

Problem Set 5 Answers

Due in lecture on **Wednesday, December 13th**. No late submissions will be accepted. Make sure your name is on your problem set, as well as the name of your (*official*) TA.

1. “In a world with currency holdings and where banks hold excess reserves, if reserve requirements on checkable deposits were set at zero, the amount of multiple deposit expansion would go on indefinitely.” Is this statement true, false, or uncertain? Explain.

False. There would still be leakage into currency and excess reserves that would limit the increase in deposit expansion. We can also see this in Equation (4) because the denominator will not equal zero if $r = 0$; therefore, the money multiplier will not be infinite.

2. Why might the procyclical behavior of interest rates (rising during business cycle expansions and falling during recessions) lead to procyclical movements in the money supply?

The rise in interest rates in a boom increases the cost of holding excess reserves and the incentives to borrow from the Fed. Therefore, e falls, which increases the amount of reserves available to support checkable deposits, which raises the monetary base. The result is a higher money supply during a boom. Similarly, when interest rates fall during a recession, the money supply also has a tendency to fall because e rises.

3. “The only way that the Fed can affect the level of borrowed reserves is by adjusting the discount rate.” Is this statement true, false, or uncertain? Explain your answer, using graphs if helpful.

False. The Fed also can affect the level of borrowed reserves by directly limiting the amount of discount loans an individual bank can have. (Although the text mentions that for the overall economy, it will be hard to control borrowed reserves w/o resort to changing the discount rate.)

4. If the Fed has an interest-rate target, why will an increase in the demand for reserves lead to a rise in the money supply?

An increase in the demand for reserves will raise the federal funds target. In order to prevent this, the Fed will buy bonds, thereby increasing the amount of nonborrowed reserves, which shifts the supply curve for reserves to the right, thereby keeping the fed funds rate from rising. The open market purchase will then cause the monetary base and the money supply to rise.

5. Suppose the Fed targets the Fed Funds rate by using this rule:

$$i_{ff}^* = \pi + i_{r,ff}^* + 0.5 \times (\pi - \pi^*) + 0.5 \times (y - y^*)$$

Where $i_{r,ff}^*$ is the equilibrium real Fed Funds rate, π is the inflation rate, π^* is the target inflation rate, y is log real GDP, and y^* is log potential GDP. Hence, $(\pi - \pi^*)$ is the inflation gap and

$(y - y^*)$ is the output gap. If the inflation gap rises from 0 to 2 percent (0.02), but the output gap falls by 1 percent (0.01), what should happen to the target Fed Funds rate? Show your work.

Take the total differential of the Taylor rule:

$$\Delta i_{ff}^* = \Delta \pi + \Delta i_{r,ff}^* + 0.5 \times \Delta(\pi - \pi^*) + 0.5 \times \Delta(y - y^*)$$

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The answer depends on whether the inflation gap rises because $\Delta(\pi - \pi^*) = 0.02$, with $\Delta \pi = 0.0$, or because $\Delta \pi = 0.02$. In the former case,

$$\Delta i_{ff}^* = 0.5 \times (0.02) + 0.5 \times \Delta(-0.01) = 0.005$$

In the latter case (which is more likely),

$$\Delta i_{ff}^* = 0.02 + 0.5 \times 0.02 + 0.5 \times (-0.01) = 0.025$$

6. What are the key advantages and disadvantages of the monetary strategy used in the United States under Alan Greenspan, in which the nominal anchor is only implicit?

This strategy has the following advantages: 1) it enables monetary policy to focus on domestic considerations; 2) it does not rely on a stable money-inflation relationship; 3) it has had a demonstrated success, producing low inflation with the longest business cycle expansion since World War II. However, it has the following disadvantages: 1) it has a lack of transparency; 2) it is strongly dependent on the preferences, skills, and trustworthiness of individuals in the central bank and the government; and 3) it has some inconsistencies with democratic principles because the central bank is not highly accountable.

