Macroeconomics: Principles & Applications

CHAPTER 14

The Money Market and Monetary Policy

Robert E. Hall & Mark Lieberman

PowerPoint slides prepared by:
Andreea Chiritescu
Eastern Illinois University

The Demand for Money

- Demand for money
  - How much money people would like to hold, given the constraints that they face
  - NOT: how much money people would like to have in the best of all possible worlds

A Household's Demand for Money

- An individual's wealth constraint
  - At any point in time, total wealth is fixed
  - You must give up one kind of wealth in order to acquire more of another
- An household's quantity of money demanded
  - Amount of wealth that the household chooses to hold as money, rather than as other assets

A Household's Demand for Money

- Households choose how to divide wealth between two assets
  - Money
    - Can be used as a means of payment
    - Earns no interest
  - Bonds
    - Earn interest
    - Cannot be used as a means of payment

A Household's Demand for Money

- Opportunity cost of holding money
  - Interest you could have earned by holding other assets instead
- Tradeoff: The more wealth we hold as money
  - The less often we will have to go through the inconvenience of changing our bonds into money
  - And the less interest we will earn on our wealth

A Household's Demand for Money

- Choose the amount of money to hold:
  - = Quantity demanded of money
  - A rise in price level
    - Hold more money
  - A rise in real income
    - Hold more money
  - A higher interest rate
    - Hold less money

The Demand for Money by Businesses

- Quantity demanded of money – is greater:
  - The higher price level
  - The higher real income
  - The lower interest rate
- Constraints:
  - Given wealth
  - How much wealth to hold as money rather than other assets (“bonds”)

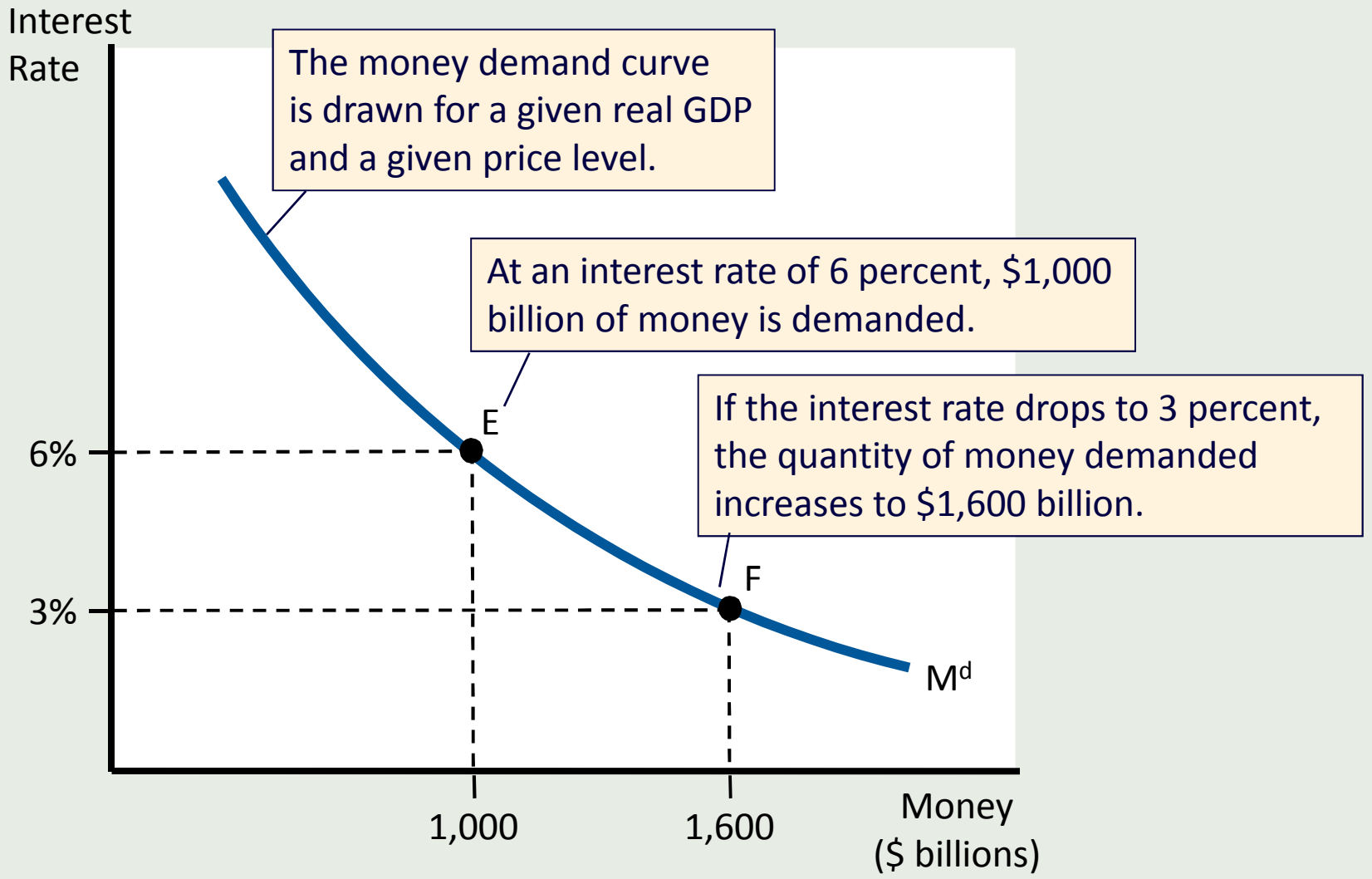
The Economy-wide Demand for Money

- Economy-wide quantity of money demanded
  - The amount of total wealth in the economy
  - That all households and businesses, together, choose to hold as money rather than as bonds
- Quantity of money demanded in the economy is greater:
  - The higher the price level
  - The higher the real income
  - The lower the interest rate

The Demand for Money

- Money demand curve
  - Total quantity of money demanded
  - At each interest rate
- Change in interest rate
  - Move along the money demand curve

Figure 1: The Money Demand Curve



The Demand for Money

- Shifts in the money demand curve
  - Change in money demand caused by something other than the interest rate
    - Real income
    - Price level

Figure 2: A Shift in the Money Demand Curve

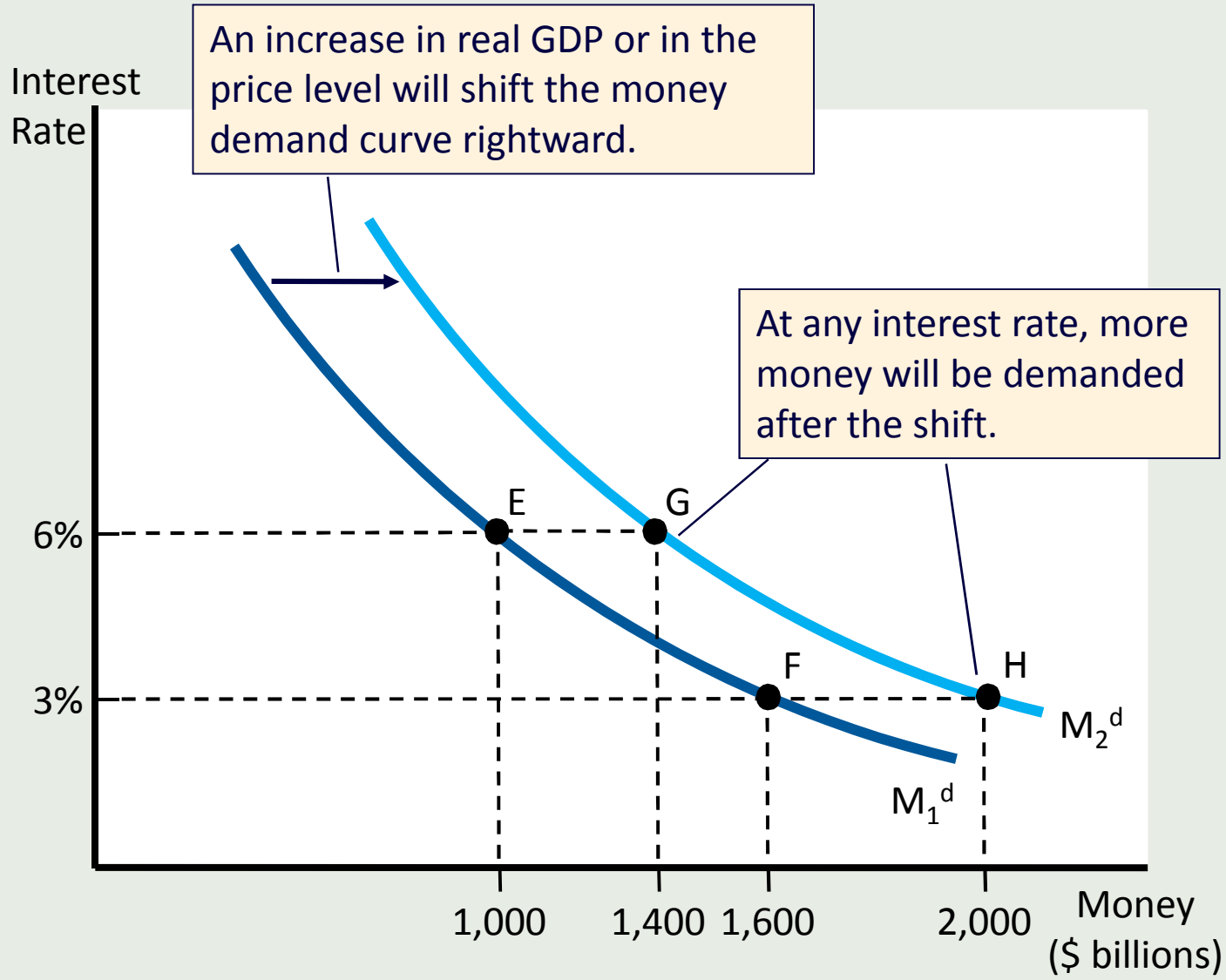
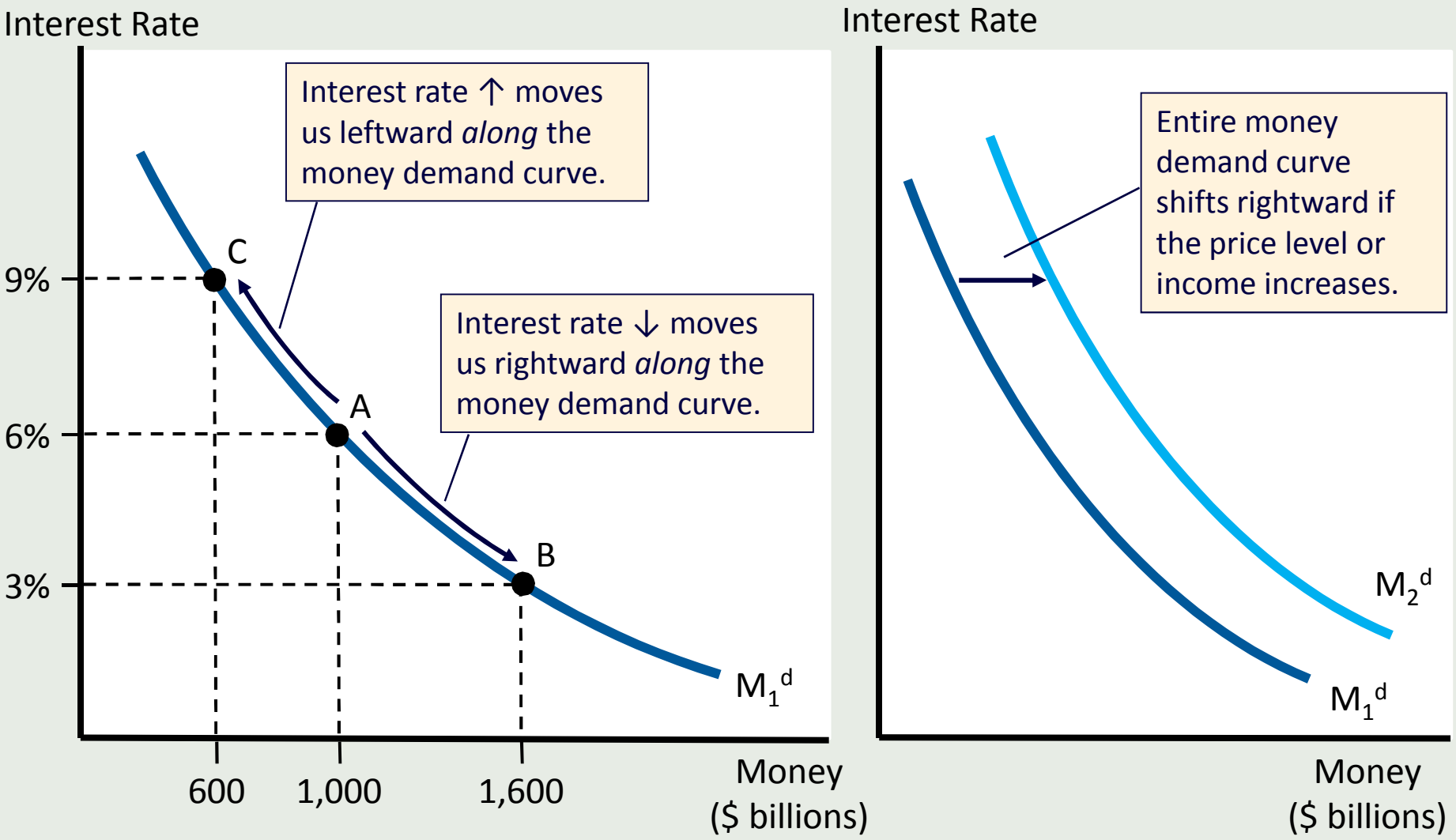


