Exam 2. Econ520. Fall 2026

Professor Lutz Hendricks
UNC, Department of Economics

Instructions

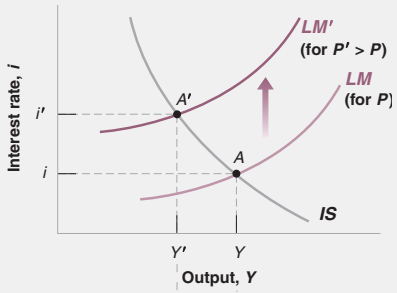
- Answer all questions.
- **Write legibly**. I cannot grade what I cannot read.
- Write your answers on the question sheets. Use additional pages, if needed.
- **Explain** your answers – do not just state them.
- Show your derivations – do not just state the final result.
- Do not refer to any **notes 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. (25 points) Show graphically in an IS/LM diagram how the AD curve is derived.
Now imagine that a parameter change makes the IS curve flatter (it does not matter which parameter changes). Does this change make the AD curve flatter or steeper? *Explain* your answer.

Answer:



Derivation: Start at the IS/LM equilibrium A with price level P. Now raise the price level to $P' > P$.

- Higher P lowers the real money supply M/P.
- LM shifts up: at the old Y, money demand now exceeds the smaller real money supply. The interest rate must rise to bring money demand down.
- The new equilibrium A' lies up and to the left along IS: i rises and Y falls. Higher i reduces investment; lower Y reduces consumption.
- Each price level gives one IS/LM equilibrium. Plotting the pairs (Y, P) traces out the downward-sloping AD curve.

Flatter IS makes AD flatter:

- A change in P shifts LM, but not IS. So the equilibrium moves along IS.
- A flatter IS means that demand responds strongly to the interest rate. The same LM shift then lowers Y by more (and raises i by less).
- So a given change in P causes a larger change in Y. That is a flatter AD curve.
- Examples: investment is more interest sensitive (larger b_2 in $I = \bar{I} + b_1 Y - b_2 i$), or the multiplier is larger.

Grading: The derivation (graph with two price levels, the LM shift, and the resulting AD points) and the slope argument count about equally. The slope argument must explain why the equilibrium moves along IS.

2. (20 points) Explain the economic logic underlying the following quote:

> The interest rate our country pays on its debt has increased sharply … It's shot up so much that it is now equal to our growth rate. That's a potential game changer for debt sustainability.
>
> — Bernstein (NYT, 2025)

Why does it matter that the interest rate is no longer below the growth rate?

Answer: Debt dynamics: New bond issues are $\Delta B = rB - S$, where $S = T - G$ is the primary surplus. Debt grows at rate $g(B) = r - S/B$. Debt/output grows at rate $r - g - S/B$. Keeping B/Y from exploding requires $S/B \geq r - g$.

Until recently ($r < g$): The government could run primary deficits ($S < 0$) forever without B/Y exploding. If it rolls over all interest, debt grows at r, but output grows faster at g. So B/Y falls. Borrowing was almost a free lunch: more debt did not require higher future taxes.

Now ($r = g$): The condition becomes $S/B \geq 0$. Rolling over the interest still keeps B/Y constant. But any primary deficit now raises B/Y. The U.S. runs large primary deficits, so B/Y keeps rising.

Why a "game changer": If r rises above g, we are back in the traditional case. The government must run primary surpluses $S \geq (r - g)B$. The larger the debt, the larger the required surpluses (higher taxes or lower spending). With debt around 100% of GDP, even a small gap matters. Example: $r - g = 1\%$ requires a primary surplus of 1% of GDP. Starting from a primary deficit of about 3% of GDP, that is a fiscal adjustment of about 4% of GDP. Waiting makes it worse: debt keeps growing, so the required surpluses grow too. The interest share of the budget rises.

"Potential" because nobody knows whether r will stay this high.

Note: It does not matter whether r and g are real or nominal, as long as both are measured the same way. Inflation adds to both.

