

**Problem 1.** Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of \$15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made but *before* the money is transferred to Bank B.

Assets		Liabilities and Net Worth	
Reserves	\$20,000	Demand Deposits	\$150,000
		Other Deposits	\$650,000
Treasury Bonds	\$30,000	Discount Loans	\$20,000
		Interbank Loans	\$80,000
Loans	\$950,000	Net worth	\$100,000

**Answer 1.** Bank A increases Loans by \$15,000 on the Assets side, and since the money is placed in Ashley's savings account, we see Other Deposits increase by \$15,000 on the Liabilities side. That's it.

Reserves	\$20,000	Demand Deposits	\$150,000
		Other Deposits	<b>\$665,000</b>
Treasury Bonds	\$30,000	Discount Loans	\$20,000
		Interbank Loans	\$80,000
Loans	<b>\$965,000</b>	Net worth	\$100,000

**Problem 2.** Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of \$15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made, *after* the money is transferred to Bank B, but *before* the Fed extends the needed loan to Bank A.

Assets		Liabilities and Net Worth	
Reserves	\$20,000	Demand Deposits	\$150,000
		Other Deposits	\$650,000
Treasury Bonds	\$30,000	Discount Loans	\$20,000
		Interbank Loans	\$80,000
Loans	\$950,000	Net worth	\$100,000

**Answer 2.** Start with the answer to the previous question. Because Ashley now transfers her borrowed funds of \$15,000 to someone at a different bank, Bank A sees Other Deposits fall by \$15,000 on the Liabilities side – her savings account at Bank A is now empty.

Bank A actually pays for that transfer by giving \$15,000 of its reserves to Bank B. Therefore Reserves drop by \$15,000 on the Assets side. This is problematic for Bank A because they are required to hold  $\$150,000 \times 10\% = \$15,000$  as required reserves, which they currently fall short of.

Reserves	<b>\$5,000</b>	Demand Deposits	\$150,000
		Other Deposits	\$650,000
Treasury Bonds	\$30,000	Discount Loans	\$20,000
		Interbank Loans	\$80,000
Loans	<b>\$965,000</b>	Net worth	\$100,000

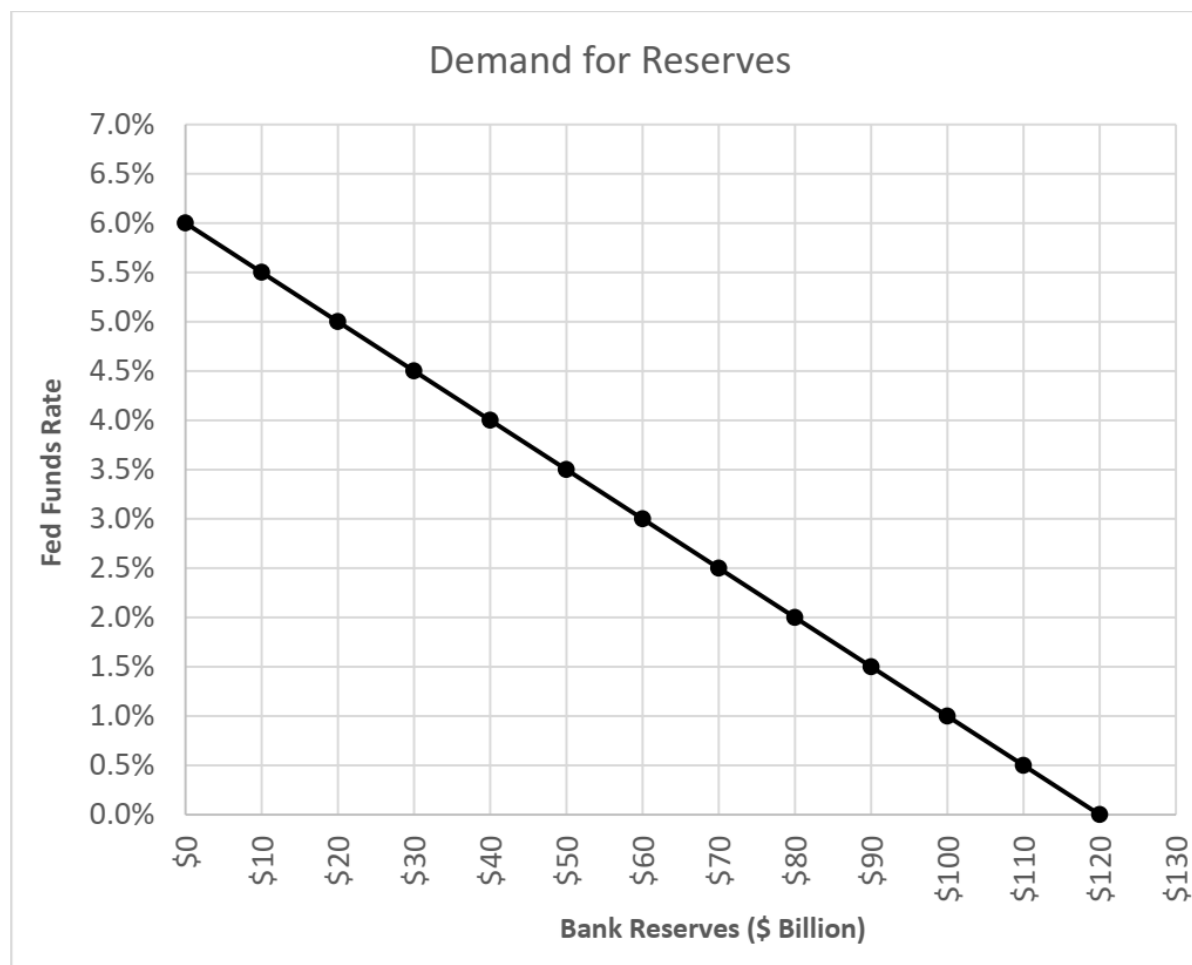
**Problem 3.** Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of \$15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made, *after* the money is transferred to Bank B, and *after* the Fed extends the needed loan to Bank A.

