HE1002 Macroeconomics I

Problem Sheet 6 – Problems & Solutions

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Problem 6-1

Is there a negative, positive, or no relationship between the price level and the following components of aggregate demand?

(a) Consumption.

Solution:

Negative relationship. As the price level increases, the real value of household wealth decreases (wealth effect). Additionally, higher prices lead to higher interest rates (money market effect), which reduces consumption. Both effects reduce consumption when the price level rises.

(b) Investment.

Solution:

Negative relationship. As the price level increases, interest rates rise, making borrowing more expensive for firms. This reduces planned investment spending.

(c) Government spending.

Solution:

No relationship. Government spending is typically determined by policy decisions and is not directly affected by the price level.

(d) Net exports.

Solution:

Negative relationship. As the U.S. price level increases, American goods become relatively more expensive compared to foreign goods. This makes exports less competitive and imports more attractive, reducing net exports.

Problem 6-2

If the government cuts taxes, what components of aggregate demand are affected?

Solution:

Consumption (C) is directly affected. Lower taxes increase disposable income, leading to higher consumption spending. Since consumption is a component of aggregate demand, the cut in taxes increases aggregate demand directly through consumption.

Additionally, there may be indirect effects on investment if lower taxes improve business profits or consumer confidence, but the primary effect is on consumption.

Problem 6-3

Consider the planned aggregate expenditure lines in Figure 12P-1.

(a) Suppose that the planned aggregate expenditure lines correspond to price levels of 100, 110, and 120. Which line corresponds to which price level?

Solution:

As price level increases, the PAE curve shifts downward. Therefore:

- The highest PAE curve corresponds to **price level 100**
- The middle PAE curve corresponds to **price level 110**
- The lowest PAE curve corresponds to **price level 120**

(b) Use the information in the expenditure diagram to trace out the aggregate demand curve for this economy.

Solution:

For each price level, find the equilibrium output level (where PAE intersects the 45-degree line). Then plot these (price level, output) combinations to create the aggregate demand curve. The curve will be downward-sloping, showing the inverse relationship between price level and quantity demanded.

Problem 6-4

For each of the following shocks, say whether it is a demand-side shock or a supply-side shock.

(a) Consumer confidence falls.

Solution:

Demand-side shock. Lower consumer confidence reduces consumption spending, shifting aggregate demand to the left.

(b) Government spending increases.

Solution:

Demand-side shock. Government spending is a component of aggregate demand, so an increase shifts aggregate demand to the right.

(c) The price of foreign goods increases.

Solution:

Demand-side shock. Higher foreign prices make domestic goods relatively cheaper, increasing demand for exports and reducing demand for imports, shifting aggregate demand to the right.

(d) The price of oil increases.

Solution:

Supply-side shock. Oil is an important input in production. Higher oil prices increase production costs, shifting short-run aggregate supply to the left.

(e) A cyclone destroys manufacturing plants.

Solution:

Supply-side shock. Destruction of physical capital reduces productive capacity, shifting short-run aggregate supply to the left.

Problem 6-5

In the late 1990s, the U.S. experienced a technology boom. In part the boom was due to a revolution in communication technology that resulted in a massive expansion of the Internet; in part the boom was due to households and firms purchasing new computer equipment in anticipation of Y2K. What two curves of the model would be affected by these events?

Solution:
Two curves affected:

1. **Aggregate Demand (AD):** Households and firms purchasing new computer equipment increases investment spending, which is a component of aggregate demand. This shifts AD to the right.

2. **Long-Run Aggregate Supply (LRAS):** The technological revolution in communication technology (Internet) permanently increases the productive capacity of the economy, shifting LRAS to the right.

Both effects contribute to economic growth and expansion during the late 1990s.

Problem 6-6

Suppose the marginal propensity to consume (MPC) is either 0.55, 0.95, or 0.75.

(a) For each value of the MPC, calculate the expenditure multiplier, or the impact of a one-dollar increase in government spending on GDP.

Solution:

Formula: Expenditure multiplier $= \frac{1}{1-\text{MPC}}$

$$\text{MPC} = 0.55: \quad \text{Multiplier} = \frac{1}{1-0.55} = \frac{1}{0.45} = \mathbf{2.22}$$
$$\text{MPC} = 0.95: \quad \text{Multiplier} = \frac{1}{1-0.95} = \frac{1}{0.05} = \mathbf{20.00}$$
$$\text{MPC} = 0.75: \quad \text{Multiplier} = \frac{1}{1-0.75} = \frac{1}{0.25} = \mathbf{4.00}$$

(b) For each value of the MPC, calculate the impact on GDP of a \$250 million increase in government spending.

