

1. Explain how each of the following effects leads to a decrease in real GDP when the price level rises.

(A) Interest rate effect

A lower price level decreases the demand for money, which decreases the equilibrium interest rate and increases investment and interest-sensitive components of consumption and, therefore, the real output.

(B) Wealth effect or real balance effect

As the price level falls, cash balances will buy more so people will spend more, thus increasing the real output.

(C) Net export effect

A lower U.S. price level means prices for goods produced in the United States are lower relative to prices in foreign countries. Thus, people will buy more U.S.-produced goods and fewer foreign-produced goods. This increases net exports, a component of real GDP.

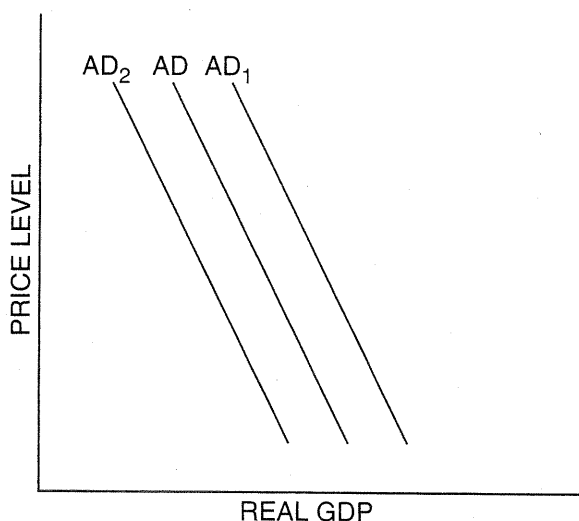
What Shifts the Aggregate Demand Curve?

AD is made up of spending by households, businesses, the government, and other countries. The AD curve will shift if there is a change in any of its components: consumption (C), investment (I), government spending (G), or net exports (Xn). As shown in Figure 3-1.2, an increase in AD is shown by a rightward shift of the AD curve, e.g., from AD to AD_1 . A decrease in AD is shown by a leftward shift of the AD curve, e.g., from AD to AD_2 .



Figure 3-1.2

Shifts in Aggregate Demand



Determine whether each change listed in Table 3-1.1 will cause an increase, decrease, or no change in AD.

2. In column 1, list which component of AD is affected: C, I, G, or Xn.
3. In column 2, draw an up arrow if the change will cause an increase in AD, a down arrow if it will cause a decrease in AD, and write NC if it will not change AD.
4. In column 3, write the number of the AD curve after the change (always start with AD).



Table 3-1.1
Changes in Aggregate Demand

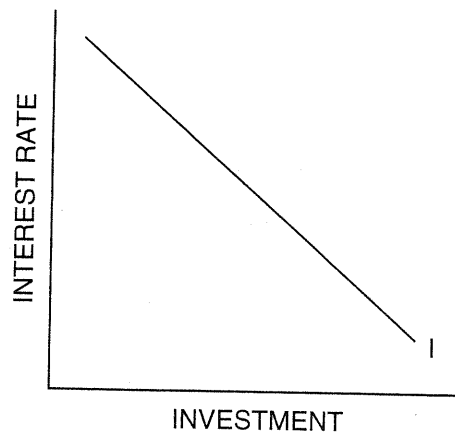
Change	1. Component of AD	2. Direction of AD change	3. Resulting AD curve
(A) Consumers respond to high levels of debt by reducing their purchases of durable goods.	C	↓	AD₂
(B) Reduced business confidence leads to a reduction in investment spending.	I	↓	AD₂
(C) Government spending increases with no increase in taxes.	G	↑	AD₁
(D) Survey shows consumer confidence jumps.	C	↑	AD₁
(E) Stock market collapses; investors lose billions.	I, C	↓	AD₂
(F) Productivity rises for fourth straight year.	N/A	NC (affects AS)	AD
(G) New tariffs on imported goods lead to a trade war that reduces exports by more than it reduces imports.	Xn	↓	AD₂

Investment Demand

Investment spending consists of spending on new buildings, machinery, plants, and equipment. Investment spending is a part of aggregate expenditures in the economy. Any increase in investment spending will necessarily increase aggregate expenditures (GDP) and AD.

Decisions about investment spending are based on a comparison of marginal cost and marginal benefit. If a firm expects a particular project to yield a greater benefit than cost, it will undertake it. An important cost associated with investment spending is the interest expense. Firms must either borrow money to engage in an investment project or use their own money. In either case, the interest rate determines the cost of the investment project. If the firm borrows money to invest, it must pay the interest rate to borrow. If the firm uses its own money, then it gives up the interest it could have earned by loaning that money to someone else. That is, the interest rate measures the opportunity cost if a firm invests with its own money.

