

# Exam 2. Econ520. Fall 2025

Professor Lutz Hendricks  
UNC, Department of Economics

## Instructions

- Answer all questions.
- **Write legibly.** I cannot grade what I cannot read.
- Write your answers on the question sheets. Use additional pages, if needed.
- **Explain** your answers – do not just state them.
- Show your derivations – do not just state the final result.
- Do not refer to any **notes or books**. You may use a calculator.
- The total time is **75 minutes**.
- The total number of points is **100**.

Name	PID

## 1. Short Questions

1. (30 points) In the AS/AD model, explain what happens as we **move along the AD curve** from high to low prices. How do consumption, investment, and the interest rate change?

Based on your intuition, how would you expect the slope of the AD curve to depend on the **interest elasticities** of

- investment (the  $b_2$  in  $I = \bar{I} + b_1 Y - b_2 i$ ) and of
- money demand (the slope of  $L(i)$  in  $M^D = Y \times L(i)$ ).

Here I am looking for intuition rather than a derivation.

**Answer:** Here is an answer from Lumo (a bit wordy, but pretty good and clear):

In the aggregate-demand (AD) framework the AD curve shows the combinations of output (Y) and the overall price level (P) at which the goods market clears, given the prevailing monetary-policy stance. When we travel from a higher price level to a lower one, three key variables shift in a fairly predictable way:

Consumption (C): Rises. Because income  $Y$  rises. (LH: Corrected Lumo's answer to fit our model.)

Investment (I): Rises. Investment depends on two forces: the real interest rate and expected profitability. A fall in (P) reduces the real interest rate, lowering the cost of financing new capital projects. At the same time, higher demand for goods increases investment (LH: slightly modified to fit our model). Both effects encourage firms to increase planned investment.

Interest rate ( $i$ ) (nominal): Falls. In the standard IS-LM picture, a lower price level shifts the LM curve rightward because the same amount of nominal money now represents a larger real stock ( $(M/P)$ ). To restore equilibrium in the money market, the nominal interest rate must decline until money demand matches the larger real money supply. Hence, moving down the AD curve is accompanied by a lower nominal (and usually also real) interest rate.

Putting these pieces together, the downward-sloping AD curve reflects the fact that a lower price level makes real balances larger, which pushes both consumption and investment up while simultaneously pulling the interest rate down.

Intuition about the slope of the AD curve The steepness (or flatness) of the AD curve tells us how much output changes for a given change in the price level. Two structural parameters shape that responsiveness:

1. Interest-elasticity of investment – the coefficient ( $b_2$ ) in  $I = \bar{I} + b_1 Y - b_2 i$

Higher ( $b_2$ ) (more interest-elastic investment):

- A small reduction in the interest rate produces a relatively large boost in investment.
- Since a fall in (P) lowers the interest rate, the resulting rise in (I) (and thus in total demand) is amplified.
- Consequently, a modest price-level drop generates a large increase in output, making the AD curve flatter (more horizontal).

2. Interest-elasticity of money demand – the slope of  $L(i)$  in  $M^D = Y \times L(i)$

Steeper money-demand curve (high sensitivity of (L) to (i)):

- When the interest rate falls, people sharply reduce their demand for real balances (they prefer to hold less money and more interest-bearing assets).

- This rapid fall in money demand offsets the increase in real money balances caused by a lower price level, requiring a larger drop in the interest rate to re-equilibrate the money market.
- The larger interest-rate movement feeds back into consumption and investment, again producing a flatter AD curve.

Putting it together: Flat AD curve → output is very responsive to price-level changes. This occurs when either (or both) of the following hold:

- Investment is highly interest-elastic ( $b_2$  large).
- Money demand is highly interest-elastic (the slope of  $L(i)$  steep).

2. (20 points) The short-run effects of an **unanticipated** monetary expansion differ from that of an **anticipated** expansion. Illustrate the difference in an AS/AD diagram. Explain in words how the difference comes about.

You need not explain all the outcomes of the monetary expansion. Focus on the changes in prices and output.

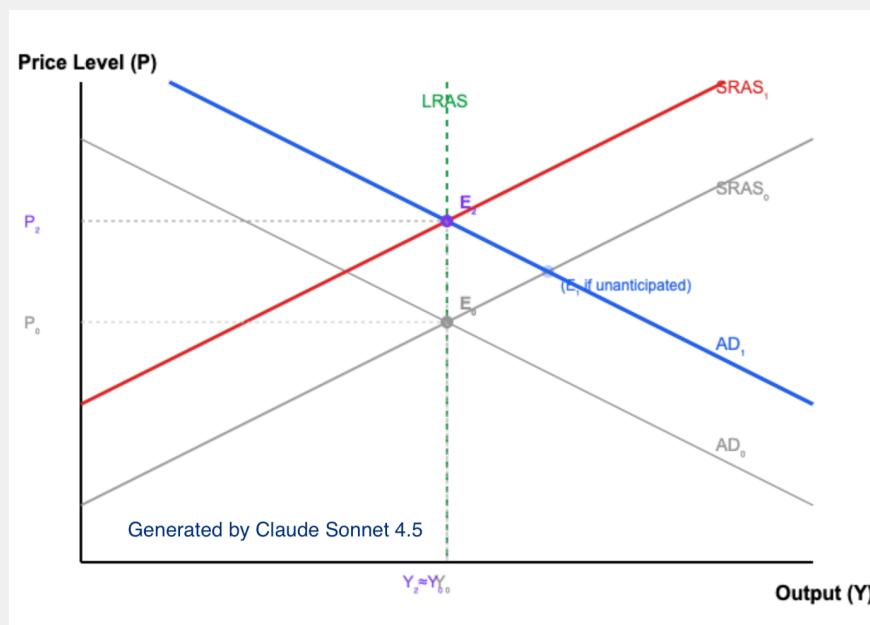
**Answer:** This is the answer produced by Claude Sonnet 4.5.