Assets		Liabilities and Net Worth	
Reserves	\$20,000	Demand Deposits	\$150,000
		Other Deposits	\$650,000
Treasury Bonds	\$30,000	Discount Loans	\$20,000
		Interbank Loans	\$80,000
Loans	\$950,000	Net worth	\$100,000

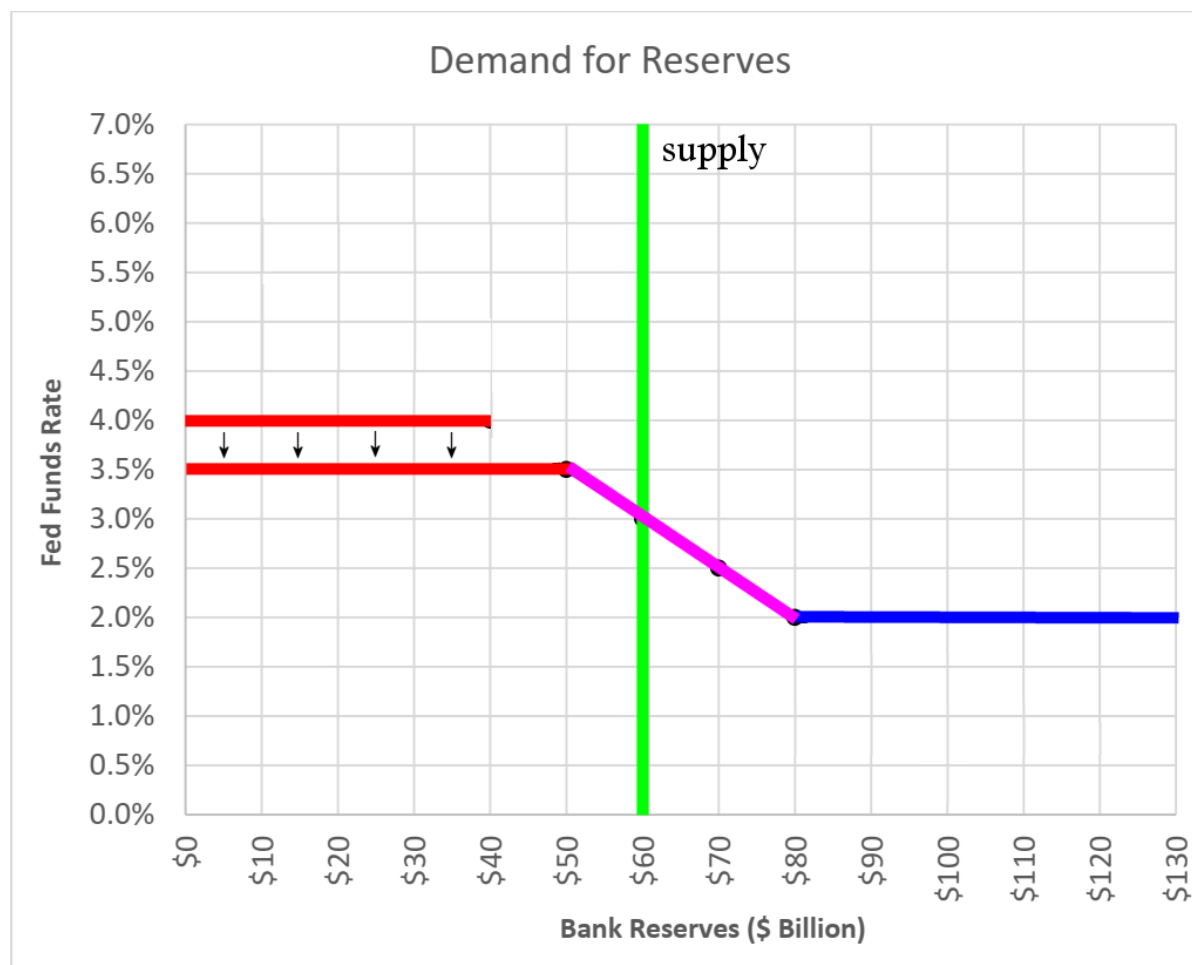
**Answer 3.** Start from the previous answer. As foreshadowed in the previous question, Bank A only has \$5,000 reserves after the transfer but is required to hold \$15,000. Therefore Bank A will borrow \$10,000 from the Fed to bring its holdings of reserves up to the required \$15,000. That means we'll see Reserves go up by \$10,000 on the Assets side and Discount Loans go up by \$10,000 on the Liabilities side.

Reserves	<b>\$15,000</b>	Demand Deposits	\$150,000
		Other Deposits	\$650,000
Treasury Bonds	\$30,000	Discount Loans	<b>\$30,000</b>
		Interbank Loans	\$80,000
Loans	<b>\$965,000</b>	Net worth	\$100,000

**Problem 4.** Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. If the Fed reduces the discount rate to 3.50 percent, what will the equilibrium fed funds rate be?