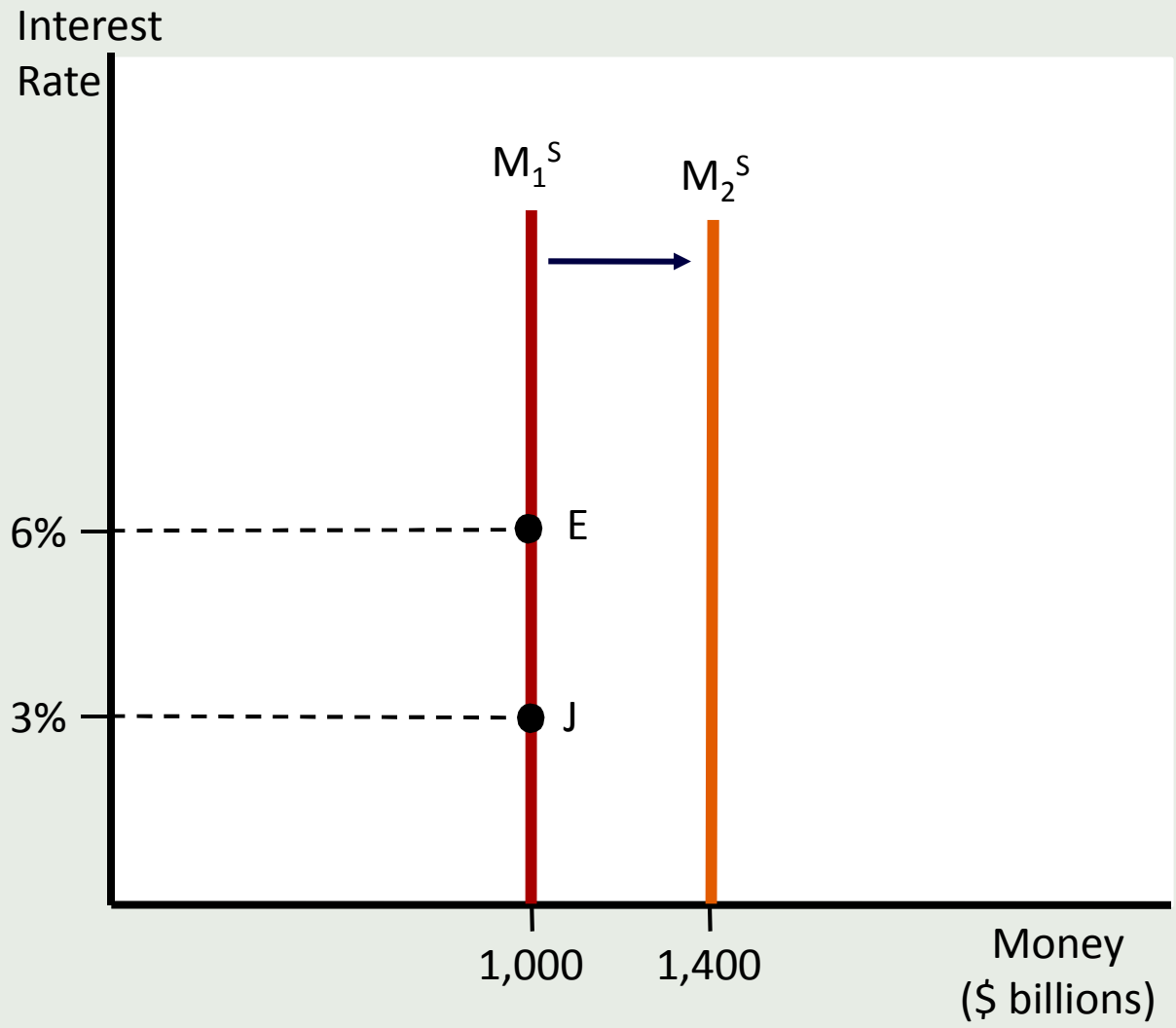
Figure 3: Shifts and movements along the money demand curve: A summary



The Supply of Money

- Money supply curve
  - Total quantity of money in the economy at each interest rate
  - Straight vertical line
  - Determined by the Fed
- Shift in money supply
  - The Fed changes the money supply

Figure 4: The supply of money



Once the Fed sets the money supply, it remains constant until the Fed changes it. The vertical supply curve labeled M_1^S shows a money supply of $1,000 billion, regardless of the interest rate. An increase in the money supply to $1,400 billion is depicted as a rightward shift of the money supply curve to M_2^S .

The Supply of Money

- Open market purchases of bonds
  - Inject reserves into the banking system
  - Shift the money supply curve rightward
    - By a multiple of the reserve injection
- Open market sales
  - Withdraw reserves from the system
  - Shift the money supply curve leftward
    - By a multiple of the reserve withdrawal

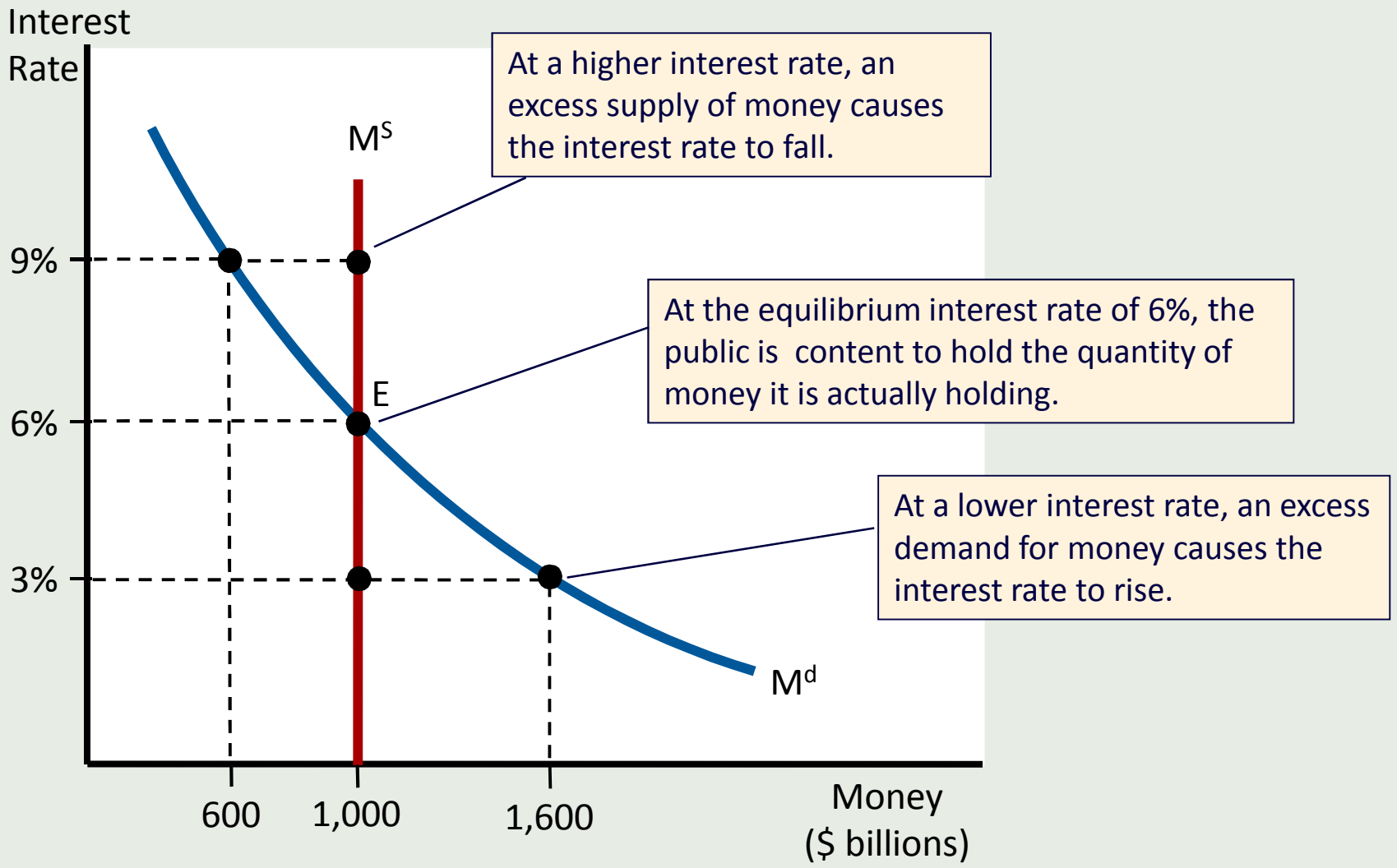
Equilibrium in the Money Market

- Interest rate, long run
  - Determined by equilibrium in the loanable funds market
  - A flow of loanable funds is offered by lenders to borrowers