Solution:

$$\text{MPC} = 0.55: \quad \Delta\text{GDP} = 2.22 \times \$250 \text{ million} = \mathbf{\$555 \text{ million}}$$
$$\text{MPC} = 0.95: \quad \Delta\text{GDP} = 20.00 \times \$250 \text{ million} = \mathbf{\$5{,}000 \text{ million}}$$
$$\text{MPC} = 0.75: \quad \Delta\text{GDP} = 4.00 \times \$250 \text{ million} = \mathbf{\$1{,}000 \text{ million}}$$

(c) Explain the relationship between the MPC and the impact of a change in government spending on GDP.

Solution:

Higher MPC leads to larger multiplier effects. When the MPC is higher, households spend a larger proportion of each additional dollar of income, creating larger indirect effects. The multiplier increases as MPC increases because more of each dollar of government spending is re-spent in the economy.

Problem 6-7

Suppose the marginal propensity to consume (MPC) is either 0.75, 0.80, or 0.90.

(a) For each value of the MPC, calculate the impact of a one-dollar decrease in taxes on GDP.

Solution:

Formula: Tax multiplier $= \frac{-\text{MPC}}{1-\text{MPC}}$

$$\text{MPC} = 0.75: \quad \text{Tax multiplier} = \frac{-0.75}{1-0.75} = \frac{-0.75}{0.25} = \textbf{-3.00}$$
$$\text{MPC} = 0.80: \quad \text{Tax multiplier} = \frac{-0.80}{1-0.80} = \frac{-0.80}{0.20} = \textbf{-4.00}$$
$$\text{MPC} = 0.90: \quad \text{Tax multiplier} = \frac{-0.90}{1-0.90} = \frac{-0.90}{0.10} = \textbf{-9.00}$$

For a *decrease* in taxes, GDP increases by these magnitudes (removing the negative sign).

(b) For each value of the MPC, calculate the impact on GDP of a \$250 million decrease in taxes.

Solution:

$$\text{MPC} = 0.75: \quad \Delta\text{GDP} = 3.00 \times \$250 \text{ million} = \textbf{\$750 million}$$
$$\text{MPC} = 0.80: \quad \Delta\text{GDP} = 4.00 \times \$250 \text{ million} = \textbf{\$1,000 million}$$
$$\text{MPC} = 0.90: \quad \Delta\text{GDP} = 9.00 \times \$250 \text{ million} = \textbf{\$2,250 million}$$

(c) Explain the relationship between the MPC and the impact of a change in taxes on GDP.

Solution:

Higher MPC leads to larger tax multiplier effects. The tax multiplier is smaller in absolute value than the expenditure multiplier (by a factor of 1), but the principle is the same: higher MPC means more of each dollar saved through tax cuts is spent, creating larger multiplier effects on GDP.

Problem 6-8

Say whether the following statements are true or false.

(a) In the long run, prices don't affect output.

Solution:

True. In the long run, output is determined by potential output (the level of output when all resources are fully employed), which depends on the productive capacity of the economy. Prices do not affect this long-run capacity.

(b) In the short run, prices may affect output.

Solution:

True. In the short run, with sticky prices and wages, an increase in the price level can reduce consumption (through the wealth effect) and investment (through higher interest rates), reducing output in the short run.

Problem 6-9

Say whether the following statements are true or false.

(a) If the prices of all final goods and services are sticky, then the short-run aggregate supply (SRAS) curve is horizontal at the given price level.

Solution:

True. If prices cannot adjust (are perfectly sticky), firms will supply whatever quantity is demanded at the fixed price, making the SRAS curve horizontal.

(b) If the prices of inputs and wages are not fixed by contracts, and instead adjust more quickly to demand and supply shocks, then the SRAS curve is more vertical.

Solution:

True. If prices and wages adjust quickly, the economy moves quickly to long-run equilibrium. The SRAS curve becomes steeper (more vertical) because output becomes less responsive to price changes.

Problem 6-10

"Fracking" is a relatively new technology that allows drillers to extract significantly larger quantities of natural gas from existing deposits than was previously possible. How is this discovery likely to affect the economy? (Hint: Think about whether this will have a short-run or long-run effect.)

Solution:

Long-run effect: Fracking increases the productive capacity of the economy by making available more natural resources. This shifts the long-run aggregate supply curve (LRAS) to the right.

Economic impact:

- In the long run, potential output increases
- Real GDP increases
- Prices may decrease as supply increases

- The standard of living improves as more output is available

There may also be short-run effects if firms invest in fracking equipment (increasing investment and AD), but the primary effect is a rightward shift in LRAS.

Problem 6-11

Throughout the nineteenth and twentieth centuries, the U.S. economy experienced frequent ups and downs, but over the past 200 years, the real GDP in the United States rose from roughly $8.2 billion to over $16.1 trillion, an increase by a factor of nearly 2,000 times. This growth represents a change in which curve?