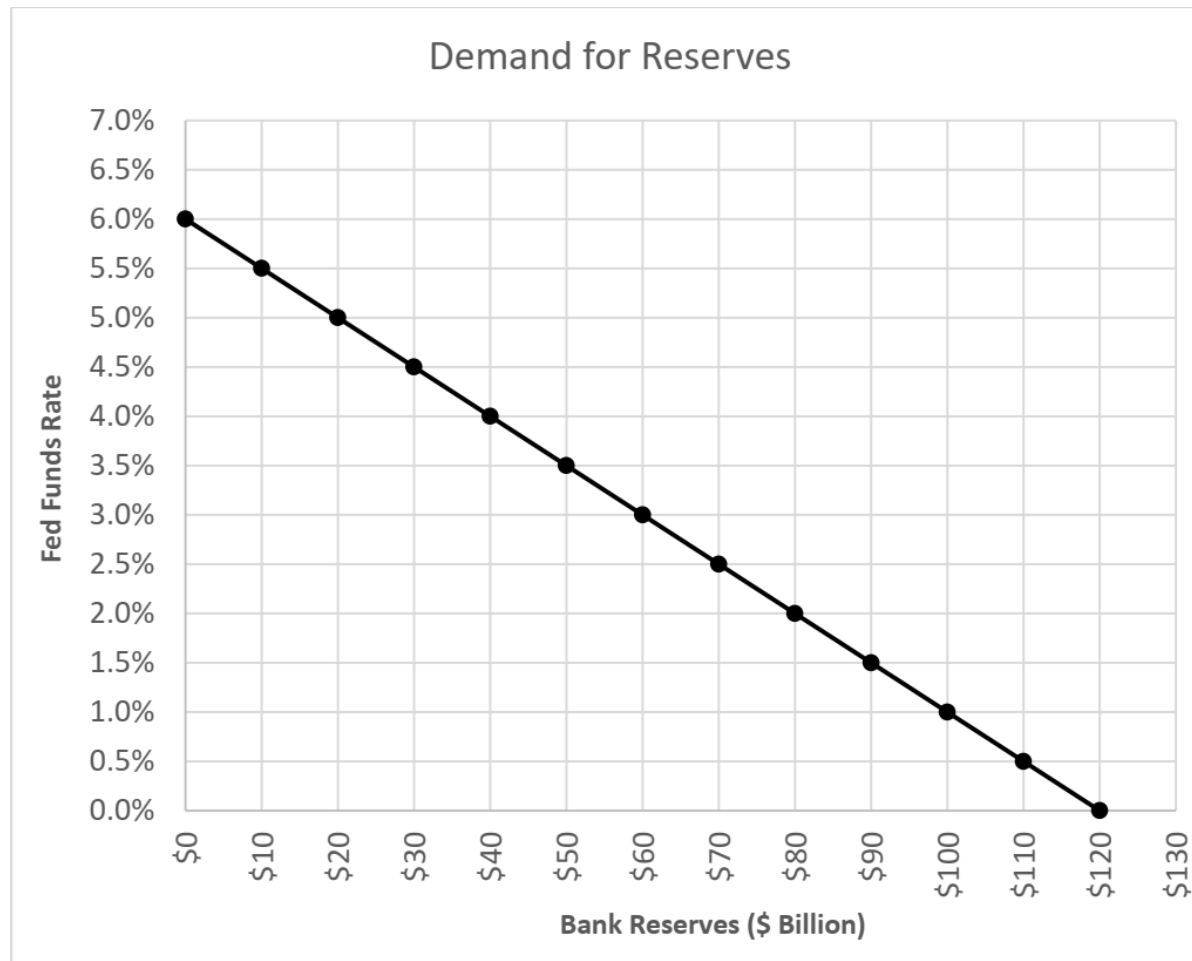


**Answer 4.** Draw the reserve supply vertically at \$60. The initial intersection is at 3%. When the discount rate (the red segment) is reduced from 4.0% to 3.5%, the intersection is unaffected and therefore remains at 3.0%.