Equilibrium in the Money Market

- Interest rate, short run
  - Equilibrium interest rate in the money market
  - Quantity of money demanded = quantity of money supplied
- Equilibrium in the money market
  - When the quantity of money people are actually holding (quantity supplied)
  - Is equal to the quantity of money they want to hold (quantity demanded)

Figure 5: Money Market Equilibrium

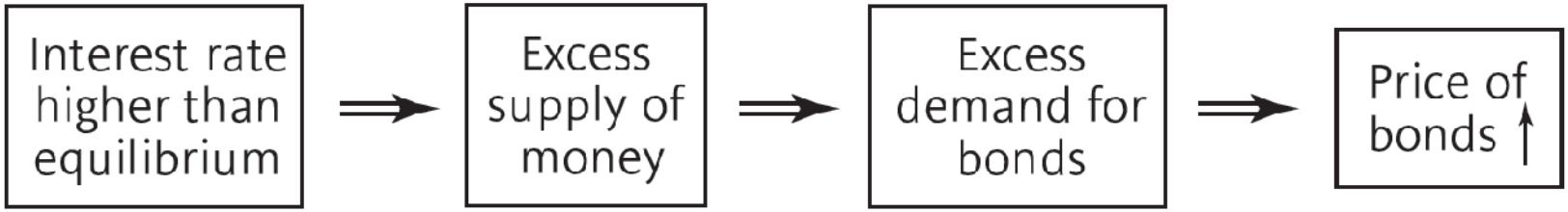


Equilibrium in the Money Market

- If interest rate > equilibrium
  - Excess supply of money
  - Excess demand for bonds
- Excess supply of money
  - Amount of money supplied > amount demanded at a particular interest rate

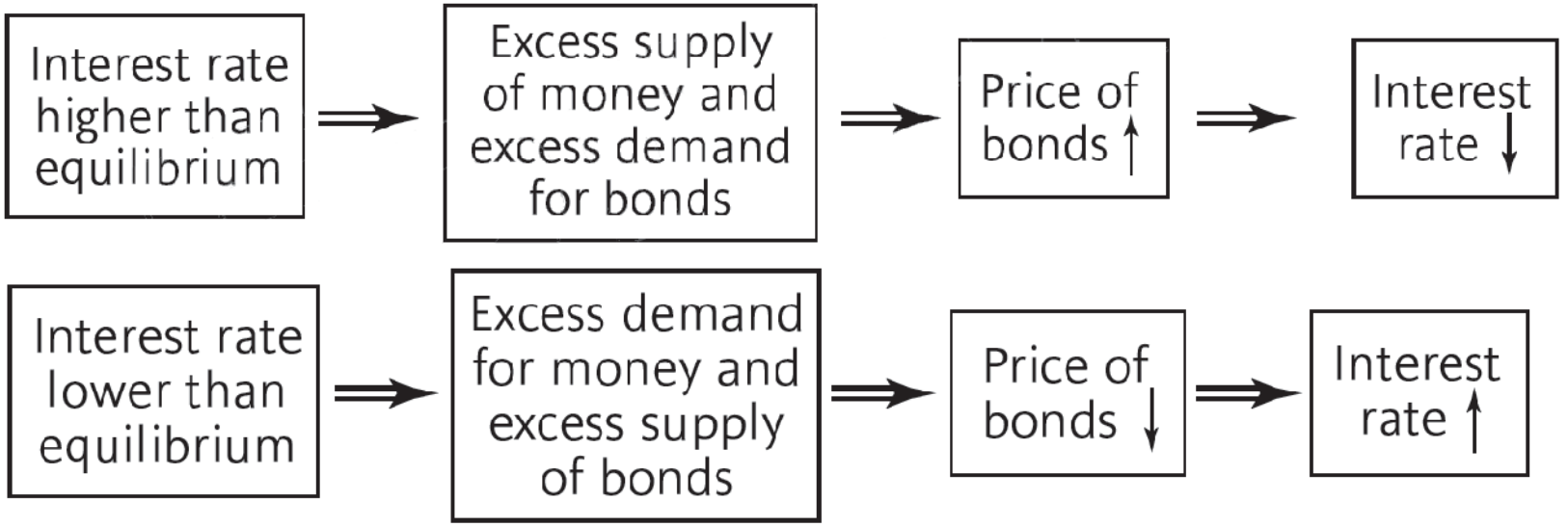
Equilibrium in the Money Market

- Excess demand for bonds
  - Amount of bonds demanded > amount supplied at a particular interest rate



Equilibrium in the Money Market

- When the price of bonds rises
  - The interest rate falls
- When the price of bonds falls
  - The interest rate rises

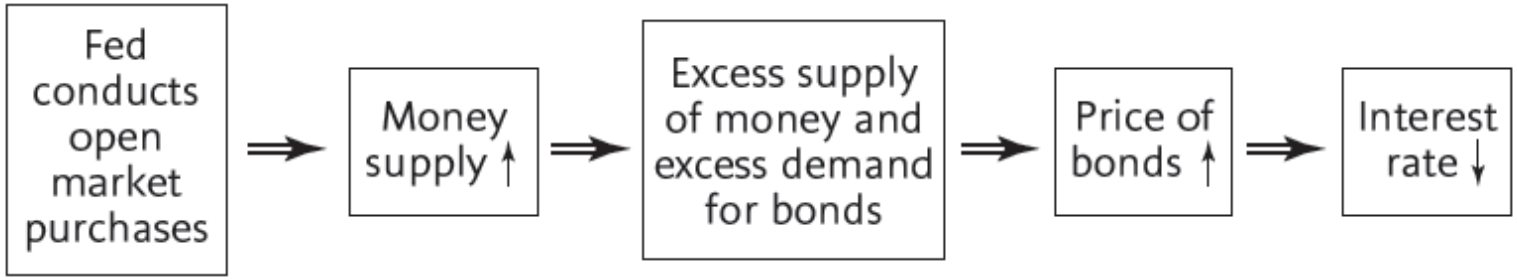


Equilibrium in the Money Market

- Interest rate
  - In the long run - determined in the market for loanable funds
    - Household saving is lent to businesses and the government
  - In the short run - determined in the money market
    - Wealth holders adjust their wealth between money and bonds
    - The Fed – can change the money supply

What Happens When Things Change?

- The Fed wants to lower the interest rate
  - Increase the money supply
  - Buy government bonds



What Happens When Things Change?

- The Fed wants to increase the interest rate
  - Decrease the money supply
  - Sell government bonds

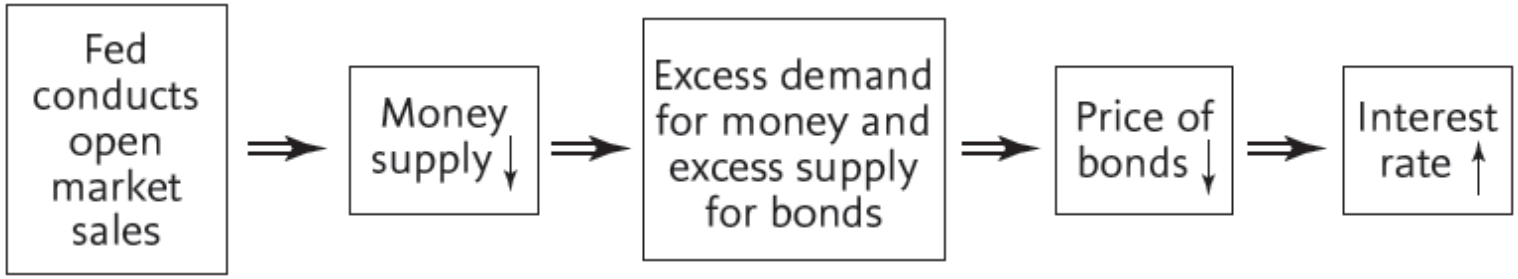
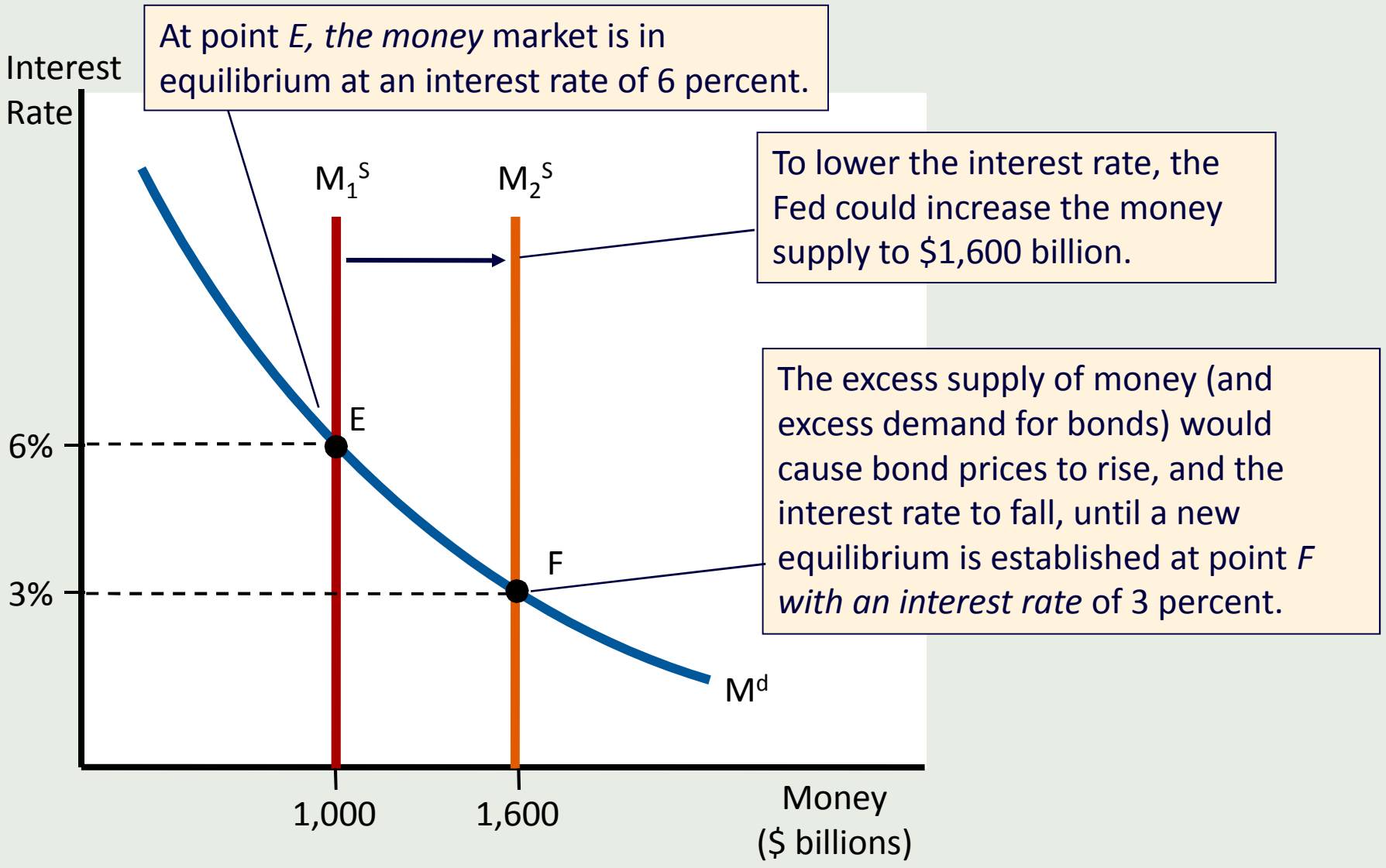