7. Using data from the 2006 *Economic Report of the President*.

7.1 Calculate velocity for the last five complete years.

	PY	M1	M2	V1	V2
2001	10128.00	1182.10	5450.30	8.57	1.86
2002	10469.60	1219.20	5800.30	8.59	1.81
2003	10971.20	1304.20	6079.40	8.41	1.80
2004	11734.30	1372.10	6422.10	8.55	1.83
2005	12479.40	1368.90	6680.50	9.12	1.87

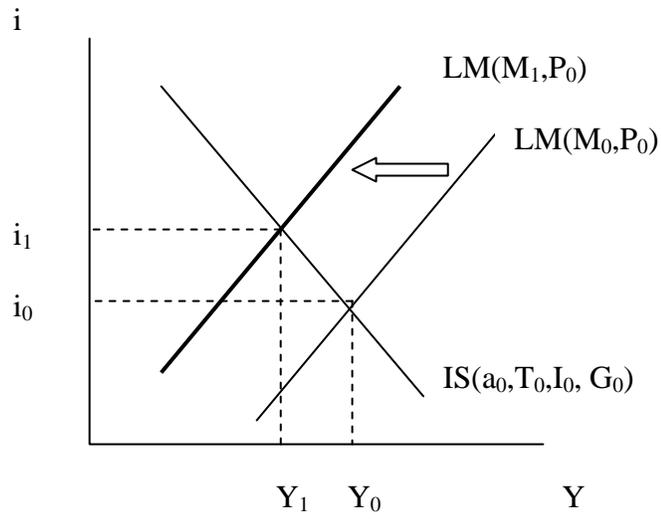
7.2 Is velocity constant? No.

7.3 What implications does your finding have for the idea of targeting monetary aggregates?

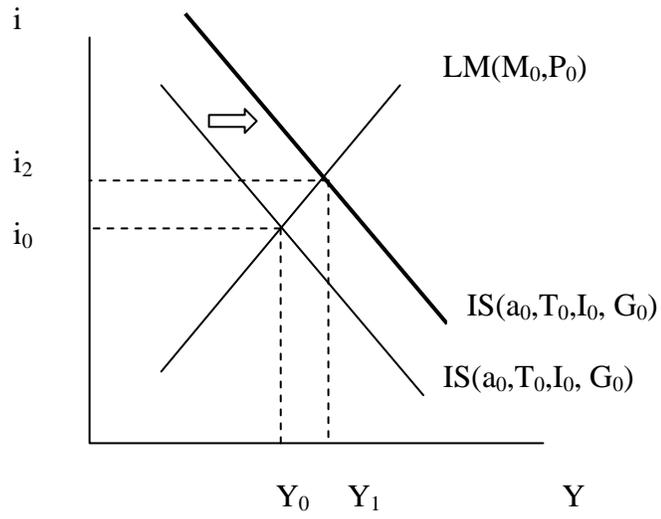
Targeting the monetary aggregates only makes sense if the relationship between money and the goal (income stabilization) is stable. The lack of stability of velocity casts this in doubt.

8. Question 8 refers to the material in Chapters 20-21 (8/e) [Chapters 23-24 7/e], and/or Economics 302. Show the effects of the following in an IS-LM diagram.

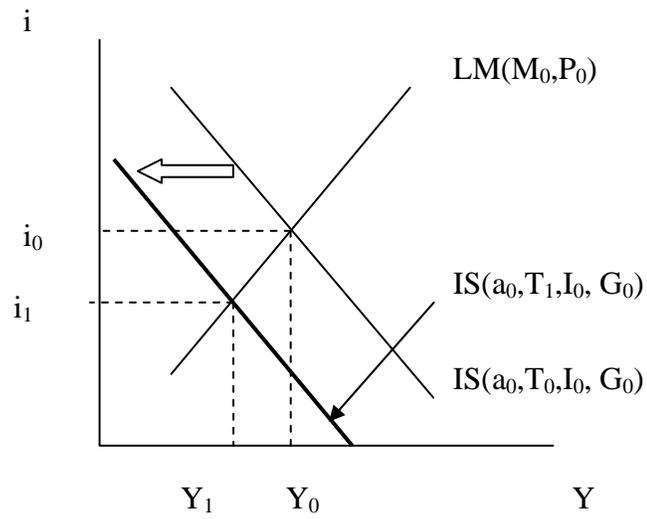
8.1 Decrease in money supply.