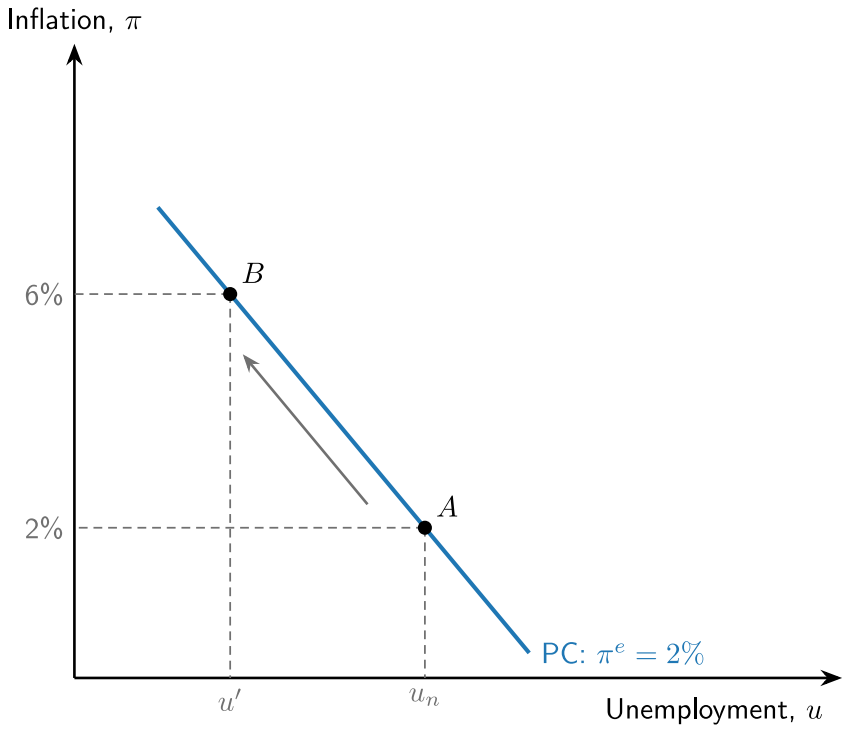
Grading: The key elements are (1) what matters is B/Y, not B; (2) with $S = 0$, debt grows at r while output grows at g; (3) $r < g$ allows permanent primary deficits, while $r > g$ requires surpluses that grow with the debt.

2. An Election Boom

Recall the Phillips Curve

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

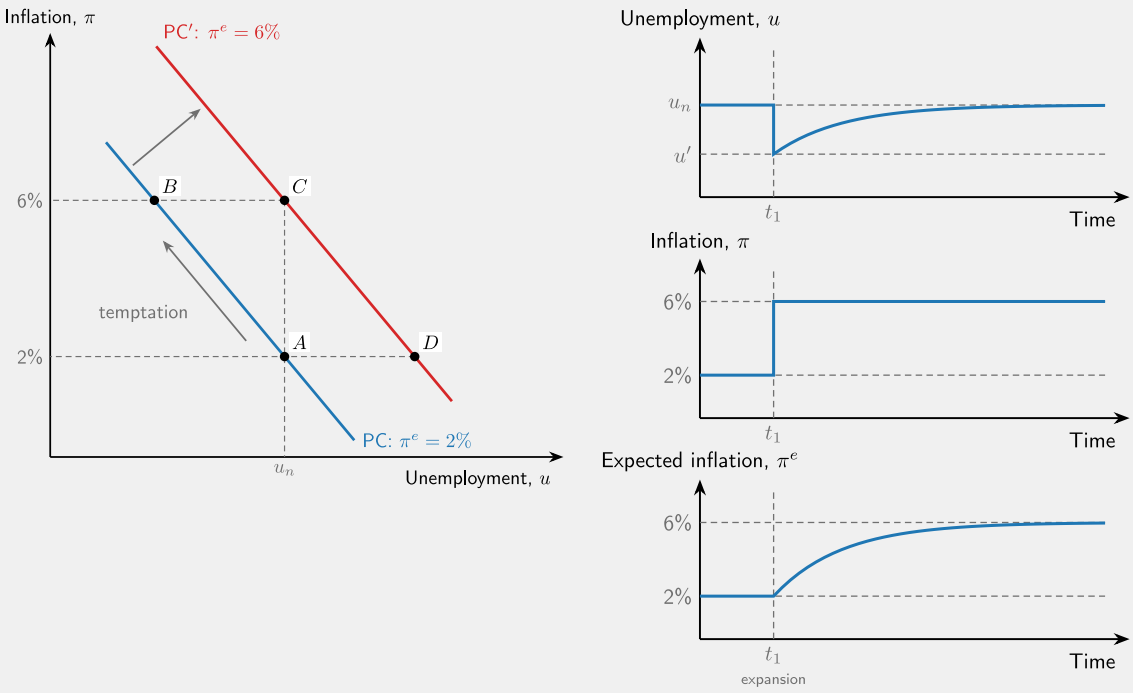
The economy starts at full employment ($u = u_n$) and 2% inflation. Inflation expectations are sticky in the short run and move towards actual inflation over time.
Consider a policy maker who controls the Fed. The policy maker would like to stimulate employment before the next election. They do so by loosening monetary policy, hoping to move the economy along the Phillips Curve from A to B.
The graph shows points A and B. The answer boxes for parts 1 and 2 contain copies of this graph for your answers.



