

**Problem 1.** In general, if the Fed increases the supply of money by 5%, which of the following statements can we claim to be true with certainty? (In general means, do not make *any* assumptions about *anything*.)

- (a) The price level will increase by 5%, but the real GDP will remain the same.
- (b) The real GDP will increase by 5%, but the price level will remain the same.
- (c) The Nominal GDP will increase by 5%.
- (d) We cannot claim any of the above to be true with certainty.

**Answer 1: d.** Here's why (a) through (c) are not necessarily true. Recall that we are making no assumptions about  $V$  being fixed or money neutrality.

- (a) If  $M$  goes up by 5% and neither  $V$  nor  $P$  change, then it must be the case that  $Y$  goes up by 5%.
- (b) If  $M$  goes up by 5% and neither  $V$  nor  $Y$  change, then it must be the case that  $P$  goes up by 5%.
- (c) If  $M$  goes up by 5% and  $V$  goes down by 5%, then  $PY$  must be unchanged.

**Problem 2.** Suppose the velocity of circulation of money is constant and equal to 5. If the Fed increases the supply of money by 5%, which of the following statements can we claim to be true with certainty?

- (a)  $P$  will increase by 5%,  $Y$  will remain the same.
- (b)  $Y$  will increase by 5%,  $P$  will remain the same.
- (c) The nominal GDP will increase by 5%.
- (d) None of the above.

**Answer 2: c.**  $M \times 5 = PY$ . If  $M$  goes up by 5%, then it must be the case that  $PY$  goes up by 5%.

- (a) If  $P$  is fixed and  $Y$  goes up by 5%, then  $MV = PY$  is still satisfied. So this can't be the answer.
- (b) If  $Y$  is fixed and  $P$  goes up by 5%, then  $MV = PY$  is still satisfied. So this can't be the answer.

**Problem 3.**  $M = \$100,000$  and  $V = 5.00$ . Suppose that, after the Fed increases the supply of money by 5%, the velocity drops to  $V = 4.90$ . What will be the rate of increase in nominal GDP?

**Answer 3.**  $MV = PY$ .

- Initially:  $MV = 100,000 \times 5 = 500,000$
- After:  $MV = 105,000 \times 4.90 = 514500$

So the rate of increase in nominal GDP is

$$\frac{514500 - 500000}{500000} \times 100 = 2.9\%.$$

**Problem 4.** *True or False.* If the velocity of circulation of money is constant, and if the Fed increases the supply of money year after year, ultimately (in the long run) we will experience high inflation rates but the real GDP may not be affected at all. This is because, in the long run, the real GDP is determined in the labor market and increases in prices will result in nominal wages to rise in such a way as to leave the employment and real GDP unchanged. So this policy will only cause inflation.

**Answer 4: True.** Uh, not sure what else to say about this one.

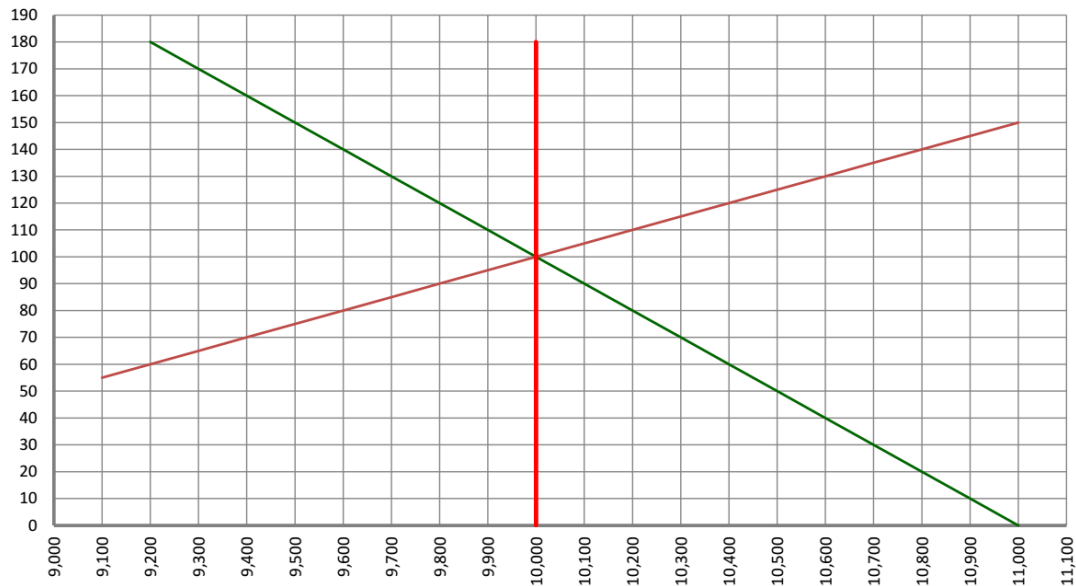
**Problem 5.** If the velocity of circulation of money is constant and if wages and prices are fully flexible, then a 5% increase in money supply will result in 5% inflation in the long run with no change in real GDP.