5. Draw a graph illustrating an investment demand curve. Remember, the price paid to invest is the interest rate, so your graph should show the interest rate on the vertical axis, and the demand curve should have a slope that illustrates the relationship between the interest rate and the amount of investment a firm will undertake.



6. What factors could cause a firm to invest more or less at any given level of the interest rate? That is, what could cause the investment demand curve to shift (increase or decrease)?
A change in anything that affects the MC or MB of investment spending; for example, a change in the expected profitability of investments.

The Multiplier

An initial change in any of the components of aggregate demand (AD) will lead to further changes in the economy and an even larger final change in real gross domestic product (GDP). That is, any initial change in spending will be multiplied as it impacts the economy. The final impact of an initial change in spending can be calculated using the *spending multiplier*. The size of the final impact of an initial change in spending on real GDP is affected by the amount of additional spending that results when households receive additional income, called the *marginal propensity to consume*, or MPC. The MPC is the key to understanding the multiplier, so the first step in understanding the multiplier is to understand the MPC.

The MPC is the change in consumption divided by the change in disposable income (DI). It is a fraction of any change in DI that is spent on consumer goods (C): $MPC = \Delta C / \Delta DI$.

The *marginal propensity to save* (MPS) is the fraction saved of any change in disposable income. The MPS is equal to the change in saving divided by the change in DI: $MPS = \Delta S / \Delta DI$.

The MPC measures *changes* in consumption when income changes. The MPC is distinct from the *average propensity to consume* (APC), which measures the average amount of the total income households spend or save.

The APC is the ratio of C to disposable income, or $APC = C / DI$.

The *average propensity to save* (APS) is the ratio of savings (S) to disposable income, or $APS = S / DI$.

1. Fill in the blanks in Table 3-2.1.



Table 3-2.1

Average Propensities to Consume and to Save

Disposable income	Consumption	Saving	APC	APS
\$0	\$2,000	-\$2,000	—	—
\$2,000	\$3,600	-\$1,600	1.80	-0.80
\$4,000	\$5,200	-\$1,200	1.30	-0.30
\$6,000	\$6,800	-\$800	1.13	-0.13
\$8,000	\$8,400	-\$400	1.05	-0.05
\$10,000	\$10,000	\$0	1.00	0
\$12,000	\$11,600	\$400	0.97	0.03

2. Fill in the blanks in Table 3-2.2.



Table 3-2.2

Marginal Propensities to Consume and to Save

Disposable income	Consumption	Saving	MPC	MPS
\$12,000	\$12,100	-\$100	—	—
\$13,000	\$13,000	\$0	0.90	0.10
\$14,000	\$13,800	\$200	0.80	0.20
\$15,000	\$14,500	\$500	0.70	0.30
\$16,000	\$15,100	\$900	0.60	0.40
\$17,000	\$18,800	\$1,400	0.50	0.50

3. Explain why the sum of MPC and MPS must always equal 1.
The only choice people have is to consume or to save. Thus, an additional dollar in income must result in a change in consumption and/or a change in savings. The sum of the change must be 1.

The Multiplier

The following example illustrates how an initial change in a component of AD results in an even larger change in real GDP (i.e., the multiplier process).

The people in Econoland live on an isolated island. One year a stranger arrives and builds a factory to make seashell charms. The factory is considered an investment on Econoland. If the MPC on the island is 75 percent, or 0.75, it means that Econoland residents consume 75 percent of any change in income and save 25 percent of any change in income. The additional spending generates additional income and eventually a multiple increase in income. This is called the *multiplier effect*. When they hear about the multiplier effect, the islanders are thrilled about the new factory because they like the idea of additional income.

The residents of Econoland want to know what would eventually happen to the levels of GDP, consumption, and saving on the island as the new spending works its way through the economy. Luckily there is a retired economist on Econoland who offers a brief statement of the multiplier. “It’s simple,” he says, “One person’s spending becomes another person’s income.” The economist gives a numerical example, as shown in Table 3-2.3. “This shows the process,” he says. The rounds refer to the movement of spending from resident to resident. His example stops at four rounds and the rest of the rounds are added together to cover the total effect on all Econoland’s citizens.