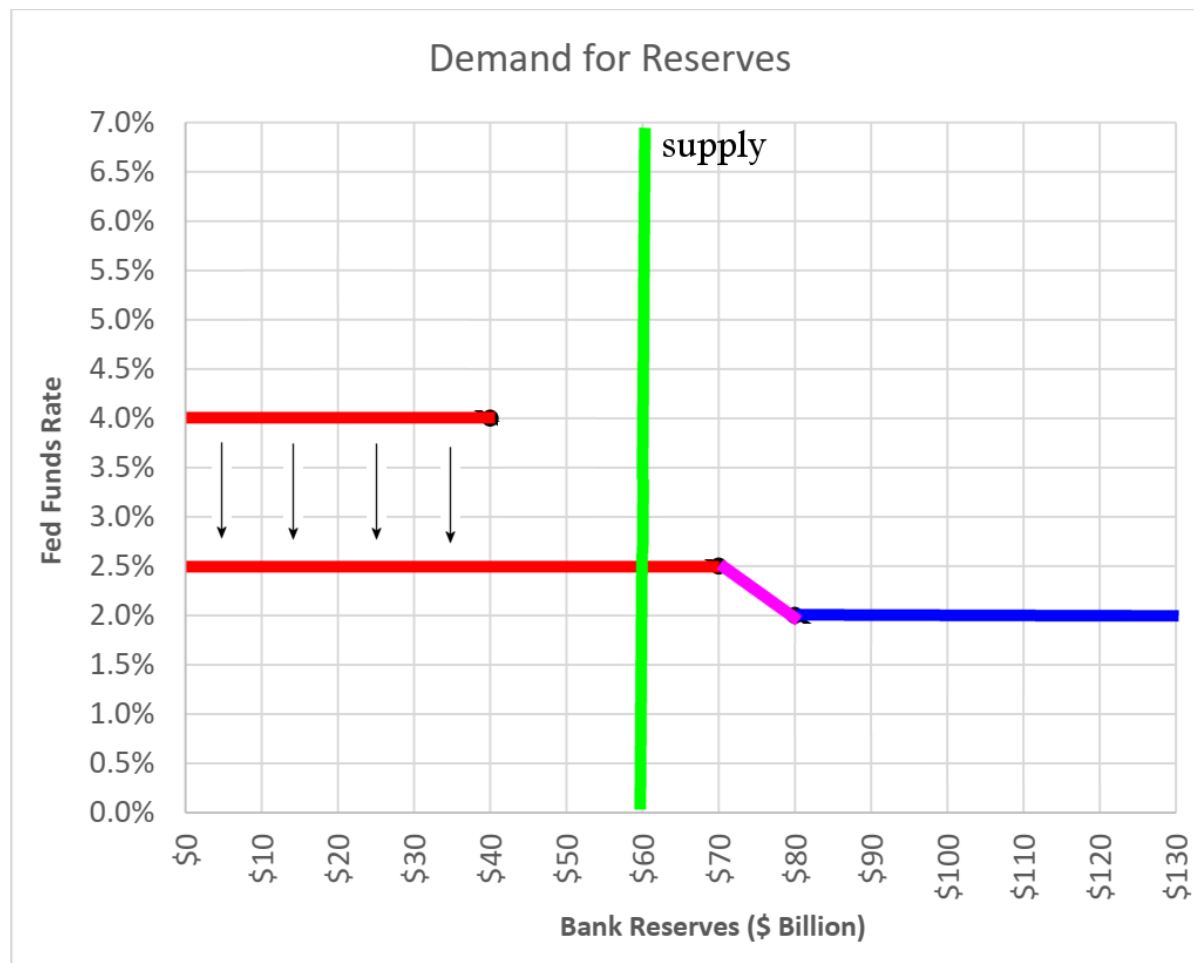




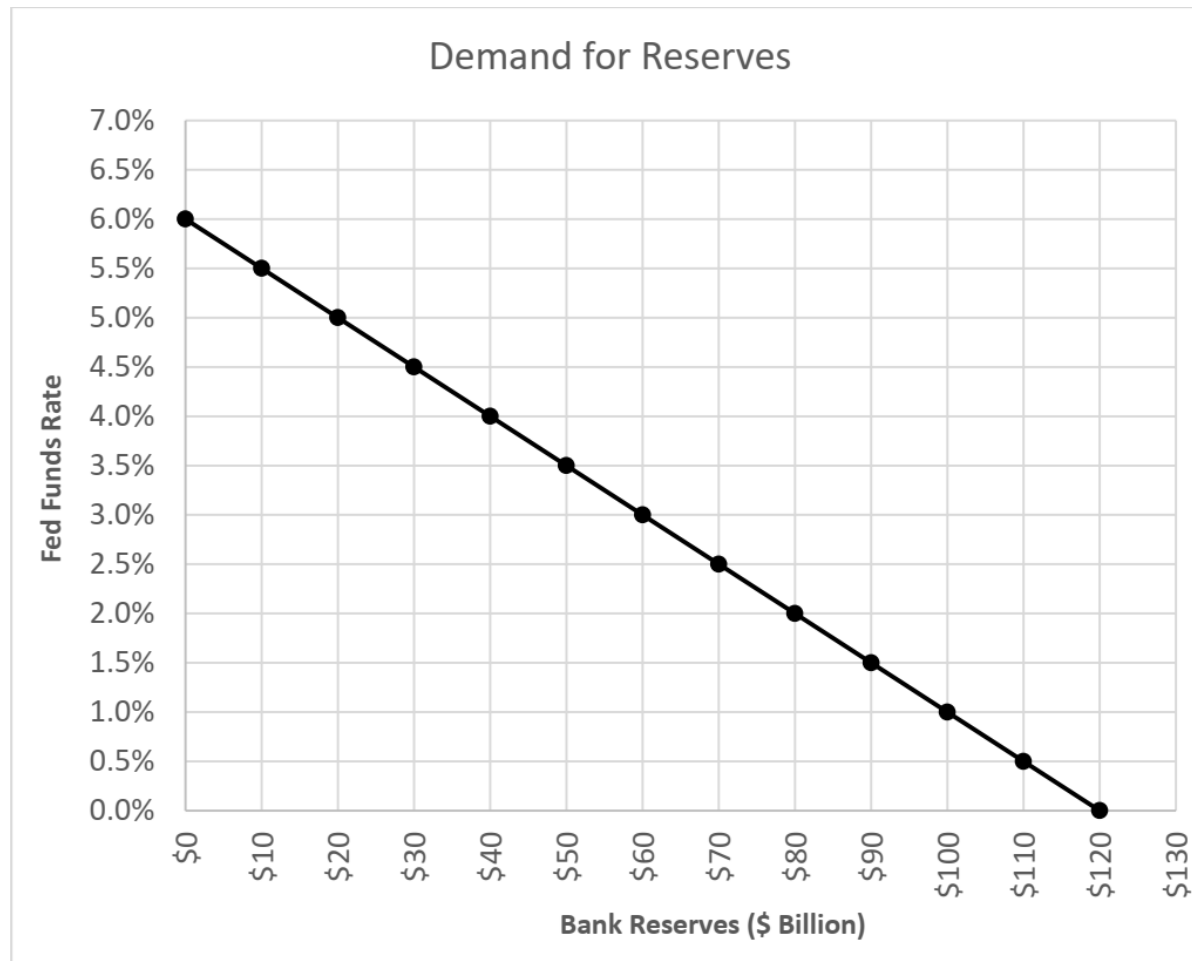
**Problem 5.** Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. Suppose the Fed reduces the discount rate to 2.50 percent. What is the fed funds rate?