Solution:
This represents a change in the Long-Run Aggregate Supply (LRAS) curve.
The LRAS curve shifts to the right over time due to:

- Technological improvements
- Capital accumulation
- Human capital development
- Increases in the labor force
- Resource discoveries

The rightward shift of LRAS represents long-run economic growth and the increase in potential output.

Problem 6-12

Suppose that a statement by the chair of the Federal Reserve Board about the state of the economy causes a loss of consumer confidence. What will be the long-run impact on the economy if the government allows the economy to adjust without a policy response?

Solution:
Correct answer: (b) Output will return to its initial level in the long run, but the price level will be lower.
Explanation:

- **Short run:** Loss of consumer confidence reduces consumption, shifting AD left. Output falls below potential, and the price level falls.
- **Long run:** With output below potential, there is unemployment and slack in the economy. Wages and prices fall further, shifting SRAS to the right. Eventually, output returns to potential output (full employment), but at a lower price level.

Problem 6-13

For each of the following situations, use an AD/AS model to describe what happens to price levels and output in the United States in the short run. In each case, assume the economy starts in long- and short-run equilibrium, and describe the appropriate shifts in the AS or AD curves.

(a) A stock market crash reduces people's wealth.

Solution:

AD shifts left (wealth effect reduces consumption). **Short-run result:** Output decreases and price level decreases.

(b) The spread of democracy around the world increases consumer confidence in the United States.

Solution:

AD shifts right (higher consumer confidence increases consumption). **Short-run result:** Output increases and price level increases.

(c) The European economy crashes.

Solution:

AD shifts left (reduced demand for U.S. exports). **Short-run result:** Output decreases and price level decreases.

(d) The United States enters into an arms race with China, resulting in a significant increase in military spending.

Solution:

AD shifts right (government spending increases). **Short-run result:** Output increases and price level increases.

(e) A revolution in Iran results in a significant reduction in the world's supply of oil.

Solution:

SRAS shifts left (oil is an important input; higher oil prices increase production costs). **Short-run result:** Output decreases and price level increases (stagflation).

(f) Terrorist activities temporarily halt the ability of Americans to engage in certain productive activities such as transportation and finance.

Solution:

SRAS shifts left (reduced productive capacity due to disruption). **Short-run result:** Output decreases and price level increases.

(g) Intel develops a new computer chip that is faster and cheaper than previous chips.

Solution:

SRAS shifts right (improved technology reduces production costs). **Short-run result:** Output increases and price level decreases.

(h) A summer of perfect weather in the Midwest leads to record harvests of corn, wheat, and soybeans.

Solution:

SRAS shifts right (increased agricultural production increases aggregate supply). **Short-run result:** Output increases and price level decreases.

Problem 6-14

For each of the following scenarios, say whether the shock was a demand-side shock, a supply-side shock, or a combination of both shocks.

(a) The price level and GDP both fell. GDP then increased, but the price level fell even further.

Solution:

Supply-side shock. SRAS shifts right: price falls and output increases.

(b) In the long run, the economy had the same level of output but a higher price level.

Solution:

Demand-side shock. AD shifts right, causing higher prices, but in the long run output returns to potential.

(c) In the short run, the price level increased, but GDP fell.

Solution:

Supply-side shock. SRAS shifts left: stagflation (falling output, rising prices).

(d) In the long run, GDP increased, and the price level fell.

Solution:

Supply-side shock. LRAS shifts right, increasing potential output and reducing prices.

(e) In the long run, GDP increased, and the price level was constant.

Solution:

Supply-side shock. LRAS shifts right, increasing potential output while prices remain stable due to stable demand.

Problem 6-15

In 2009, during the height of the U.S. financial crisis, real GDP fell 3.5 percent, and the Consumer Price Index fell from 215.3 to 214.9. Was this recession likely caused by a shift in aggregate demand or aggregate supply?

Solution:

Aggregate demand shock. Both output fell and prices fell (deflation), which is characteristic of a leftward shift in AD. A supply-side shock would typically result in either rising prices (supply decrease) or the price level not falling as much as output (supply increase).

Problem 6-16

In 1974, GDP fell by 0.6 percent, and inflation increased from 6.2 percent to 11.0 percent. Was this recession likely caused by a shift in aggregate demand or aggregate supply?

Solution:

Aggregate supply shock (stagflation). The combination of falling output and rising prices is characteristic of a leftward shift in SRAS, likely due to the oil price shocks of the early 1970s. This is the classic stagflation scenario.

Problem 6-17

Suppose a stock market crash reduces people's wealth.

(a) Show what happens to price levels and output in the U.S. in the short run.