Table 3-2.3

Changes in Econoland's GDP, Consumption, and Saving

Round	Income (GDP)	Consumption spending	Saving
Round 1	\$1,000	0.75 of \$1,000 = \$750.00	0.25 of \$1,000 = \$250.00
Round 2	One person's spending becoming another person's income: \$750.00	0.75 of \$750 = \$562.50	0.25 of \$750 = \$187.50
Round 3	The next person's spending becoming another person's income: \$562.50	0.75 of \$562.50 = \$421.88	0.25 of \$562.50 = \$140.62
Round 4	The next person's spending becoming another person's income: \$421.88	0.75 of \$421.88 = \$316.41	0.25 of \$421.88 = \$105.47
Rounds continue	⋮	⋮	⋮
All rounds	Final outcome for income (GDP) $1 / (1 - 0.75) \times \$1,000 = 4 \times \$1,000$ = \$4,000	Final outcome for consumption spending $0.75 \text{ of } \$4,000 = \$3,000$	Final outcome for saving 0.25 of \$4,000 = \$1,000

The retired economist summarizes the multiplier effect for the crowd of Econolanders. "This shows us that the factory is an investment that has a multiplied effect on our GDP. In this case, the multiplier is 4." He adds, "It appears to be magic, but it is simply that *one person's spending becomes another person's income.*" The islanders nod with agreement but also look puzzled, so the old professor asks the citizens a series of questions. How would Econolanders answer these questions?

4. Would the multiplier be larger or smaller if you saved more of your additional income?

Smaller

5. What do you think would happen if all Econolanders saved all of the change in their incomes?

There would not be any change in output from consumption.

6. What would happen if you spent *all* of the change in your income?

There would be an infinite change in output from consumption.

The professor then points out that a new road around the island or a new bridge built by the island government over the lagoon would also have a multiplied effect on GDP. He also tells them that if the government of Econoland lowers taxes, the citizens would have more income to spend, which would cause a multiplier effect. He notes that there is another side to this. If taxes are raised, there is a multiplier effect, which decreases income and GDP by a multiple amount.

Multiplier Formulas and Terms

$$MPC = \Delta C / \Delta DI$$

$$MPS = \Delta S / \Delta DI$$

Spending Multiplier = $1 / (1 - MPC)$ or $1 / MPS$

How to use the spending multiplier:

$$\text{Change in GDP} = \text{change in AD component} \times \text{spending multiplier.}$$

When to use the spending multiplier:

When there is a change in a component of AD.

When the government changes taxes, it will also affect AD. If taxes are decreased, consumers (or businesses) have more disposable income and will increase spending. When the government raises taxes, households (or businesses) have less disposable income and will decrease spending. The basic multiplier effect is the same, but with two differences. First, increasing taxes decreases spending, and decreasing taxes increases spending. The effect of taxes on spending is negative, so the tax multiplier has a negative sign. Second, taxes are not a component of AD. When taxes change, consumers (or businesses) will change their spending by only part of that amount, determined by the MPC. So, for every additional dollar in disposable income, spending will only increase by $\$MPC$. Therefore, the numerator of the tax multiplier is MPC, rather than 1.

Student Alert: Make sure to use the tax multiplier when the change affecting AD is a change in taxes!

$$\text{Tax Multiplier} = -MPC / (1 - MPC) = -MPC / MPS$$

How to use the tax multiplier:

$$\text{Change in GDP} = \text{change in taxes} \times \text{tax multiplier.}$$

When to use the tax multiplier:

When there is a change in lump-sum taxes.

Note: Remember that the tax multiplier has a negative sign.

Quick Quiz on Multipliers

7. What is the value of the tax multiplier if the MPC is 0.80? -4

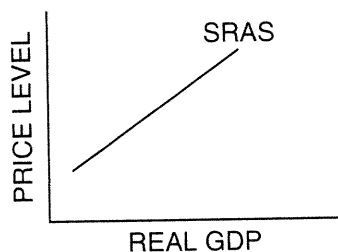
8. What is the value of the spending multiplier if the MPC is 0.67? 3

9. What is the tax multiplier if the MPS is 0.25? -3

An Introduction to Short-Run Aggregate Supply

Why Is the Short-Run Aggregate Supply Curve Upward Sloping?

The short-run aggregate supply (SRAS) curve shows the relationship between real gross domestic product (GDP) and the price level. This positive relationship exists because producers seek to maximize profits and production costs are inflexible. Since firms seek to maximize profits, change in the price level will affect the quantity that they produce. When the price level rises, but production costs stay the same, firms make more profit on each unit sold, so they increase the quantity that they produce. When the price level decreases, but production costs stay the same, firms make less profit, and they reduce the quantity that they produce. In the long run, when production costs are flexible, this relationship does not hold true. But in the short run, inflexible production costs lead to a positive relationship between the price level and real GDP and therefore an upward sloping SRAS curve.