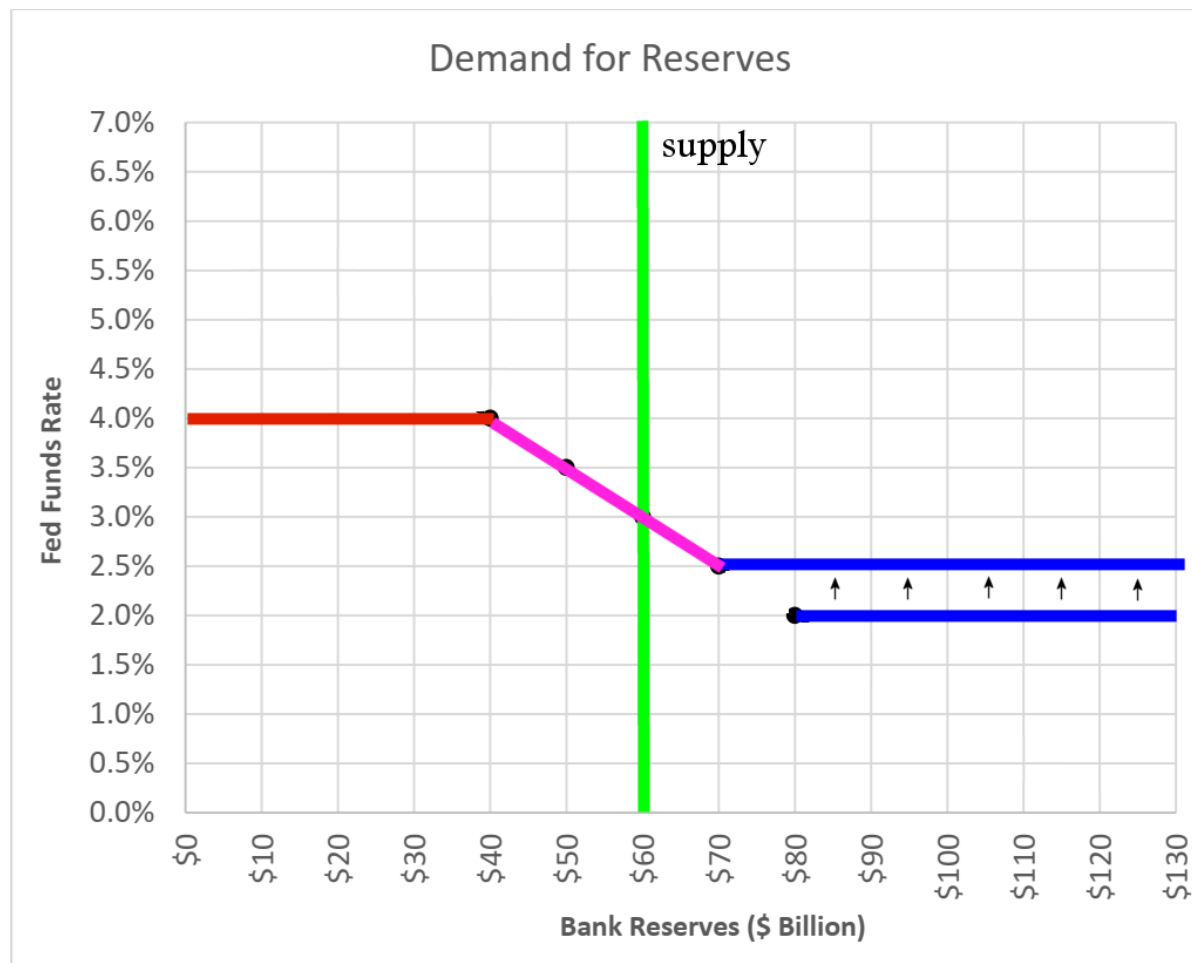
**Answer 5.** Drop the discount rate all the way to 2.5 percent and then the supply line intersects at the discount rate. So the fed funds rate is 2.5%.



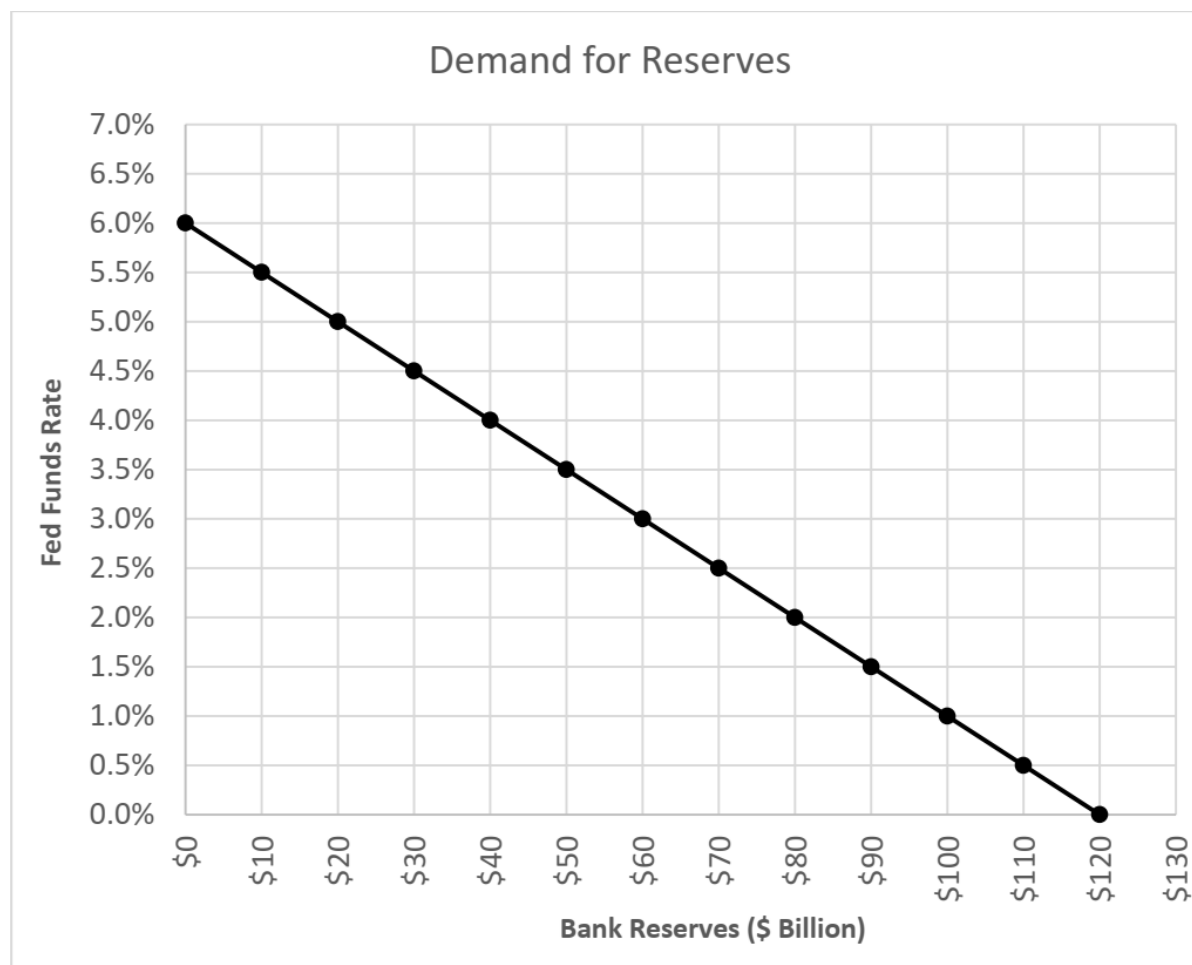
**Problem 6.** Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. Suppose the Fed increases the interest rate on reserves up to 2.5 percent. What's the fed funds rate?