#### Unanticipated monetary expansion:

- AD shifts right
- Firms see higher demand but haven't adjusted wage contracts or price expectations
- They increase both output and prices
- Movement along the existing short-run AS curve

#### Anticipated monetary expansion:

- AD shifts right (same as above)
- Workers and firms expect inflation before it happens
- They build higher inflation into wage contracts and pricing decisions
- This shifts the short-run AS curve left (up)
- Result: Prices rise more, output rises less (or not at all)



#### Why This Happens

The mechanism is expectation formation. When expansion is unanticipated, price expectations are fixed. Higher aggregate demand means firms can sell more at higher prices. With sticky price expectations, perceived real wages rise temporarily. Workers supply more hours and produce more output.

When expansion is anticipated, workers demand higher nominal wages. They expect inflation. Firms agree because they also expect to raise prices. The short-run AS curve shifts up to reflect higher expected costs. The output effect is muted or eliminated. Most of the adjustment occurs through prices alone. (I adjusted the intuition slightly to fit our model better.)

## 2. Supply Shock and the Phillips Curve

Recall that the Phillips Curve is given by

$$\pi = \pi^e + m + z - \alpha u$$

Consider an economy that starts at full employment. It is then hit by a permanent negative supply shock, represented by an **increase in the markup  $m$** .

### Questions:

1. (15 points) Explain what happens to the Phillips Curve when  $m$  increases. Explain the intuition.

**Answer:** Recall that the Phillips Curve is essentially  $AS$  rewritten in inflation terms. Just as a higher  $m$  shifts  $AS$  to the left, a higher  $m$  shifts the Phillips Curve to the right. The shift is to the right because lower  $Y_n$  means higher  $u_n$ .

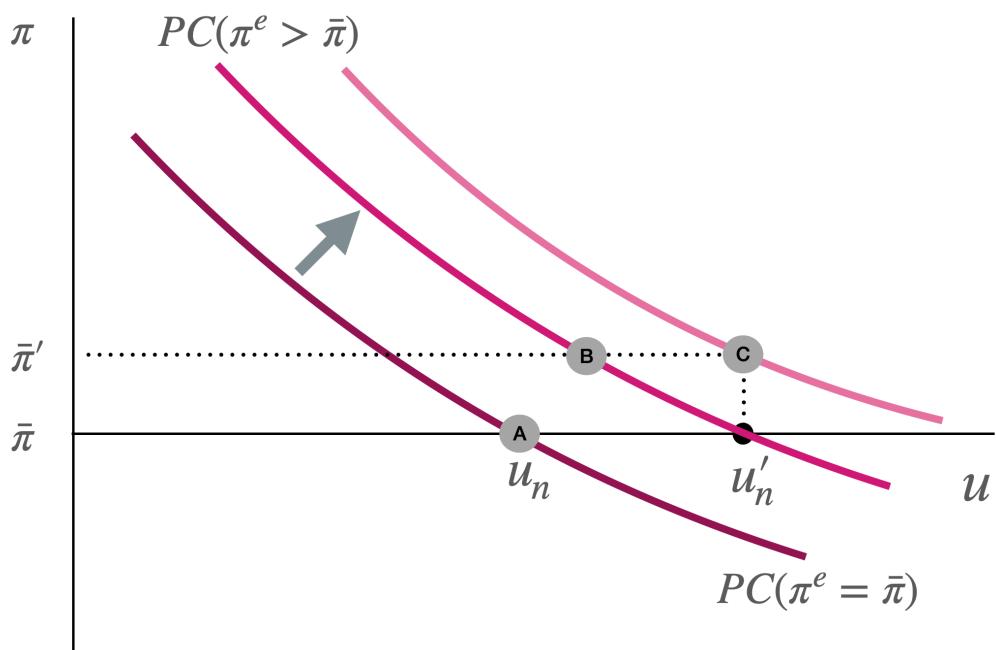
Intuition: Lower real wage reduces labor supply.

2. (35 points) Suppose that the Fed decides to keep output and employment at their pre-shock levels. It does so by increasing the money growth rate once. Then it keeps the money growth rate constant forever at that higher level.

- What do you expect to happen to inflation?
- What about inflation expectations?
- What happens to output and employment over time?

Explain and illustrate in your graph.

### Answer:



The economy moves to higher inflation, to the north-east along the new PC ( $A \rightarrow B$ ). Here, I don't actually impose that the Fed holds output constant at the original  $u_n$ . It is enough to assume that output is above the new  $u'_n$ .

Unless inflation expectations are well-anchored, they will start to rise because  $\pi > \pi^e$ . Hence, the PC will shift up.

Since the Fed keeps inflation constant, the economy moves gradually eastward ( $B \rightarrow C$ ).

Eventually, the economy returns to full employment, but at a higher inflation rate. In sum:

- Output initially remains high, but gradually returns to the now lower full-employment level.
- Inflation rises and then remains high permanently.
- Inflation expectations gradually catch up with inflation.

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End of exam

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