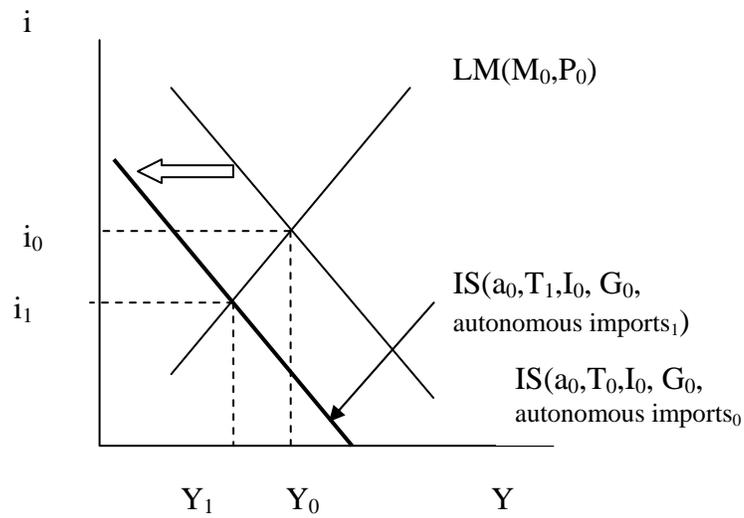
8.2 Increase in autonomous consumption (“ a ” in the consumption function).



8.3 Increase in lump sum taxes.

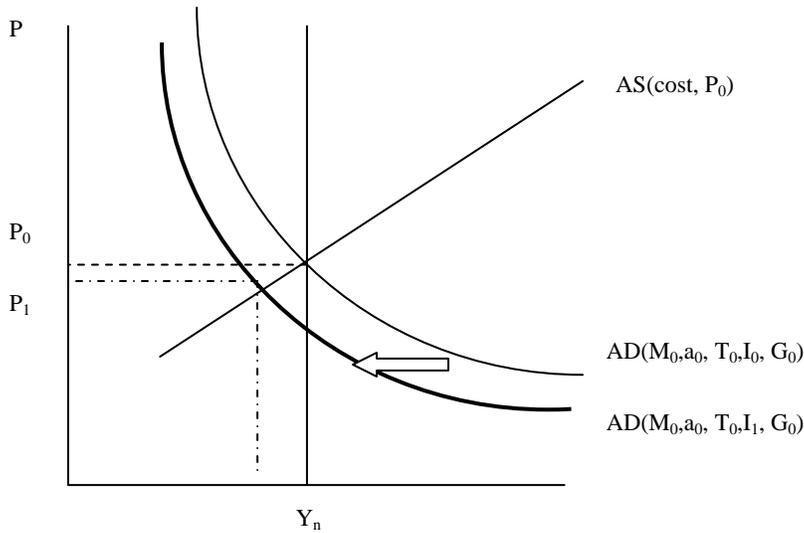


8.4 Increase in the autonomous component of imports (in other words, a decrease in the autonomous component of *net exports*).