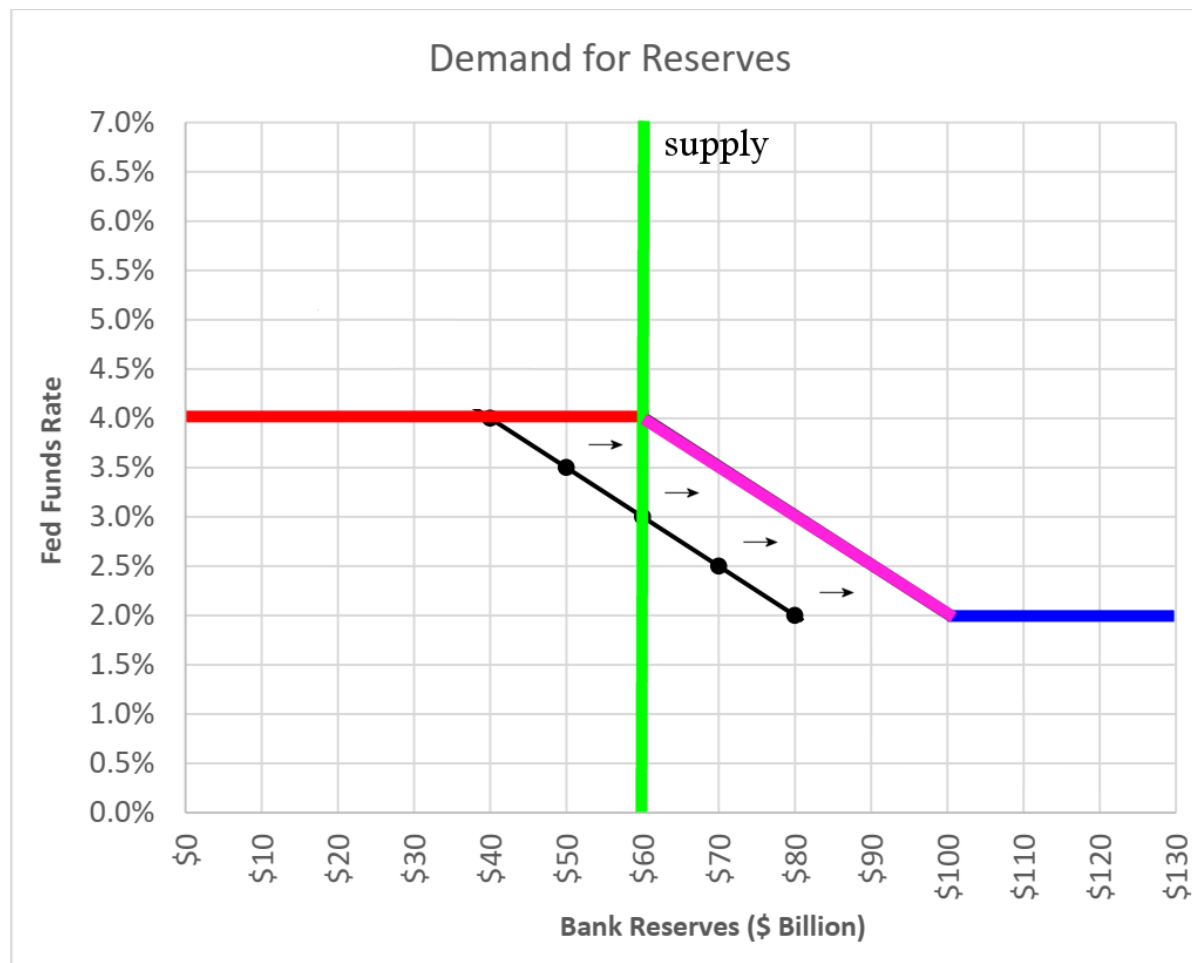
**Answer 6.** Move the IOR segment (the blue one) up to 2.5 percent. The intersection is still at 3%, however, so there's no change.