Solution:

Short run: AD shifts left (wealth effect reduces consumption). Output decreases below potential output, and the price level decreases.

(b) Suppose the government takes no action to help the economy. What happens to price levels and output in the long run?

Solution:

Long run: Output gradually returns to potential output. Prices and wages fall further, shifting SRAS to the right until equilibrium is restored at the potential output level with a lower price level.

(c) Suppose, instead, the government decides to take action to help the economy. What action(s) would you recommend? Why?

Solution:

Recommended policies:

- **Expansionary fiscal policy:** Increase government spending or cut taxes to shift AD right and restore output to potential.
- **Expansionary monetary policy:** Lower interest rates to encourage investment and consumption.

Rationale: These policies speed up the recovery by avoiding the prolonged period of adjustment and unemployment that occurs when the economy adjusts on its own.

(d) If the U.S. government makes the appropriate policy response, what happens to price levels and output in the long run?

Solution:

With appropriate policy: Output returns to potential more quickly and smoothly. Depending on the magnitude of the policy response, prices may stabilize near their initial level rather than falling, avoiding deflation.

Problem 6-18

Suppose the spread of democracy around the world increases consumer confidence in the United States.

(a) Show what happens to price levels and output in the United States in the short run.

Solution:

Short run: AD shifts right (higher consumer confidence increases consumption). Output increases above potential output, and the price level increases.

(b) Suppose the government takes no action to help the economy. What happens to price levels and output in the long run?

Solution:

Long run: Output gradually returns to potential output. Prices and wages rise, shifting SRAS to the left until equilibrium is restored at the potential output level with a higher price level.

(c) Suppose, instead, the government decides to take action to help the economy. What action(s) would you recommend? Why?

Solution:

Recommended policies:

- **Contractionary fiscal policy:** Decrease government spending or raise taxes to shift AD left.
- **Contractionary monetary policy:** Raise interest rates to discourage investment and consumption.

Rationale: These policies prevent overheating and inflation by keeping output at the potential level.

(d) If the U.S. government makes the appropriate policy response, what happens to price levels and output in the long run?

Solution:

With appropriate policy: Output remains at potential, and prices remain stable, avoiding inflation.

Problem 6-19

Suppose a revolution in Iran results in a significant reduction in the world's supply of oil.

(a) Show what happens to price levels and output in the United States in the short run.

Solution:

Short run: SRAS shifts left (oil price increases, raising production costs). Output decreases below potential output, and the price level increases (stagflation).

(b) Suppose the government takes no action to help the economy. What happens to price levels and output in the long run?

Solution:

Long run: Over time, the economy adjusts. Higher prices and lower output reduce aggregate demand, wages and prices fall, and SRAS shifts back. Eventually, equilibrium is restored at the potential output level.

(c) Suppose, instead, the government decides to take action to help the economy. What action(s) would you recommend? Why?

Solution:

Recommended policies:

This is a difficult situation because the shock causes both lower output and higher prices. Options include:

- **Mixed response:** Small expansionary policy to partially offset the output loss, accepting some inflation.
- **Adjust to the shock:** Accept the temporary stagflation while the economy adjusts naturally.

Rationale: A strong expansionary response would worsen inflation without significantly increasing output beyond the supply constraint.

(d) If the U.S. government makes the appropriate policy response, what happens to price levels and output in the long run?

Solution:

With appropriate policy: The economy returns to potential output, but at a higher price level due to the supply shock. The adjustment is smoother than without intervention.

Problem 6-20

Suppose a summer of perfect weather in the Midwest leads to record harvests of corn, wheat, and soybeans.

(a) What happens to price levels and output in the United States in the short run?

Solution:

Short run: SRAS shifts right (increased agricultural production increases aggregate supply). Output increases above potential output, and the price level decreases.

(b) Suppose the government takes no action to help the economy. Show what happens to price levels and output in the long run.

Solution:

Long run: Lower prices reduce overall price level expectations. Eventually, AD adjusts and SRAS shifts back, returning output to potential with the lower price level now permanent.

(c) If the U.S. government reacts to the record harvests by increasing taxes or decreasing spending, what happens to price levels and output in the long run?

Solution:

Long run: Contractionary fiscal policy shifts AD to the left, offsetting the rightward shift in SRAS. Output remains at or below potential, and prices fall further.

(d) What is the problem associated with the government reacting to the record harvests by increasing taxes or decreasing spending?

Solution:

The problem: A favorable supply shock (like record harvests) increases productive capacity and should be allowed to boost the economy's standard of living. By implementing contractionary fiscal policy, the government essentially wastes this opportunity for improved welfare.

The record harvest naturally increases output—preventing this through fiscal contraction means consumers don't benefit from the increased production. The appropriate policy response is to do nothing and allow output and consumption to increase while prices fall.