**Answer 5: True.** From the book,

“If wages and prices are fully flexible, an increase in money supply will not affect the real GDP and other real variables. It will only affect the nominal variables. Money is neutral.”

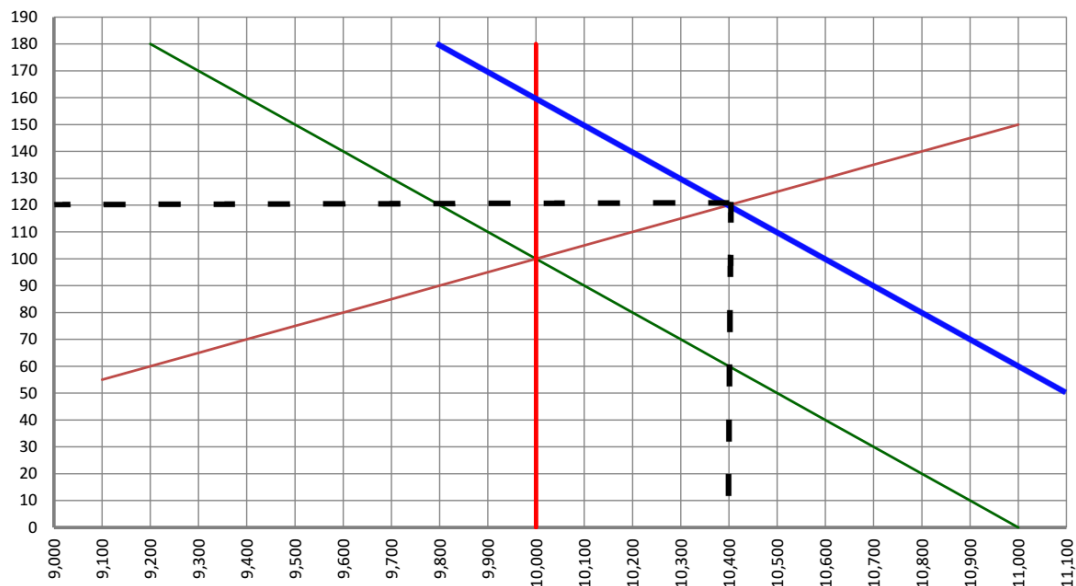
**Problem 6.**

- Prices are sticky in the short run, flexible in the long run.
- $MPC = 0.75$  and Okun's coefficient is  $\alpha = 2$ .
- We start in equilibrium where  $G = 1000$  and  $NX = 0$ .