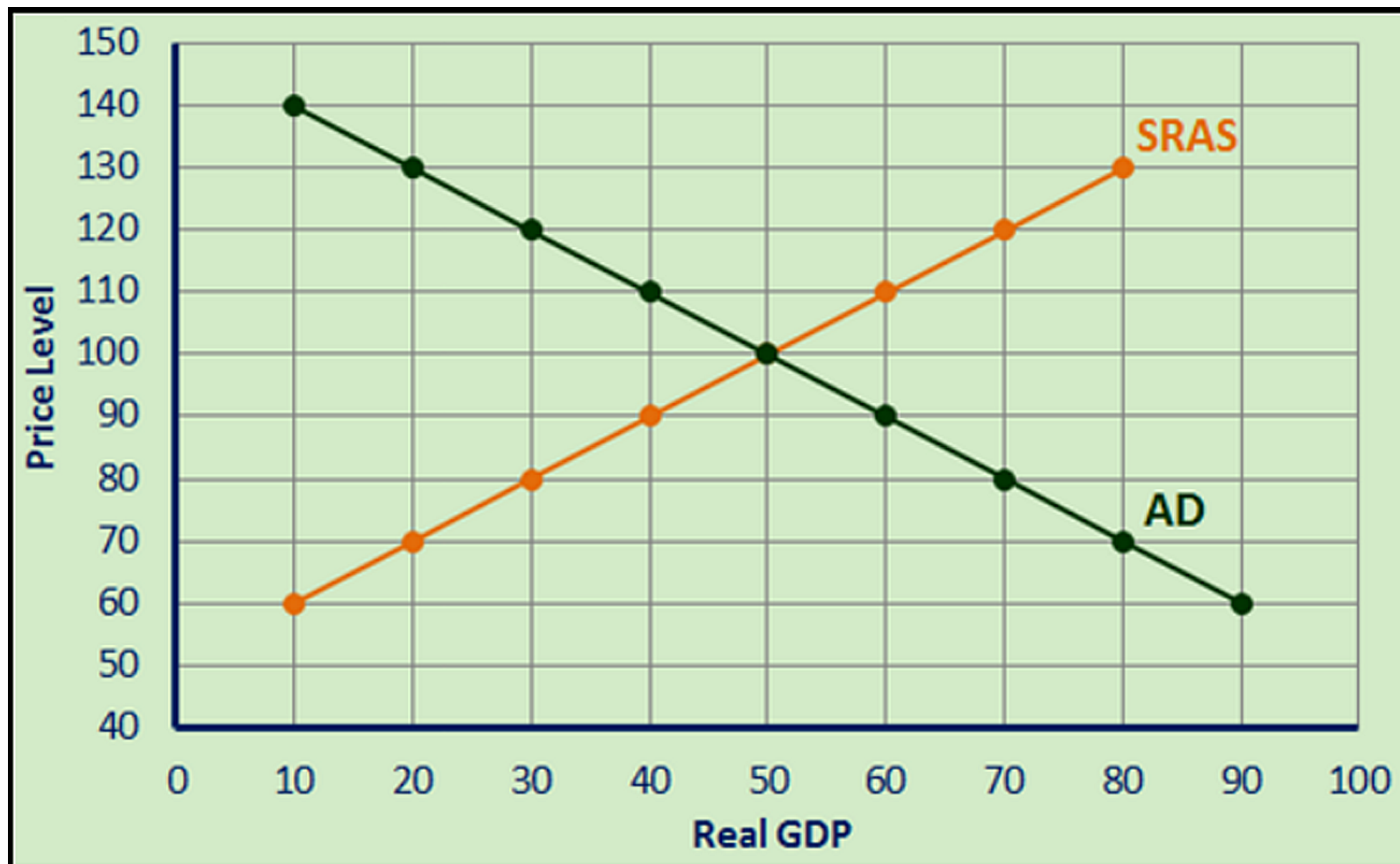
**Problem 7.** Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. Suppose the Fed increases the required reserve ratio so that the demand for reserves increases by \$20. What's the new federal funds rate?



**Answer 7.** Take the demand curve and shift the whole thing over to the right by \$20. The new intersection is at 4%.



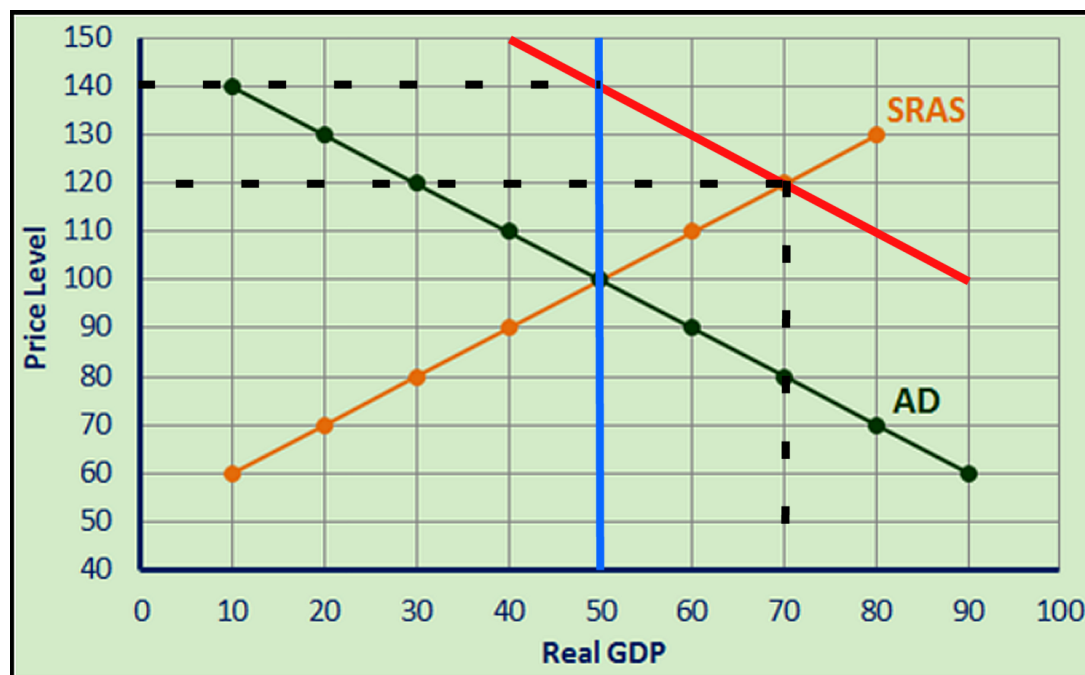
**Problem 8.** Currently  $Y = 50$ ,  $Y_p = 50$ , and  $P = 100$ . The expenditure multiplier equals 5. All else the same, transfer payments  $TR$  increase by 10 units through deficit financing. Find the short-run and long-run equilibria.