Figure 6: An Increase in the Money Supply



What Happens When Things Change?

- Interest rate falls
  - Increased spending on:
    - Plant and equipment
    - New housing
    - Consumer durables (especially automobiles)
- Interest rate rises
  - Decreased spending on:
    - Plant and equipment, New housing
    - Consumer durables (especially automobiles)

Monetary Policy

- Monetary policy
  - Control or manipulation of interest rates by the Federal Reserve
  - Designed to achieve a macroeconomic goal
- Fed - open market purchases of bonds:

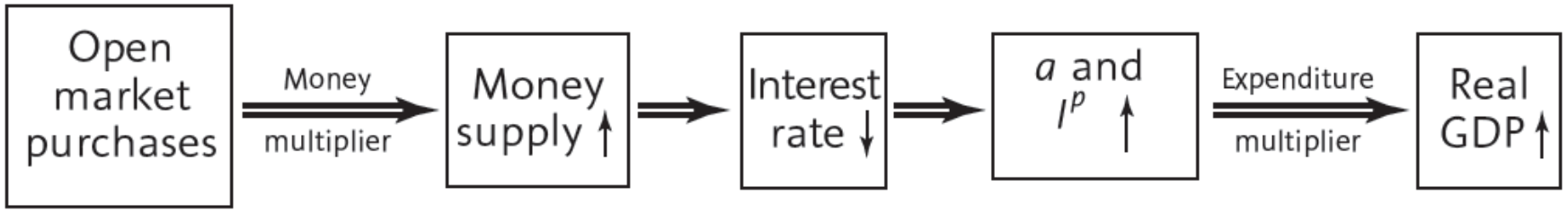
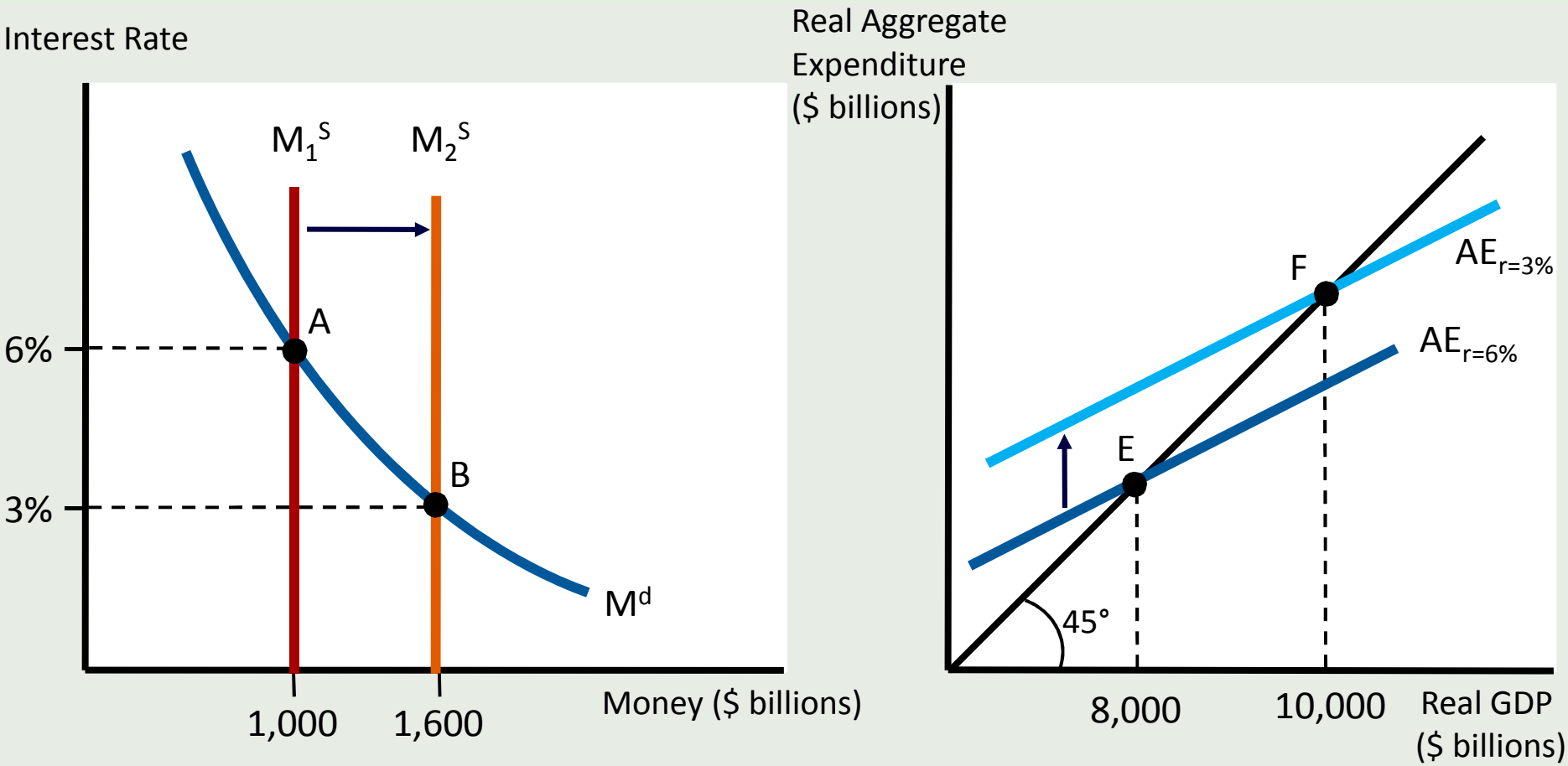


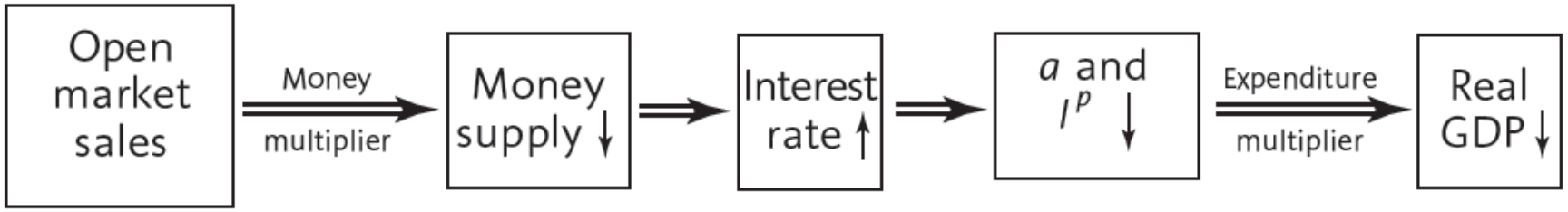
Figure 7: Monetary Policy and the Economy



Initially, the Fed has set the money supply at $1,000 billion, so the interest rate is 6% (point A). Given that interest rate, aggregate expenditure is $AE_{r=6\%}$ in panel (b), and real GDP is $8,000 billion (point E). If the Fed increases the money supply to $1,600 billion, money market equilibrium moves to B in panel (a). The interest rate falls to 3% (point B), stimulating interest-sensitive spending and driving aggregate expenditures upward in panel (b). Through the multiplier process, real GDP increases to $10,000 billion (point F).

Monetary Policy

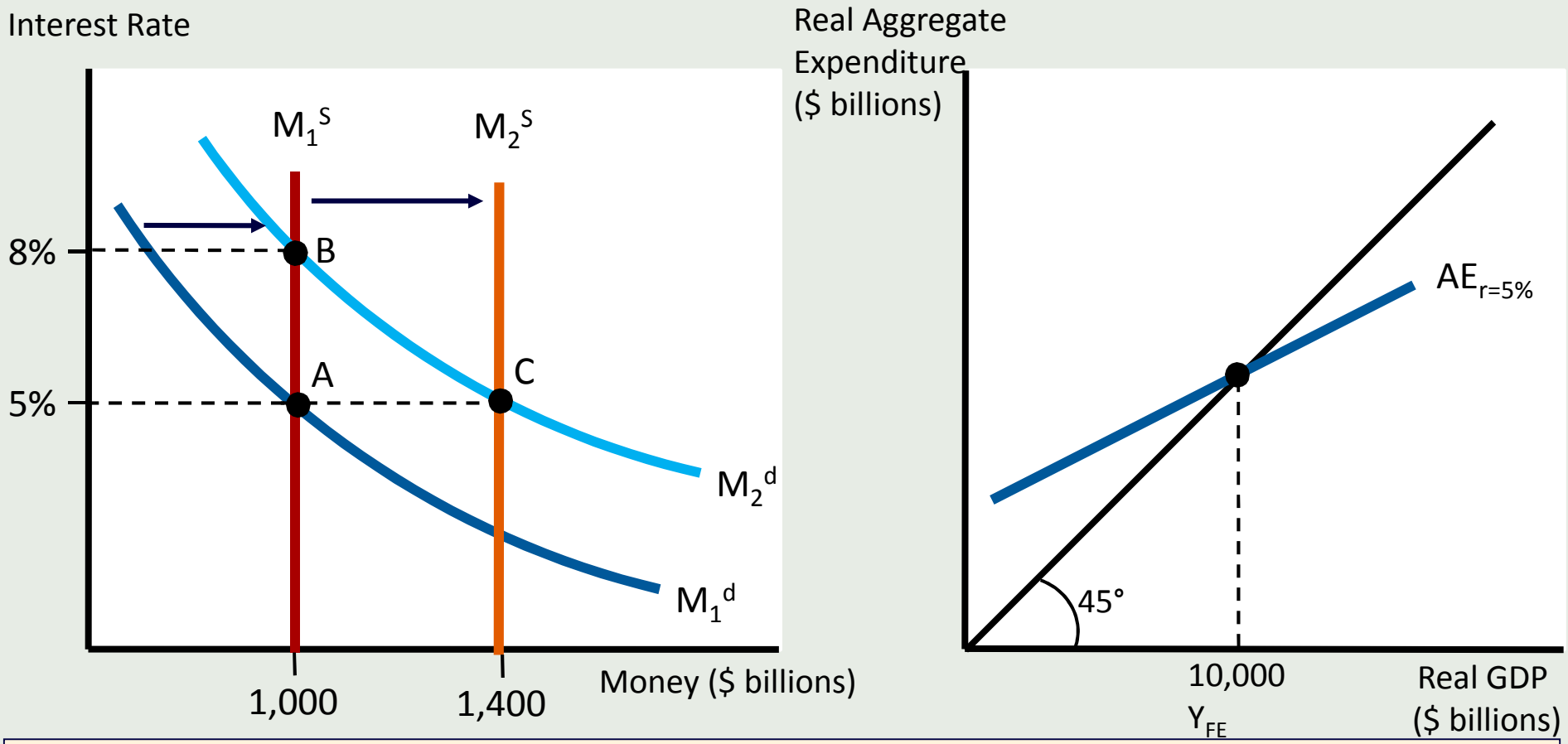
- Fed - open market sale of bonds:



Monetary Policy

- Fed – maintain an interest rate target:
  - To prevent fluctuations in money demand from affecting the economy
  - The Fed adjusts the money supply to maintain its interest rate target

Figure 8: Maintaining an Interest Rate Target

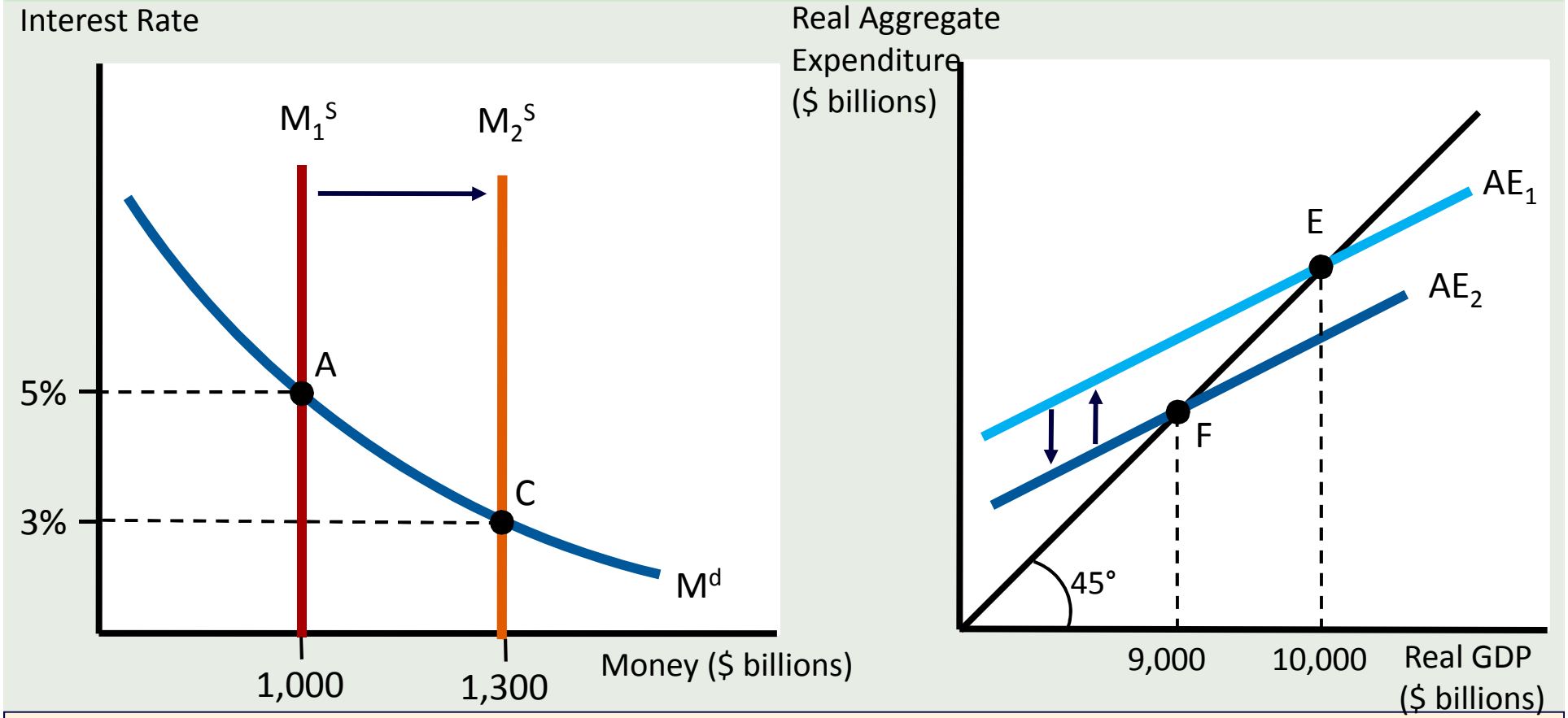


Initially, the money market in panel (a) is at point A, with the interest rate at its target of 5%. In panel (b), this interest rate positions the AE line to create equilibrium output of $10,000 billion, which results in full employment. An increase in money demand from M_1^d to M_2^d in panel (a), with no action by the Fed, would drive the interest rate up to 8%, and shift the AE line in panel (b) downward. To prevent this, the Fed increases the money supply from $1,000 billion (M_1^S) to $1,400 billion (M_2^S), moving the money market equilibrium to point C. This maintains the interest rate at its target of 5%, and prevents any change in equilibrium output in panel (b).

Monetary Policy

- Fed – change the interest rate target:
  - To prevent or address unwanted changes in aggregate expenditure
  - The Fed changes its interest rate target, adjusting the money supply as needed to reach it

Figure 9: Changing the Interest Rate Target to Prevent a Recession



Initially, the money market in panel (a) is at point A, with the interest rate at its target of 5%. In panel (b), equilibrium output is $10,000 billion, which is the full-employment output level. Then, in panel (b), the AE line shifts downward because of a decrease in some sector's spending. With no change in Fed policy, output would fall from $10,000 billion to $9,000 billion (point F). To prevent this recession, the Fed lowers its interest rate target to 3% in panel (a), and increases the money supply from $1,000 billion (M_1^S) to 1,300 billion (M_2^S). This moves the money market equilibrium to point C. The lower interest rate raises consumption and investment spending, shifting the AE line in panel (b) back to its original position.

Monetary Policy with Many Interest Rates

- Federal funds market
  - Banks with excess reserves lend them out to other banks
  - For very short periods, usually a day
  - Interest rate = federal funds rate

Monetary Policy with Many Interest Rates

- Federal funds rate
  - The interest rate charged for loans of reserves among banks
  - Targeted by the Fed
- New tool: interest on reserves
  - Interest rate for reserves sets a floor for the federal funds rate

Unconventional Monetary Policy

- The Fed – unconventional tools in case of:
  - Changing interest rate spreads
  - The zero lower bound
  - Financial crises
- Interest rate spread
  - The difference between any particular interest rate and a benchmark interest rate

Unconventional Monetary Policy

- Changing interest rate spreads
  - The Fed cannot use federal funds rate
  - The Fed can change spreads by arranging the buying or selling of assets other than government bonds
  - Economic and political costs

Unconventional Monetary Policy

- Zero lower bound
  - Federal funds rate – could reach zero
  - The Fed can reduce the real rate as low as it wants by increasing expected inflation
  - Uncertain effects on long-term real interest rates
  - Can leave the economy with a difficult-to-solve inflation problem

Unconventional Monetary Policy

- Financial crises
  - Conventional features – for banks
    - Deposit insurance
    - The discount window
  - Expand and extend these features to non-banks

The Fed and the financial crisis of 2008

- Conventional tools in 2007 and early 2008
  - Lower federal funds target, September 2007
    - Before the AE line began shifting downward
    - Continued to lower it for the next 15 months
  - Not enough to prevent a recession
  - Other interest rates in the economy remained stubbornly high