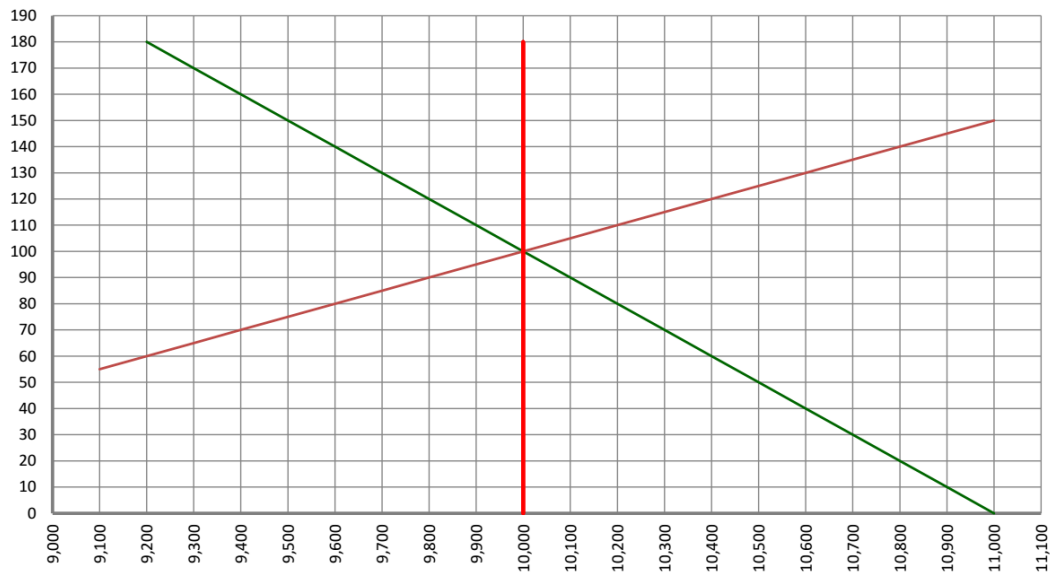
Gov't increases its purchase of goods and services by 150 units and borrows from the public to pay for it. The short-run effect of this policy is...?

**Answer 6.** The multiplier is  $1/(1 - 0.75) = 4$ . So AD shifts by  $150 \times 4 = 600$ . The short run equilibrium is thus (10400, 120).



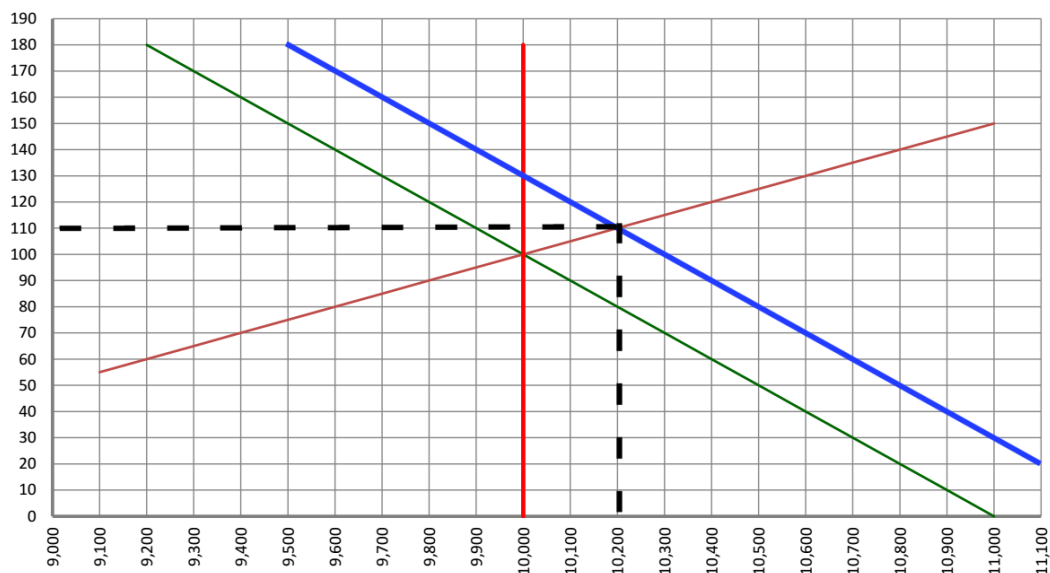
**Problem 7.**

- Prices are sticky in the short run, flexible in the long run.
- $MPC = 0.75$  and Okun's coefficient is  $\alpha = 2$ .
- We start in equilibrium where  $G = 1000$  and  $NX = 0$ .