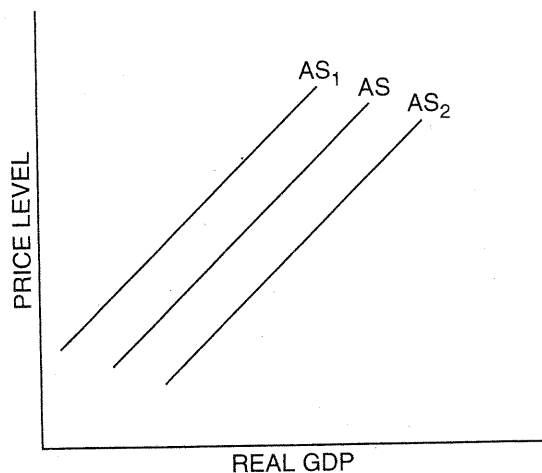
What Shifts the Short-Run Aggregate Supply Curve?

SRAS will increase if firms produce more at any given price level, and it will decrease if firms produce less at any given price level. Therefore, the SRAS curve will shift as a result of changes in input prices (e.g., nominal wages or oil prices) or productivity (e.g., technological advances), as shown in Figure 3-3.1.



Figure 3-3.1

Shifts in Short-Run Aggregate Supply



- Determine whether each change listed in Table 3-3.1 will cause an increase, decrease, or no change in aggregate supply (AS). Always start with AS.
- In column 1, list which component of AS is affected: input prices or productivity.
- In column 2, draw an up arrow if the change will cause an increase in AS, a down arrow if it will cause a decrease in AS, and write NC if it will not change AS.
- In column 3, write the number of the AS curve after the change.



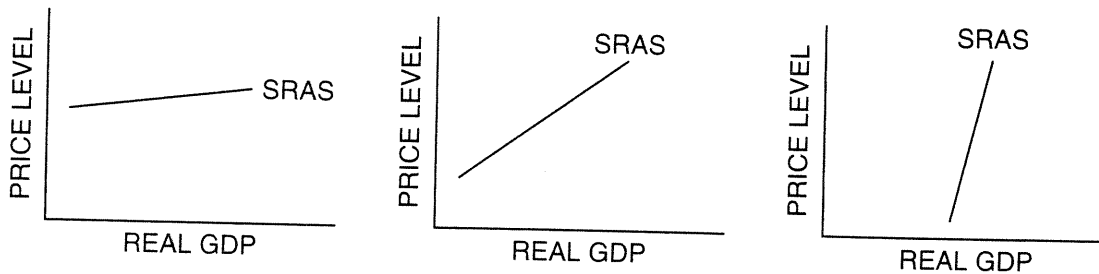
Table 3-3.1

Changes in Aggregate Supply

Change	1. Determinant of AS	2. Change in AS	3. Resulting AS curve
(A) Unions are more effective so that wage rates increase.	<i>Input prices</i>	↓	AS₁
(B) OPEC successfully increases oil prices.	<i>Input prices</i>	↓	AS₁
(C) Labor productivity increases dramatically.	<i>Productivity</i>	↑	AS₂
(D) Giant natural gas discovery decreases energy prices.	<i>Input prices</i>	↑	AS₂
(E) Computer technology brings new efficiency to industry.	<i>Productivity</i>	↑	AS₂
(F) Government spending increases.	<i>N/A</i>	NC (affects AD)	AS
(G) Cuts in tax rates increase incentives to save and invest.	<i>N/A</i>	NC	AS
(H) Low birth rate will decrease the labor force in the future.	<i>Input prices</i>	NC (until the future)	AS
(I) Research shows that improved schools have increased the skills of American workers and managers.	<i>Productivity</i>	↑	AS₂

Possible Shapes of Short-Run Aggregate Supply Curve

In general, the SRAS has a positive slope. However, in special situations, the SRAS may be very flat or very steep, as shown below.



5. What does it tell you about the relationship between the price level and real GDP if the SRAS is flat? Under what conditions would an economy have a flat SRAS curve?

It tells you that real GDP and the price level are not related. This could happen when there are a lot of unemployed resources or a constant price level as in a recession or depression.

6. What does it tell you about the relationship between the price level and real GDP if the SRAS is steep? Under what conditions would an economy have a steep SRAS curve?

It tells you that changes in real GDP are not possible, only changes in the price level. This happens at the full employment level when any increase in AD will only result in an increase in prices.