Figure 10a: The Fed in Action: 2001

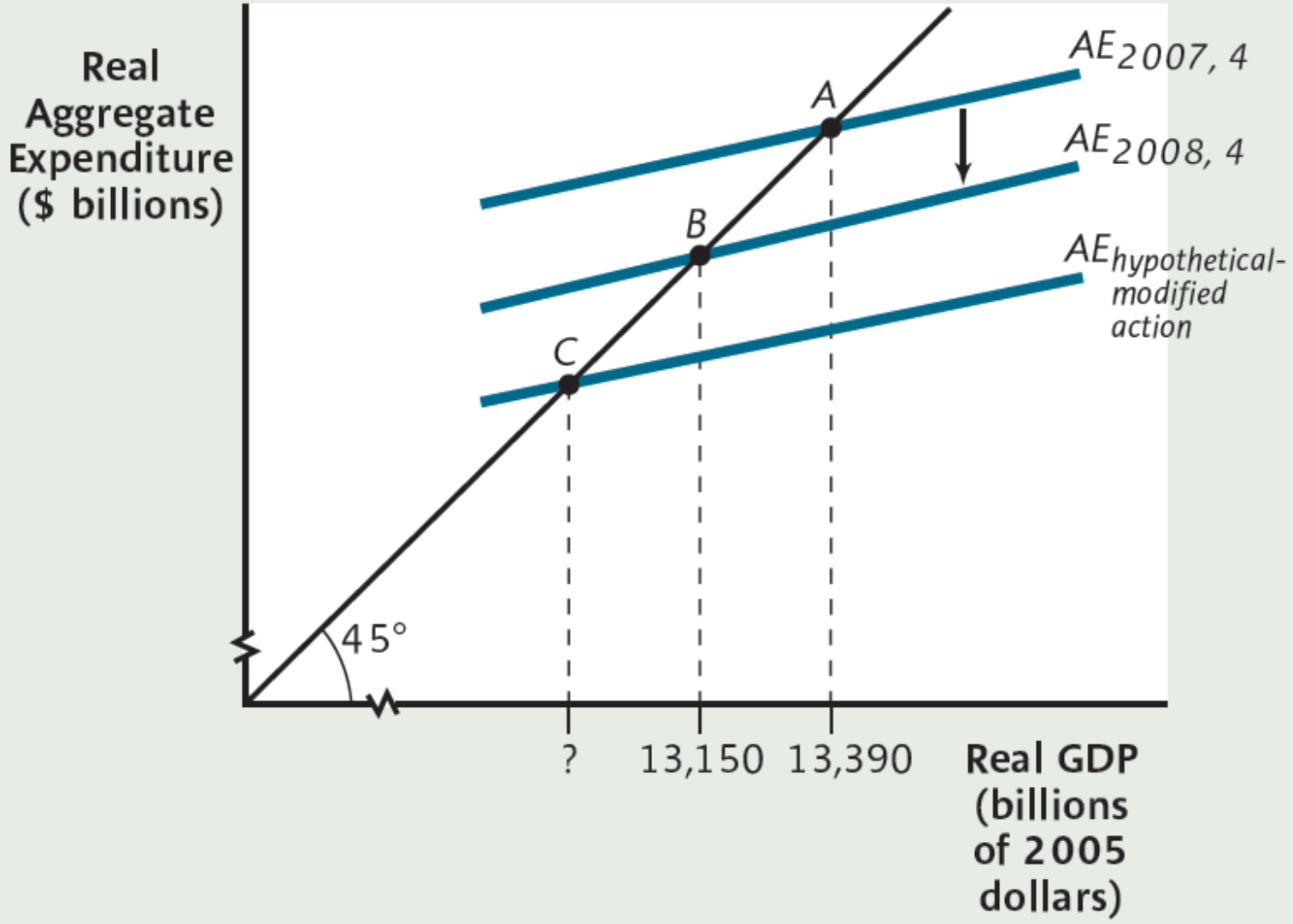


Figure 10b: The Fed in Action: 2001

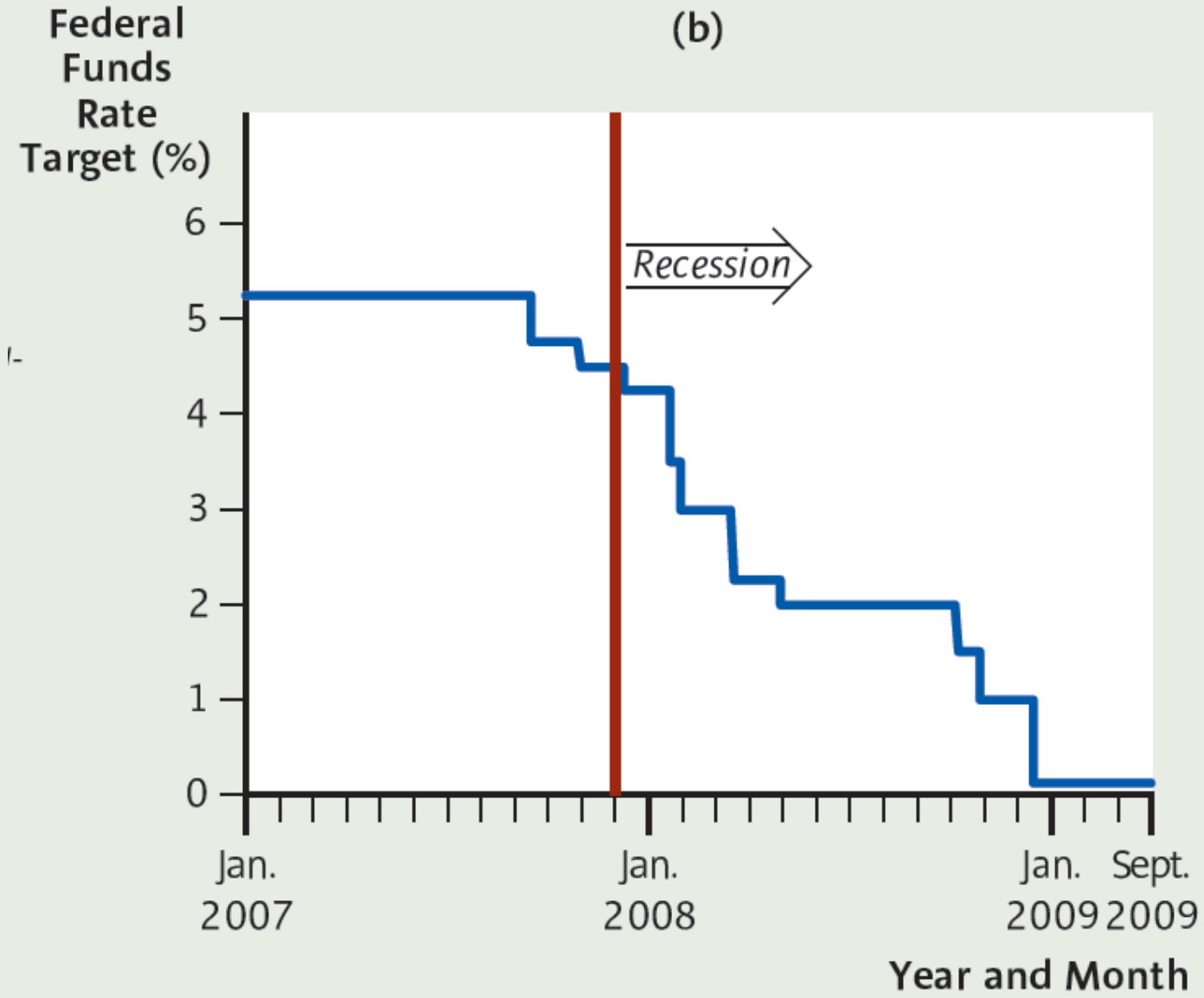
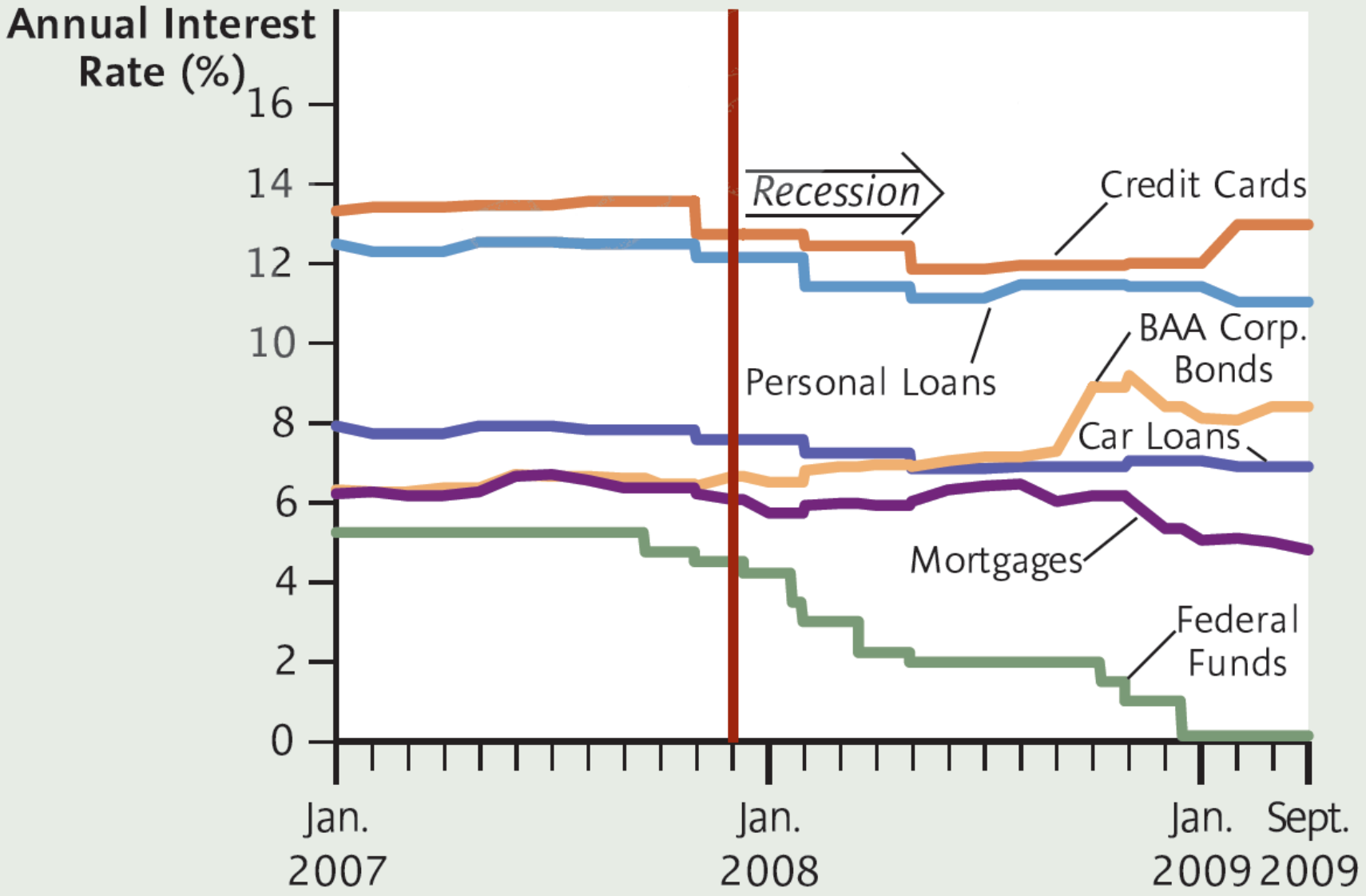


Figure 10c: The Fed in Action: 2001



The Fed and the financial crisis of 2008

- The need for unconventional tools
  - Rising spreads
  - Federal funds rate was fast approaching the zero lower bound
  - Financial crisis was worsening
- How the Fed (and the Treasury) responded
  - Lender of last resort: easier for banks to borrow anonymously for short periods
  - Created incentives for other financial players to purchase mortgage-backed securities

The Fed and the financial crisis of 2008

- How the Fed (and the Treasury) responded
  - Purchase $500 billion worth of mortgage backed securities
    - Later increasing the amount to more than $1 trillion
  - Assisted the Treasury as it lent out hundreds of billions of dollars to troubled financial institutions
    - Taking newly issued shares of stock as collateral.