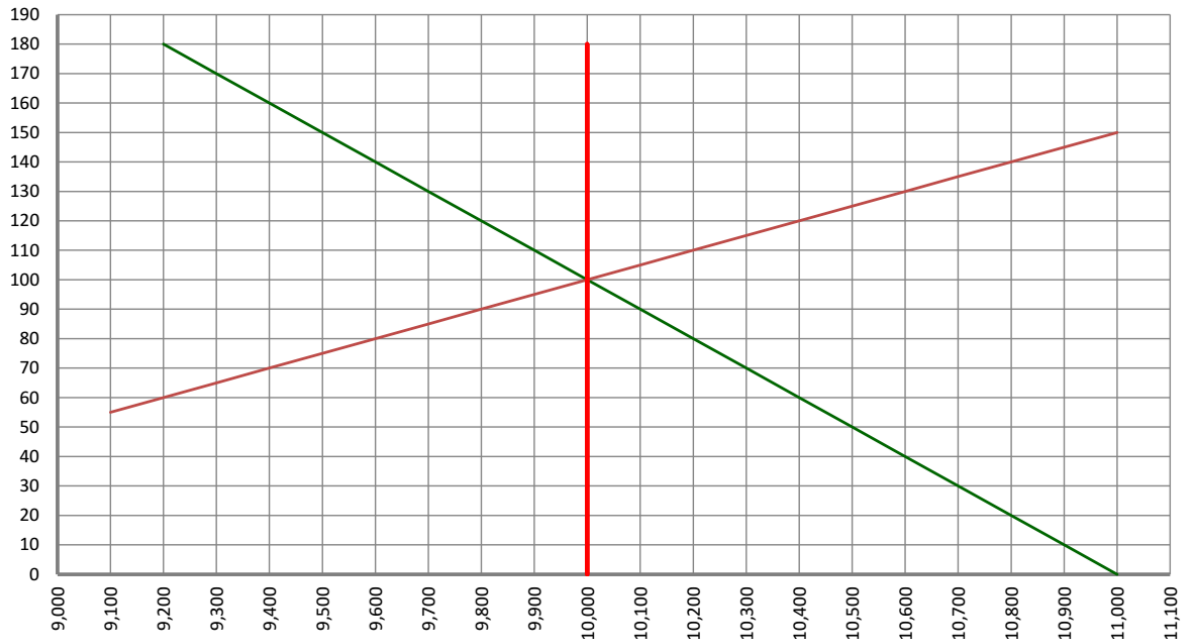
Gov't conducts a balanced-budget increase in its purchase of goods and services equal to 300 units. The short-run effect of this policy on the real GDP and the general price level is...?

**Answer 7.** Remember that a balanced-budget increase in  $G$  has different implications apropos the multiplier effect. In particular, it cancels out the multiplier effect, so AD will shift only by 300. The short run equilibrium will be (10200, 110).



**Problem 8.**

- Prices are sticky in the short run, flexible in the long run.
- $MPC = 0.75$  and Okun's coefficient is  $\alpha = 2$ .
- We start in equilibrium where  $G = 1000$  and  $NX = 0$ .



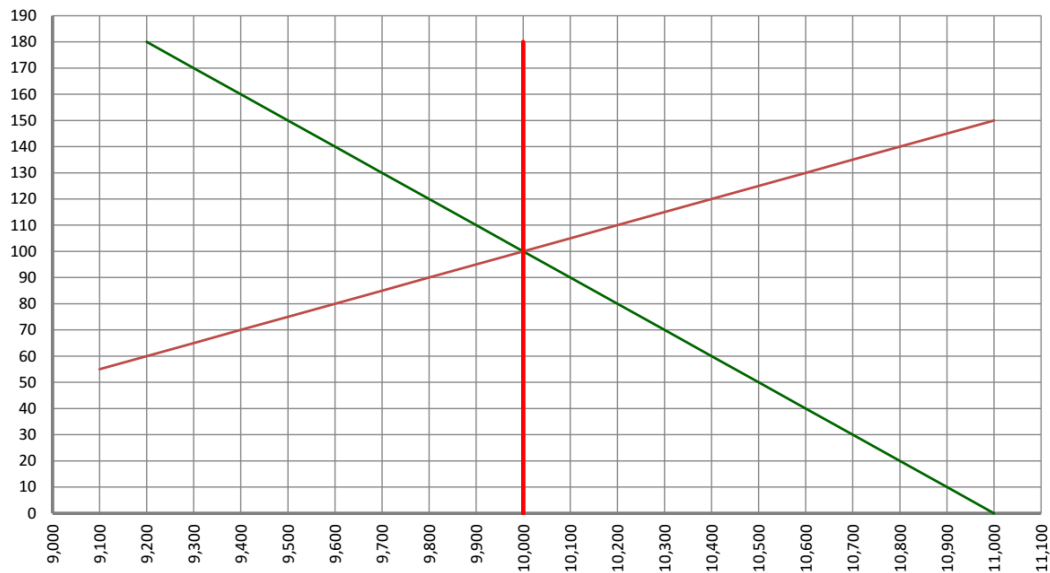
The government conducts a balanced-budget increase in its purchase of goods and services equal to 300 units. As the result of this policy the cyclical unemployment in the short run will equal \_\_\_\_\_ percent. (By short run I mean after the AD shifts but before the SRAS starts shifting)

