 English

IELTS Academic/General · SAT · PTE · Duolingo · TOEFL | AP (College Board) · IB Diploma · Cambridge IGCSE / A-Level | sẵn học bổng du học.

Vì sao chọn 8020 English?

- **100% giáo viên** đạt tối thiểu 8.0 IELTS hoặc 1500 SAT — đội ngũ Giáo sư · Tiến sĩ · Thạc sĩ tốt nghiệp trường top đầu thế giới (Carnegie Mellon — #1 Hoa Kỳ về Khoa học Máy tính).
- **Kèm 1–1** mọi độ tuổi; lớp sĩ số nhỏ 2–5 bạn (đa số dưới 10 bạn/lớp).
- Lộ trình cá nhân hoá, theo sát tiến độ từng học viên; lớp OFFLINE tại TP.HCM & ONLINE toàn quốc.

Bảng vàng học viên

AP 5/5 — Calculus AB/BC
SAT 1590 / 1570 / 1550

AP 4–5 — Biology, Chemistry
IELTS 8.0–9.0

IB 90/100 — Economics
Duolingo 110 · PTE 90

Cảm nhận học viên & phụ huynh

"Bạn đã cải thiện được tư duy Writing — kỹ năng từng là nỗi sợ lớn nhất — và cuối cùng đã đậu vào trường top như mong muốn. Thái độ học tập cực kỳ nghiêm túc; ngay cả khi nằm viện vẫn cố gắng học đều đặn."

— Phan Thị Thanh Hằng • IELTS Overall 8.5

"Cần tất cả kỹ năng trên 7.5 để xét vào trường top 1 Anh Quốc về Y học (chương trình UKFPO của NHS) — và đã đạt mục tiêu sau khi học Writing 1-1."

— Trần Hoàng Bảo Ngọc • IELTS Overall 8.0 (Writing 6.0 → 7.5)

"Gia đình và bé xin cảm ơn thầy cô đã giúp con có hành trang chín chu khi qua Mỹ. Đạt điểm 5 môn Giải tích trong thời gian ngắn là quá mãn nguyện."

— Phụ huynh • AP Calculus BC 5/5

"Em cảm ơn thầy đã luôn đồng hành. Nhờ thầy, em học vững hơn rất nhiều dù thời gian ôn không dài."

— Học viên • AP Calculus AB 4

KẾT QUẢ HỌC VIÊN

FEEDBACK PHỤ HUYNH & HỌC VIÊN AP



Phụ huynh • AP Calculus BC: 5

"Gia đình cảm ơn thầy cô đã giúp con có hành trang chín chu khi qua Mỹ. Đạt điểm 5 môn Giải tích trong thời gian ngắn là quá mãn nguyện."



Phụ huynh • AP Calculus BC

"Mẹ con xin gửi lời cảm ơn chân thành tới thầy và cả nhóm. Thời gian ôn rất ngắn nhưng con nhận được rất nhiều sự hỗ trợ."



Học viên • AP Calculus AB: 4 • Statistics: 3

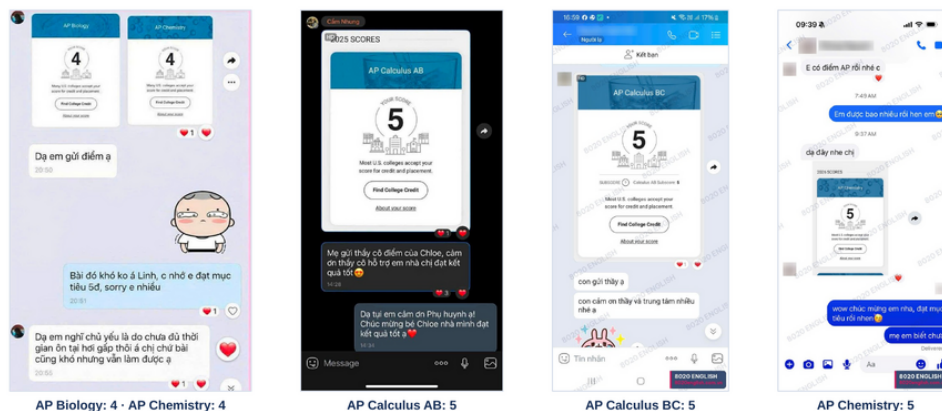
"Em cảm ơn thầy Steven đã luôn đồng hành. Nhờ thầy, em học vững hơn rất nhiều dù thời gian không dài."

