Exam 1. Econ520. Spring 2024

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UNC

Instructions:

- Answer all questions.

- Write legibly.

- If you need more space, attach additional pages. Number your answers. Do not write on the back of the pages.

- *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 75.

Name:	PID:

1 Short Questions

Here, I am looking for short answers that get to the main point. No models are needed, unless I specifically ask for them.

1. [10 points] What is a **liquidity trap**? In words, why does it render conventional monetary policy ineffective? How could the Fed still stimulate aggregate demand in a liquidity trap? You need not graph the IS/LM curves to answer this question.

   Answer ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

   Liquidity trap: demand for money becomes highly interest elastic. Typically that happens when interest rates get very close to zero, so that the opportunity cost of holding money is also close to zero. I gave full credit for answers along the lines: a liquidity trap occurs when the interest rate hits zero.

   Monetary policy becomes ineffective because the Fed has trouble changing the interest rate. The normal transmission mechanism ($i \downarrow \implies I \uparrow$) is then broken.

   To be effective, the Fed needs to change either the real interest rate (inflation expectations) or expectations about future output or interest rates. Note: The Fed does not control fiscal policy (the treasury and congress do); changing G is not a valid answer.

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2. [10 points] Explain the economic mechanism that generates an **upward sloping aggregate supply** curve (AS rises with P). And why does the supply curve shift when price expectations change? In class, we talked about two mechanisms. You can pick either one.

   Answer ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

   Upward sloping supply curve: In both stories, what matters is the discrepancy between actual and expected prices. It is really $Y^s (P/P^e)$.

   (a) My preferred story: Unanticipated inflation erodes real wage. Wages are set based on P^e such that W/P^e results in full employment (whatever that means). After wages have been set, shocks hit (e.g. Fed actions) that determine that actual P. Labor demand depends on the real wage W/P. If $P > P^e$, wages are set "too low." Real wages are below workers' target level. Firms hire more workers and employment is above full employment.

   (b) The story in the AS/AD model (less logical, but easier to write down mathematically): Labor supply is increasing in the real wage, but workers do not see the actual price level. Instead, they look at W/P^e. Inflation drives up W somehow (not W/P, but the nominal wage). In our model, firms set $W = (1 + m) P$. Workers see a high nominal wage and think it reflects a high real wage.

In both cases, it is apparent that only P/P^e matters, not P by itself. This is why P^e shifts the AS curve. Key implication: anticipated inflation is neutral.

Note: the question asks about the economic mechanism. A math answer along the lines of "in the labor supply equation $\left(Y^s = F\left(\frac{P}{P^e}\frac{1}{1+m}, z\right)\right)$, higher P^e reduces the argument of F" does not really answer the question.

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3. [12 points] Suppose the Fed implements an interest rate target. That is, the Fed adjusts M to hold $i = i^*$ no matter what. What would the AD curve look like (in a closed economy)? Derive your answer using the IS/LM diagram below. Explain in words what you find.
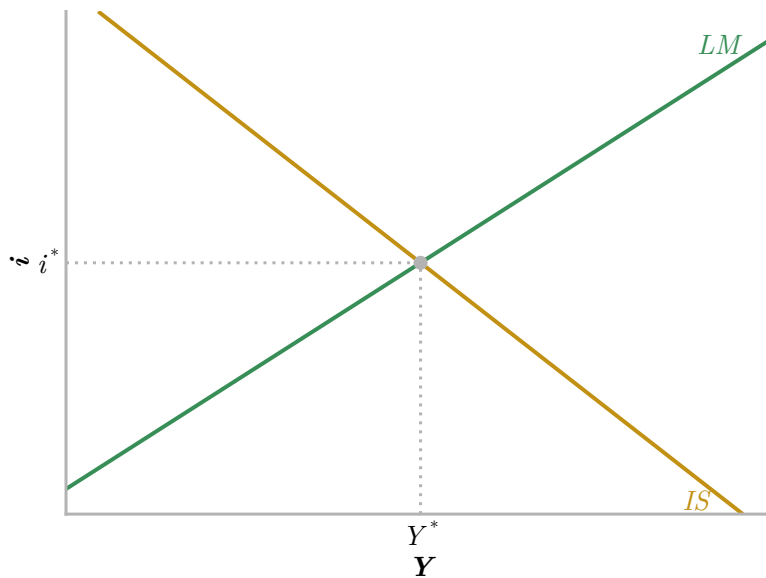
Answer

The AD curve would be vertical (independent of P). The transmission mechanism from prices to AD works only through i (in the closed economy).

Details: AD is derived by tracing out intersections of IS/LM as P varies. In our baseline model, higher P shifts LM left and raises i. That's why AD falls.

When the Fed fixes i: higher P does nothing in the IS/LM diagram. The Fed increases M to hold $i = i^*$.

Note: The question asks "what does AD look like?" It is not about any shifts in AD. The question is also not about policy effectiveness.