The Fed and the financial crisis of 2008

- The exit strategy
  - As it provided reserves to specific institutions or markets through most of 2008
    - It simultaneously conducted open market sales to prevent the total amount of reserves from rising
  - Congress - granted the Fed immediate authority to pay interest on reserves

Figure 11: The Fed acting as a financial intermediary

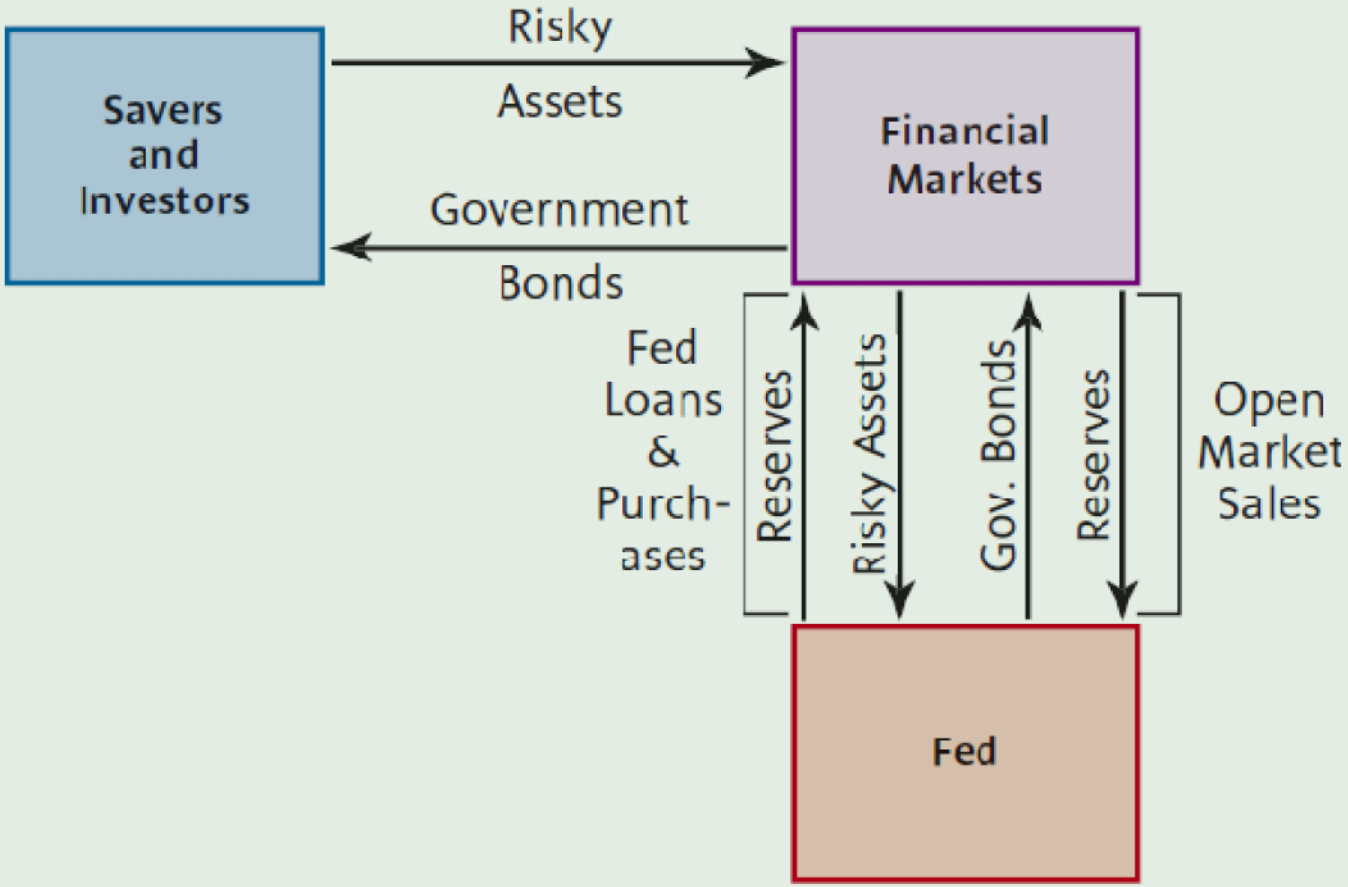
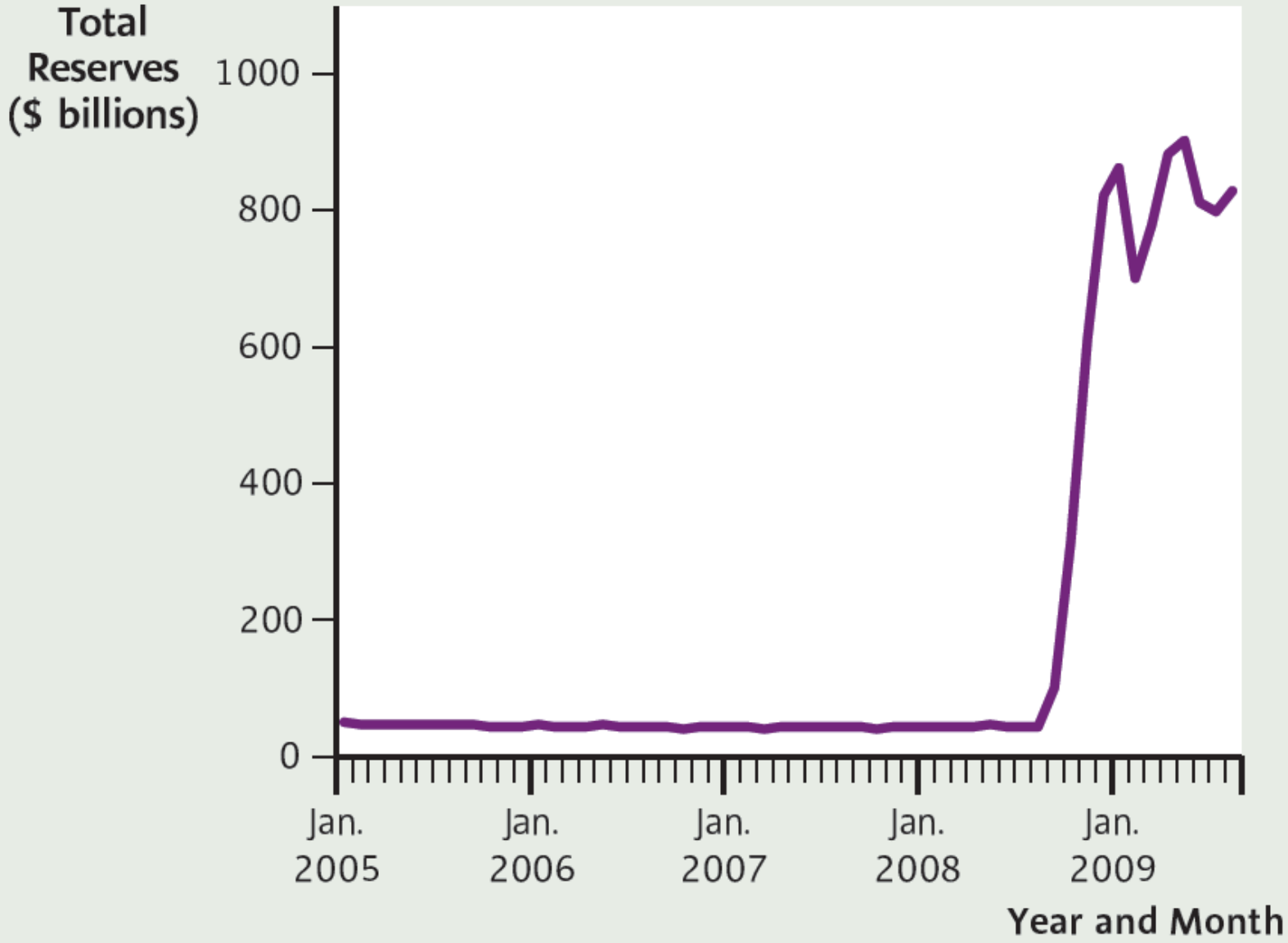


Figure 12: Explosive growth in the total reserves of U.S. banks



The Fed and the financial crisis of 2008

- The Controversies
  - Should have lowered the Federal funds rate more aggressively in late 2007 and throughout 2008
  - Why it began paying significant interest on reserves so early
    - Encouraged banks to hold reserves during the crisis rather than create new loans
  - Could have done more to raise expected inflation
    - Lowered the real federal funds rate even after the nominal funds rate reached the zero lower bound

The Fed and the financial crisis of 2008

- The Controversies
  - Over the Fed's enlarged role in the economy
  - Some in Congress and the public - not happy
    - The Fed - imposing risks on taxpayers
    - To rescue the financial system itself and the owners and creditors of financial institutions

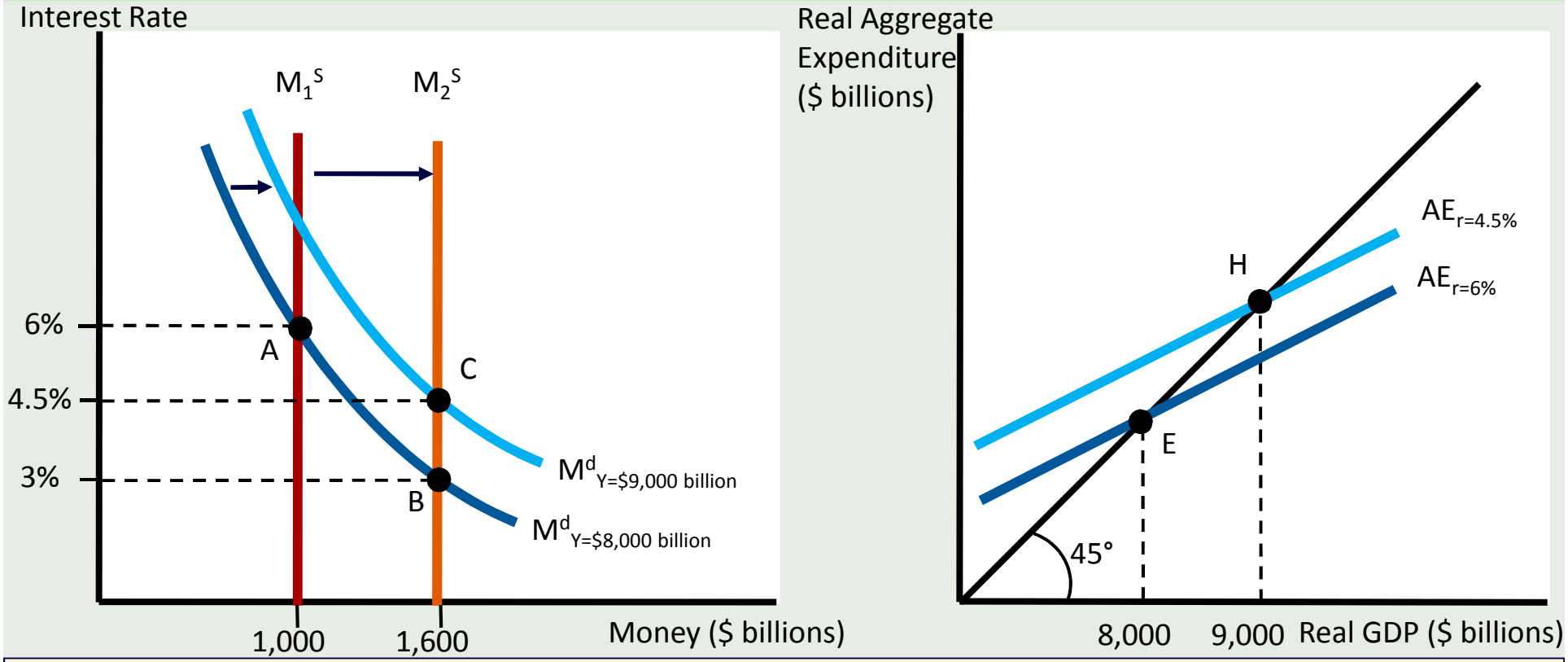
The Fed and the financial crisis of 2008