**Answer 8.** Since the expenditure multiplier is 5, it follows that

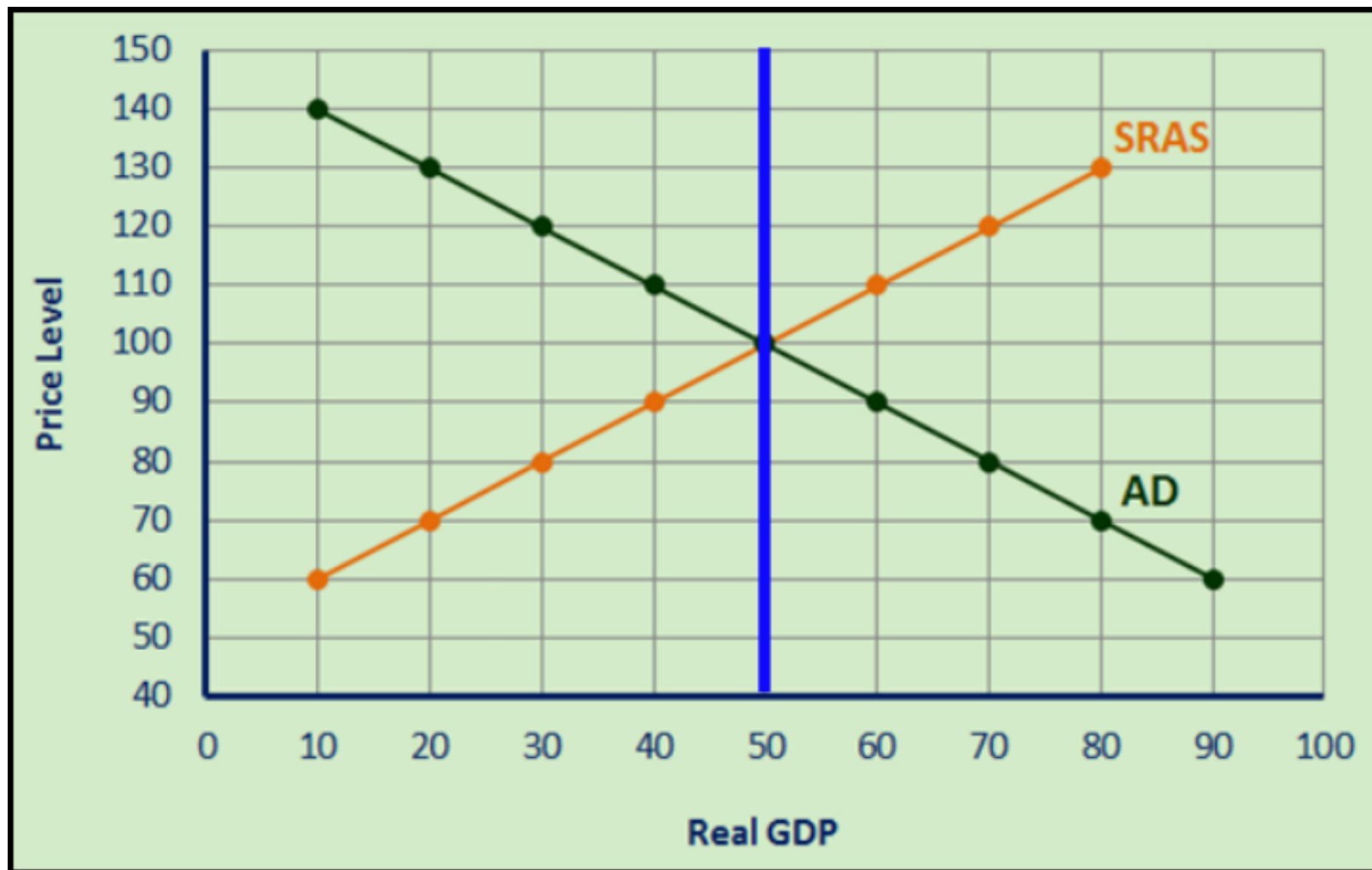
$$\frac{1}{1 - MPC} = 5 \implies MPC = 0.80.$$

So when transfer payments increase by 10 units, it means disposable income  $Y_d$  increases by 10 units and therefore consumption initially increases by  $MPC \times \Delta Y_d = 8$  units. Then from the expenditure multiplier, the overall increase in consumption (and therefore AD) will be  $8 \times 5 = 40$ . So shift AD to the right by 40 units. The short-run equilibrium is then (70, 120) and the long-run equilibrium is (50, 140).





**Problem 9.** Suppose the expenditure multiplier equals 5. Show the effect of a decrease in taxes by 10 units in both the short run and long run.



**Answer 9.** First we should find out what MPC is.

$$\frac{1}{1 - MPC} = 5 \implies MPC = 0.80.$$

Because  $TX$  decreases by 10, it means that  $Y_d$  increases by 10. This means that consumption increases by  $0.80 \times 10 = 8$ . Now use the multiplier effect on this increase in consumption;  $AD$  will shift to the right by  $8 \times 5 = 40$  and we get the same answer as above.

Two takeaways. First, an increase in transfers payments and a decrease in taxes have the same expansionary effect. (Symmetrically, a decrease in transfer payments and an increase in taxes have the same contractionary effect.) Second, changes in  $TX$  and  $TR$  need to first be converted in to changes in  $C$  because  $TX$  and  $TR$  are not part of  $Y = C + I + G + NX$ . Once we have the change in  $C$ , however, then we can start the multiplier process and shift  $AD$  accordingly.

On the other hand, if we are told that there is a direct change in  $C$ ,  $I$ ,  $G$ , or  $NX$ , then we can just multiply that change by the multiplier and be on our way.