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4. [10 points] Across all of our AS/AD models (closed and open economy) we found that increasing government spending does change not medium run output. What is the intuition for this general result?

Answer

Mechanically, the reason is that the MR-AS curve is vertical. Then it determines Y while demand only determines P.

The intuition for this result is as follows. AS is basically determined by technology (think real wage) and household preferences (how much to work for a given real wage). The price level "should" not play a role. Without any price (expectations) stickiness, raising G would simply crowd out some other form of demand (e.g., I via higher i). This does not affect real wages or the incentives to work and hence AS).

In the short run, sticky prices drive a wedge between prices and price expectations. That changes perceived real wages. But the stickiness eventually resolves (P^e catches up with P).
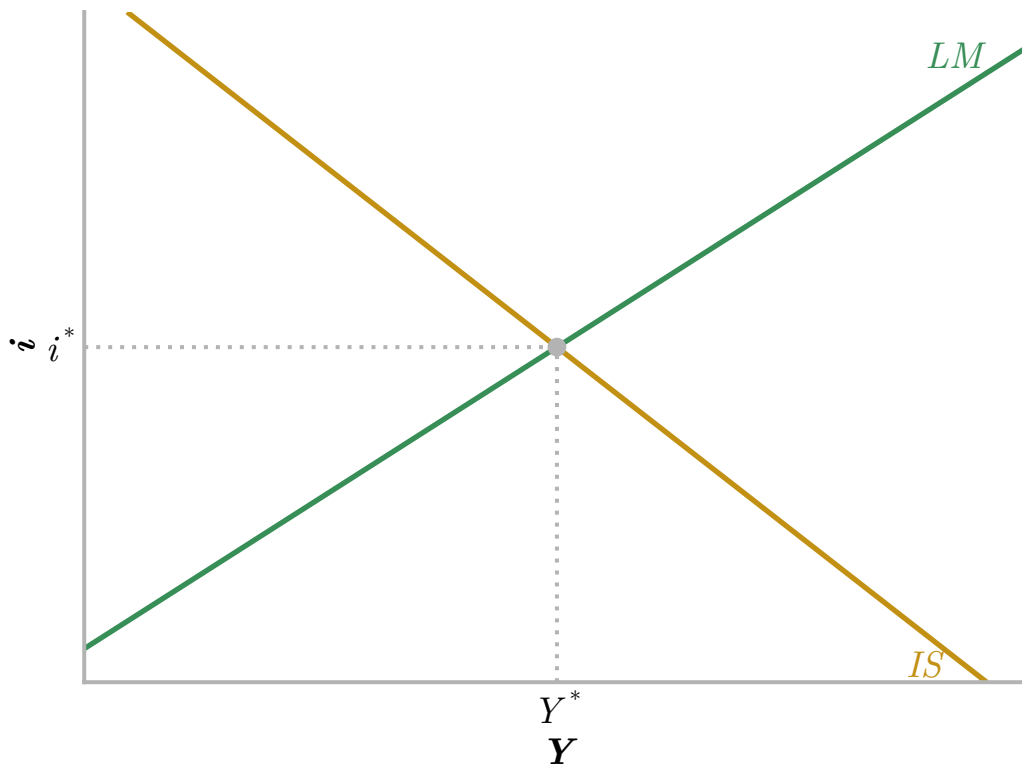
2 Overshooting

Recall the equations for the AS/AD model:

- AS: $Y = F\left(\frac{P}{P^e}\frac{1}{1+m}, z\right)$

- IS: $Y = C(Y - T) + G + I(Y, i)$

- LM: $M/P = YL(i)$

Consider an economy starts in the medium-run equilibrium where $P = P^e$. The treasury reduces G which shifts AD left. The economy now looks like this:
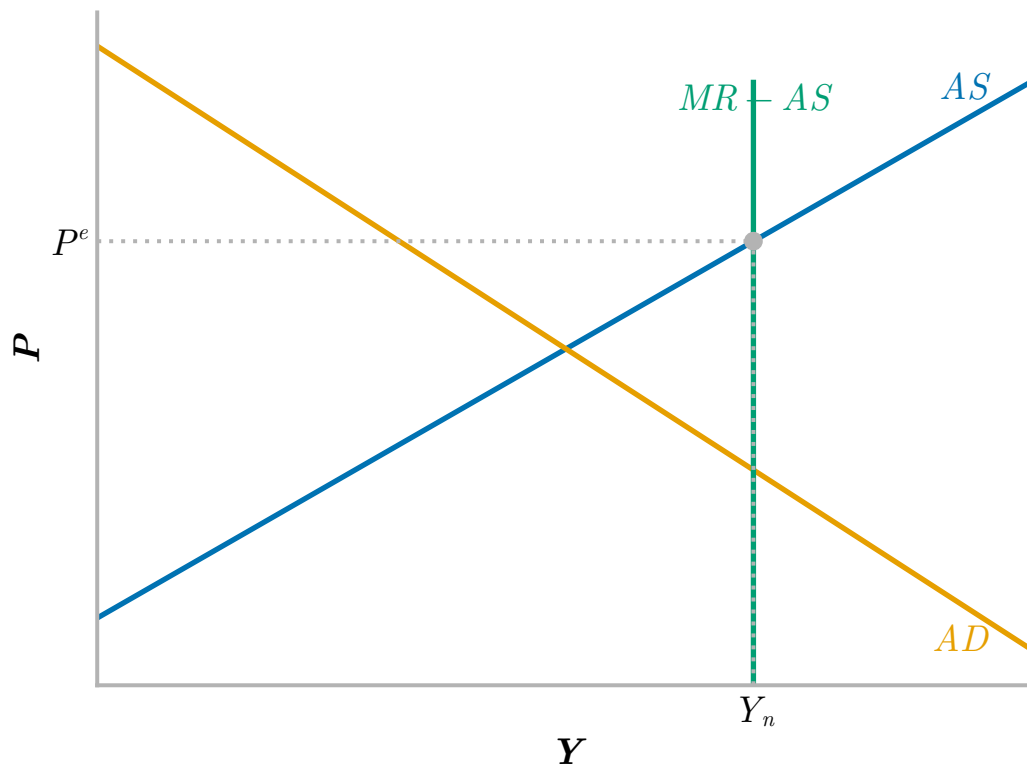
And the IS/LM graph underlying AD before G is reduced looks like this:

LM

i i^*

IS

Y^*

Y

Questions

1. [15 points] Graph and explain the **short and medium run** effects of this shock. Be sure to explain how consumption, investment, and the interest rate change.

   Answer

   We did all of this in class. See the slides on government spending shocks.

   Do not forget that lower P shifts LM to the right.

   MR: $Y-, P\uparrow$ from the graph. Therefore $C-$. From IS/LM: $i\uparrow$ and therefore $I\downarrow$. From money market clearing (or IS/LM): $M/P\downarrow$ (also because $P\uparrow$).
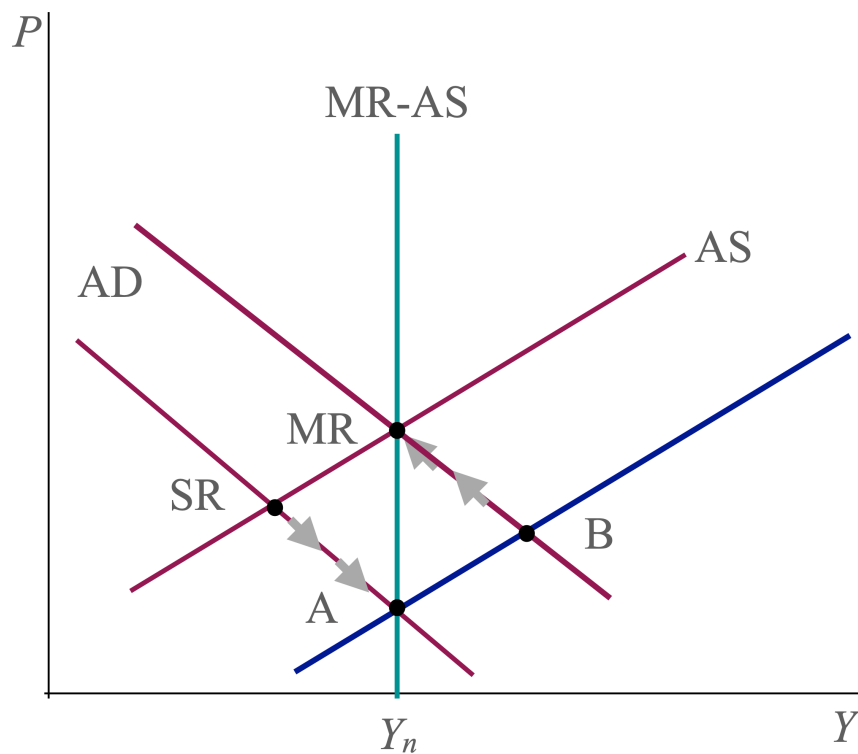
   SR: $Y\uparrow, P\uparrow$ from the graph. Therefore $C\uparrow$. From IS/LM: $i\uparrow$ and therefore I ambiguous. $M/P\downarrow$ because prices up.

2. [18 points] Now suppose the Central Bank attempts to counteract the shock through a **monetary expansion**. However, the policy affects AD only **with a lag**. Illustrate how this can lead to an overshooting of output (Y rises above Y_n) and additional inflation.
   This is easiest to graph if you assume that the monetary expansion only takes effect when the economy has reached the medium run equilibrium described in part 1.

Answer

The economy starts (after the shock) at point SR. Given the assumption that AS shifts first, the economy follows its usual $SR \to MR$ transition to point A. Now the monetary stimulus kicks in which shifts AD right. The economy is at point B. Since we are above full employment, AS shifts left again until we reach MR.

The end result is overshooting for full employment output and a period of inflation ($A \to MR$).

End of exam.