Feedback phụ huynh & học viên AP — nhiều môn đạt điểm 4 & 5

Điểm thi thật của học viên

KẾT QUẢ HỌC VIÊN

ĐIỂM SỐ AP

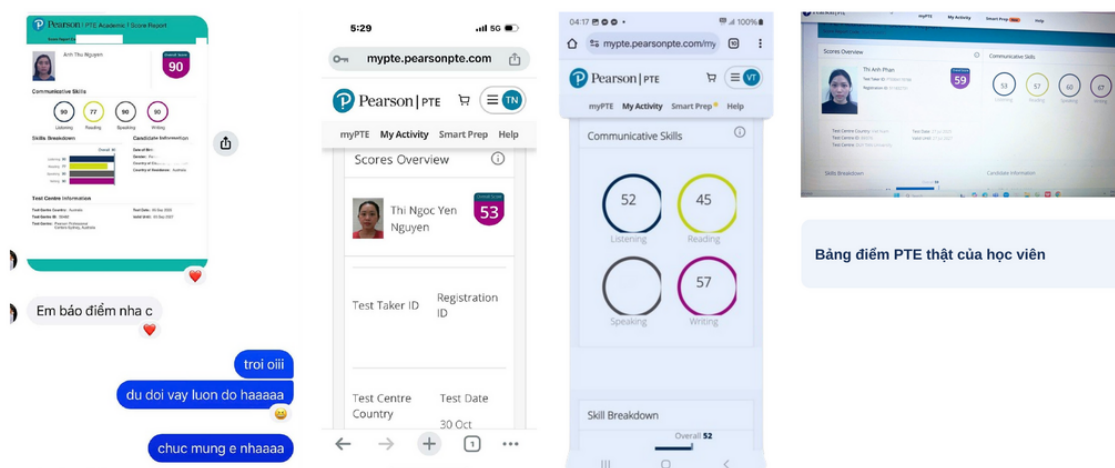
8020
ENGLISH

Bảng điểm AP thật của học viên – nhiều môn đạt điểm 4 & 5

Bảng điểm AP thật – Calculus AB/BC 5/5 · Biology & Chemistry 4-5 (College Board)

KẾT QUẢ HỌC VIÊN

ĐIỂM SỐ PTE

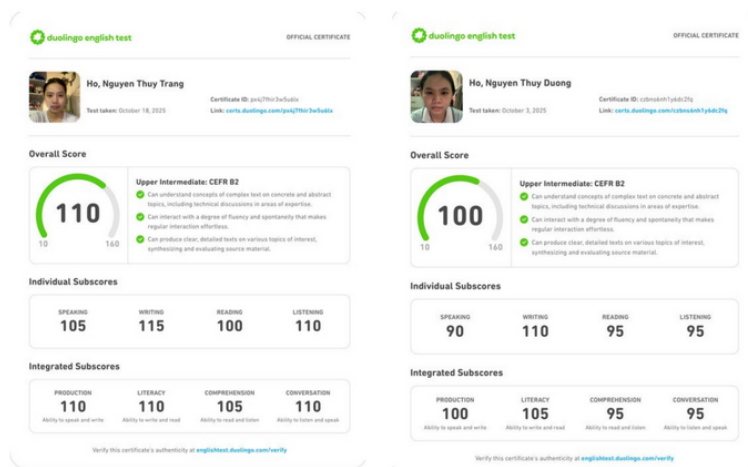
8020
ENGLISH

Bảng điểm PTE thật của học viên

Học viên 8020 – PTE Academic 90

KẾT QUẢ HỌC VIÊN

ĐIỂM SỐ DUOLINGO



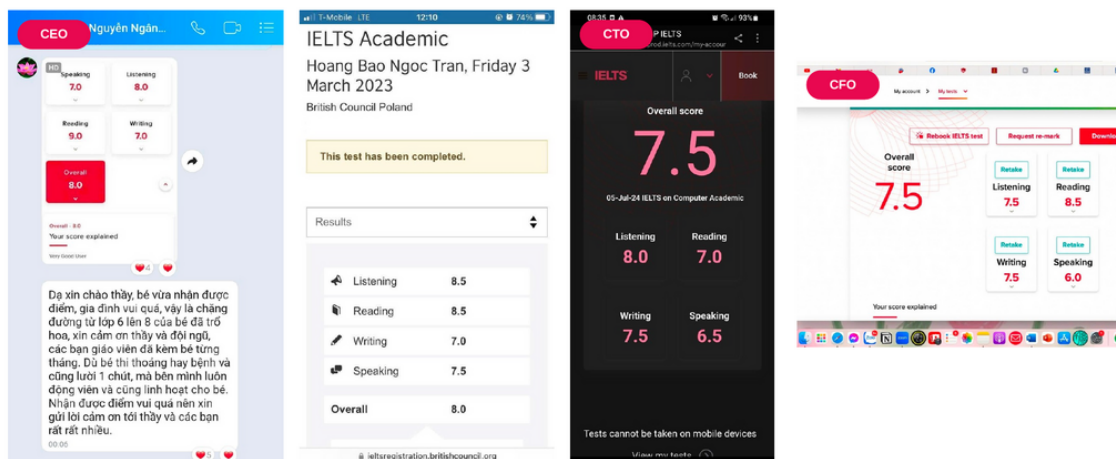
Duolingo English Test – 110 & 100

Học viên 8020 – Duolingo English Test 110 & 100

KẾT QUẢ HỌC VIÊN

THÀNH TÍCH HỌC VIÊN

Bảng điểm thi thật – chất lượng được giám sát nghiêm ngặt. Một số học viên chỉ cần 1–2 khóa để đạt kết quả mong muốn.



Học viên 8020 – IELTS 8.0 / 7.5 / 8.5 (báo điểm thật)

**8020 ENGLISH – CHƯƠNG TRÌNH QUỐC TẾ**

Test đầu vào & tư vấn lộ trình MIỄN PHÍ

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