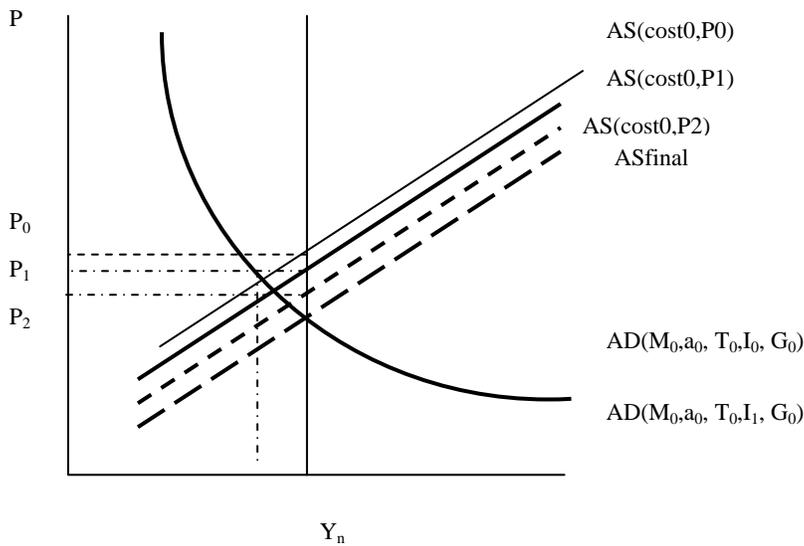


9. Consider the model in Chapter 22 (8/e) [Chapter 25 7/e]:

9.1 Using an AD-AS diagram, carefully indicating the curve shifts, show what happens in the short run when housing investment confidence decreases (say in period 1).



9.2 On another graph, indicate what happens over time to the interest rate, the price level and output as the economy moves to medium run equilibrium.

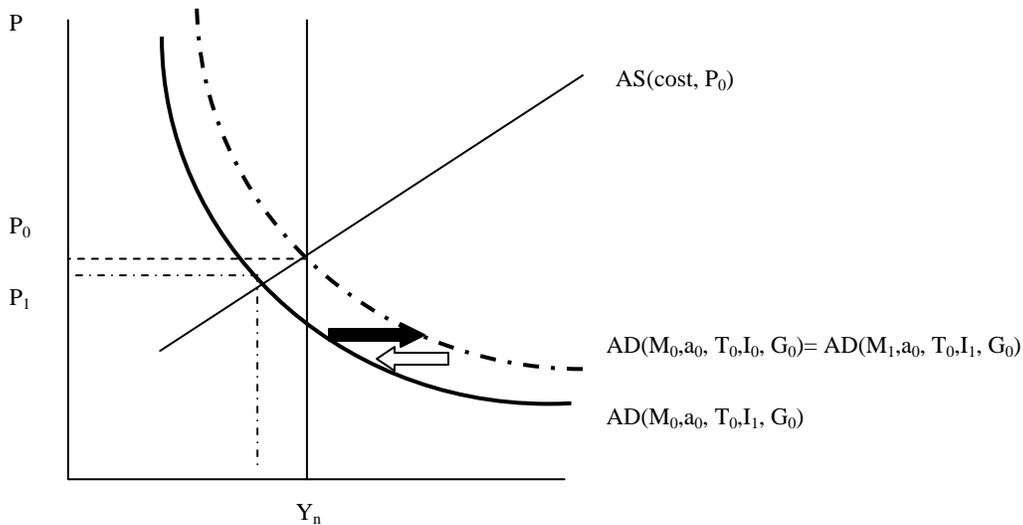


9.3 Explain why the economy takes this path (referring to the graphs, and equations). Indicate where output and the price level end up.

In period 2, the expected price level is the price level in the previous period, i.e., P_1 (which is less than P_0). The AS schedule shifts down and out in the top graph. In the bottom graph, the decrease in the price level increases the real money stock, thereby shifting out the LM curve. Interest rates fall, and hence investment and output rises to Y_2 (greater than Y_1).

As long as output is less than potential GDP, prices keep on falling, the expected price level keeps on being revised downward. Lower and lower price levels continue to expand the real money stock (all these intermediate steps are not shown above). This process stops when $Y = Y_n$, so the economy ends up at $Y_{Final}, i_{Final}, P_{Final}$. Note that in the end, the economy has returned to its pre-shock level of output, but the price level and interest rates are lower. Since output is the same as initially, but consumption is lower, it must be the case that something else is at a higher level. The fact that interest rates are lower gives us the hint that investment is crowded in dollar for dollar for the decrease in consumption.

9.4 Suppose in period 1, the Fed increases the money supply to counter the investment decline. What effect would this have in period 1? In subsequent periods (Use a separate graph)?



The initial investment decline shifts in the AD curve so income falls. Expansionary monetary policy shifts the AD back out to where it started from. Output and the price level can stay at the initial levels forever, in the absence of further shocks.