Questions:

1. (22 points) Suppose that the economy reaches point B. Then, after the election, the Fed keeps inflation at 6%. What happens **over time** to inflation expectations, unemployment, and inflation? Illustrate in the Phillips Curve graph below. Plot the time paths of u, π, and π^e in the charts next to it. Be sure to *explain* your answer.

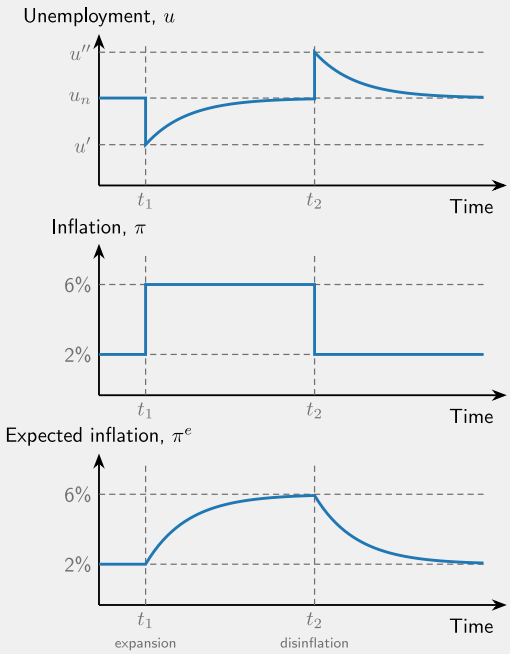
Answer:



Because $\pi > \pi^e$, inflation expectations rise over time. The Phillips Curve shifts up. With inflation held at 6%, unemployment rises back to u_n ($B \to C$).
In the end: $u = u_n$, but inflation is permanently higher ($\pi = \pi^e = 6\%$). The employment gain was temporary. Keeping u below u_n would require ever accelerating inflation.

2. (22 points) What is the downside of the expansion? Starting from where the economy ends up in part 1, what would it take to bring inflation back down to 2%? Illustrate in the Phillips Curve graph below. Plot the time paths of u, π, and π^e in the charts next to it.

Answer:



The downside is permanently higher inflation. To bring inflation back to 2%, the Fed must push inflation below $\pi^e = 6\%$. The economy moves down along the new Phillips Curve to D: a recession ($u > u_n$). Only as π^e falls does the Phillips Curve shift back down, and the economy returns to A.
The pre-election boom is paid for with a recession later.

3. (11 points) Now suppose households and firms know that the policy maker controls the Fed and plans to stimulate the economy before the election. How does this change your answers? In light of your answer, why might it be a good idea to make the Fed independent?

Answer: Wage setters now expect the pre-election expansion and raise π^e in advance. The Phillips Curve shifts up before the expansion. The expansion then only produces higher inflation (C), with no gain in employment. If the Fed does not expand, the economy ends up in a recession (D).
An independent Fed that is committed to low inflation removes the expectation of a pre-election boom. Inflation expectations stay anchored at 2% and the economy stays at A: lower inflation at no cost in employment.

End of exam