- The Controversies
  - The Fed found itself in the center of a political firestorm
    - Expand the Fed's regulatory powers
    - Shrink the Fed's role and limit its powers
    - Greater disclosure about the details of Fed policy-making

Feedback effects from GDP to the money market

- Include feedback effects from income to the money market
  - A given change in the money supply
    - Will cause a smaller change in the interest rate
  - To achieve any given change in the interest rate
    - Requires a larger change in the money supply

Figure A.1: A More Complete View of Monetary Policy



Initially, the Fed has set the money supply at $1,000 billion, so the interest rate is 6% (point A). Given that interest rate, the aggregate expenditure line is $AE_{r=6\%}$ in panel (b), and real GDP is $8,000 billion (point E). If the Fed increases the money supply to $1,600 billion and the money demand curve did not shift (as in the chapter), the money market equilibrium moves temporarily to point B in panel (a). The interest rate falls, stimulating interest-sensitive spending and shifting up the aggregate expenditure line in panel (a). Through the multiplier expenditure, real GDP increases. The rise in GDP has feedback effects on the money market in panel (a): The money demand curve shifts rightward, because more money is demanded when income is greater. In the new equilibrium, real GDP is $9,000 billion, and the interest rate is 4.5% (point C). Because of the feedback effects from GDP to the money market, the interest rate drops less, and GDP rises less, than when these feedback effects are ignored.

Feedback effects from GDP to the money market

- Fiscal policy - increase in government purchases
  - Expenditure multiplier process
    - Increase GDP and income in each round
    - Shift AE line upward
  - As income increases
    - Money demand curve - shift rightward
    - Raising the interest rate
    - Autonomous consumption (a) and investment spending (I) will decrease
    - Shift AE line downward

Feedback effects from GDP to the money market

- Fiscal policy - increase in government purchases
  - In the short run
  - Causes real GDP to rise, but not by as much as if the interest rate had not increased

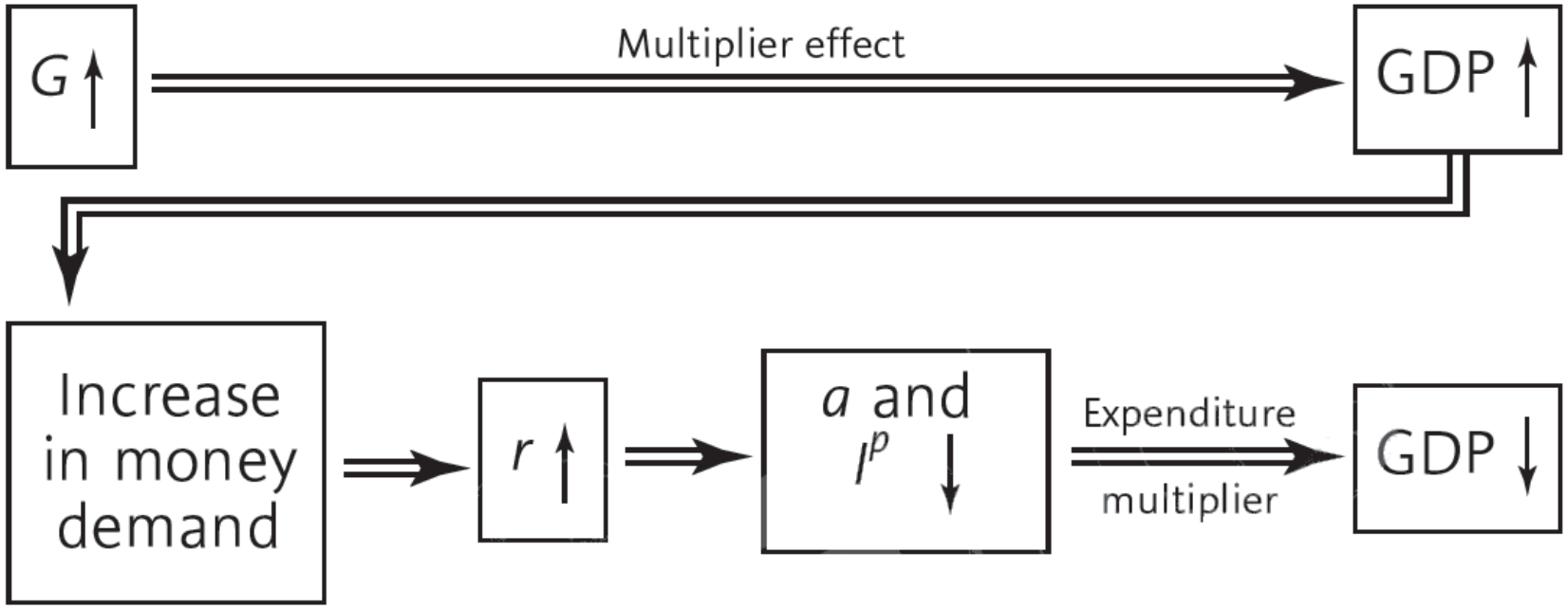
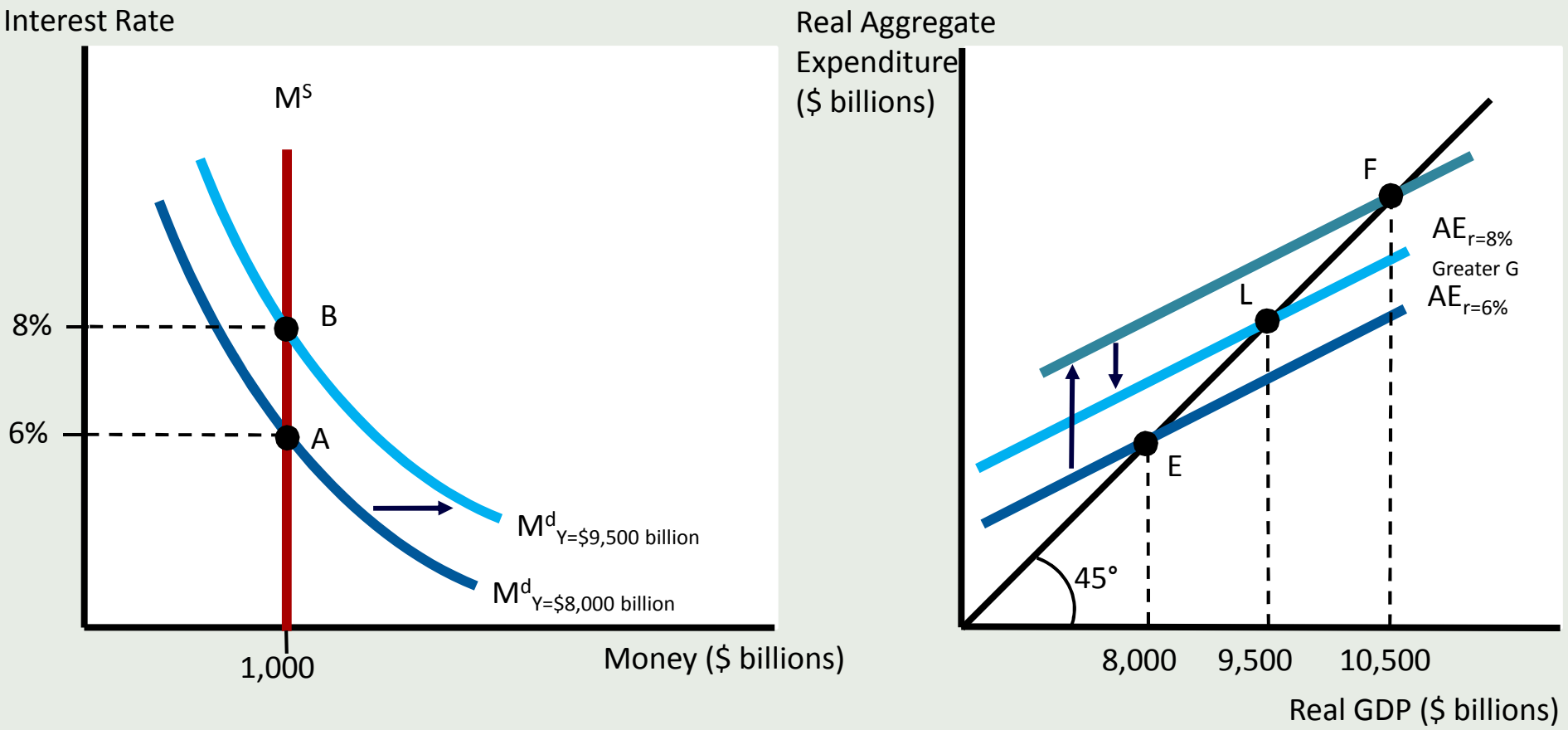


Figure A.2: Fiscal Policy and the Money Market



The economy is initially in equilibrium with an interest rate of 6 percent in panel (a) and real GDP of $8,000 billion in panel (b). An increase in government purchases shifts the aggregate expenditure line upward, triggering the expenditure multiplier process. If the interest rate did not change, equilibrium would be reestablished at point F in panel (b) with real GDP of $10,500 billion. But the increase in GDP increases money demand in panel (a), driving the interest rate upward to 8 percent at point B. That reduces interest-sensitive spending, lowering aggregate expenditure to $AE_{r=8\%}$ in panel (b) so that the real GDP at the new equilibrium is $9,500 billion (point L).

Feedback effects from GDP to the money market

- New equilibrium after an increase in government purchases:
  - AE line is higher
    - But by less than ΔG
  - Real GDP and real income are higher
    - But the rise is less than $[1/(1—MPC)]^{x}\Delta G$.
  - Money demand curve has shifted rightward
    - Because real income is higher

Feedback effects from GDP to the money market

- New equilibrium after an increase in government purchases:
  - Interest rate is higher
    - Because money demand has increased.
  - Autonomous consumption and investment spending are lower
    - Because the interest rate is higher

Feedback effects from GDP to the money market

- Crowding out
  - Including the effects in the money market in the short-run macro model
  - An increase in government purchases
    - Raises the interest rate
    - Crowds out some private investment spending
    - May crowd out consumption spending