**Answer 8.** Same graph as in the last problem. We can solve this using Okun's law:

$$\frac{Y_p - Y}{Y_p} = \frac{10,000 - 10,200}{10,000} = 2 \times u_n \implies u_n = -1\%.$$

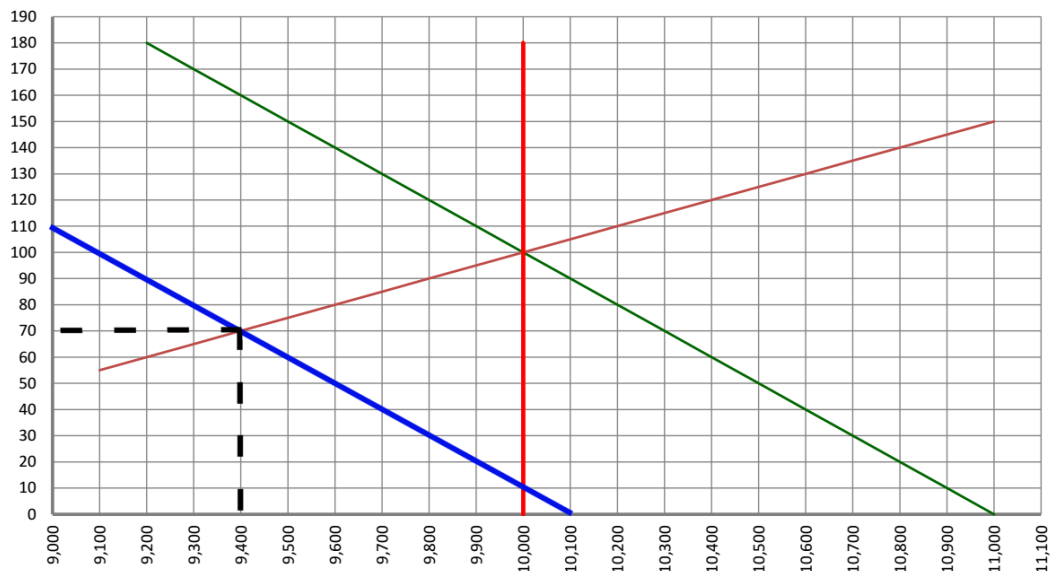
**Problem 9.**

- Prices are sticky in the short run, flexible in the long run.
- $MPC = 0.75$  and Okun's coefficient is  $\alpha = 2$ .
- We start in equilibrium where  $G = 1000$  and  $NX = 0$ .



Business firms become pessimistic about the future state of the economy and, therefore, reduce their investment spending by 225 units. The short-run effect of this event on the real GDP and the general price level will be...?

**Answer 9.** The drop in investment spending will shift AD by  $-225 \times 4 = -900$ . The short run equilibrium will be (9400, 70).



**Problem 10.** To fight the ongoing inflation the central bank reduces the supply of money by 30%. The long-run effect of this policy on the real GDP and the general price level will be...?

**Answer 10.** In the long-run, money is **neutral**, meaning that real variables are unaffected by changes in the money supply. Therefore output will still be 10000.

To figure out what happens to the price level, we need to use the **equation of exchange**,  $MV = PY$ . In words, this equation says “the quantity of money in circulation times the velocity at which it circulates equals nominal GDP.” We will assume that velocity is constant. And since we know that  $Y$  is also unchanged in the long run via money neutrality, we can see that  $P$  and  $M$  must move in the same direction and in exact proportion.

$$\overset{\downarrow 30\%}{M} \overline{V} = \overset{\downarrow 30\%}{P} \overline{Y}$$

So a reduction in the money supply of 30% will decrease the price level by 30% in the long run. So the price level will drop to from 100 to 70.