

## Prep Questions for Exam #1: Answers

1. *Briefly define: 1) money; 2) financial institutions; and 3) financial markets.*
  - A. Money, such as fiat money, gold, silver, and cigarettes, is anything generally accepted as a means of payment.
  - B. Financial institutions, such as banks, investment companies, and insurance companies, receive funds from deposits and premiums and in turn make loans to borrowers.
  - C. Financial markets, such as stock markets and bond markets, transfer funds from savers to borrowers.

2. *Briefly describe the difference between direct finance and indirect finance. Do federal, state, and local governments primarily use direct finance or indirect finance when selling government securities and municipal bonds? What type of companies tend to use direct finance, and what type of companies tend to use indirect finance?*
- A. In direct finance, borrowers directly sell securities (bonds or stock) in financial markets to lenders. Governments and large firms usually use direct finance.
- B. In indirect finance, borrowers lend funds from financial intermediaries who acquire those funds from savers. Small firms usually use indirect finance.

3. *What is asymmetric information? Which channel of finance, direct or indirect, tries to minimize the impact of asymmetric information? Briefly name and describe the two types of asymmetric information.*

Asymmetric information occurs when one party does not know enough about the other party to make competent decisions. Financial intermediaries, via indirect finance, try to minimize the problems associated with asymmetric information.

- A. Adverse selection occurs when asymmetric information is present *before* the transaction occurs.
- B. Moral hazard occurs when asymmetric information is present *after* the transaction occurs.

4. *Name and briefly explain the three characteristics of money. Does Bitcoin satisfy those three characteristics? Briefly explain.*

A. Medium of Exchange is any item that is generally accepted as a means of payment. Bitcoin is a good medium of exchange because many entities accept Bitcoin as a payment for goods and services.

B. Unit of account is anything that serves as a common unit to measure the value of goods and services. Bitcoin does not make a good unit of account because its value is highly volatile.

C. Store of value is any asset that people use to store their wealth. Bitcoin does not make a good store of value because its value is highly volatile.

5. Use the information below to calculate the answers to parts a – c.

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<i>Currency outside of banks</i>	<i>\$285</i>
<i>Demand deposits</i>	<i>\$360</i>
<i>Institutional money market mutual funds</i>	<i>\$170</i>
<i>Other checkable deposits</i>	<i>\$440</i>
<i>Retail money market mutual funds</i>	<i>\$410</i>
<i>Savings deposits</i>	<i>\$390</i>
<i>Small time deposits</i>	<i>\$550</i>
<i>Traveler's checks</i>	<i>\$5</i>

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a. *M1*.

$$M1 = \text{Curr} + \text{DD} + \text{Other ChD} + \text{TC} + \text{SavD}$$

$$M1 = 285 + 360 + 440 + 5 + 390$$

$$M1 = \$1,480$$

b. *M2*.

$$M2 = M1 + \text{RMMMF} + \text{STD}$$

$$M2 = 1,480 + 410 + 550$$

$$M2 = \$2,440$$

c. *MZM*.

$$\text{MZM} = M2 + \text{IMMMF} - \text{STD}$$

$$M^B = 2,440 + 170 - 550$$

$$M^B = \$2,060$$

6. *Suppose someone takes out a simple \$4,000 loan payable in 5 years. If the payoff amount for that loan is \$4,866.61, what is the interest rate on the loan?*

$$\begin{aligned}FV &= (1+R)^n \times PV \\4,866.61 &= (1+R)^5 \times 4,000 \\(1+R)^5 &= 4,866.61/4,000 \\(1+R) &= (1.216653)^{(1/5)} \\(1+R) &= 1.04 \\R &= 0.04 = 4\%\end{aligned}$$

7. *Calculate the loan value of a 3-year fixed payment loan where the borrower must make an annual payment of \$10,000 and the interest rate is 6%.*

$$LV = FP/(1+R) + FP/(1+R)^2 + FP/(1+R)^3$$

$$LV = 10,000/(1+0.06) + 10,000/(1+0.06)^2 + 10,000/(1+0.06)^3$$

$$LV = 10,000 \times (1/1.06 + 1/1.1236 + 1/(1.191016))$$

$$LV = 10,000 \times 2.673012$$

$$LV = \$26,730.12$$

8. *Consider a coupon bond maturing in 2 years with a face value of \$1,000 and an annual payment of \$50. If the interest rate is 4%, what is the present value of the coupon bond?*

$$PV = C/(1+R) + C/(1+R)^2 + FV/(1+R)^2$$

$$LV = 50/(1+0.04) + 50/(1+0.04)^2 + 1,000/(1+0.04)^2$$

$$LV = 50 \times (1/1.04 + 1/1.0816) + 1,000/(1.0816)$$

$$LV = \$1,018.86$$

9. *Consider the following two bonds: a 1-year discount bond with a \$1,000 face value that sells for \$950 and a perpetuity that pays an annual coupon of \$25 for a cost of \$500. Which bond has a higher interest rate? Show your work.*

1-year bond

$$PV = FV/(1+R)$$

$$950 = 1,000/(1+R)$$

$$1+R = 1,000/950$$

$$R = 1.052632 - 1$$

$$R = 0.052632 = 5.2632\%$$

Perpetuity

$$PV = C/R$$

$$500 = 25/R$$

$$R = 25/500$$

$$R = 0.05 = 5\%$$

The 1-year bond has a higher interest rate ( $5.2632\% > 5\%$ ) than the perpetuity.

10. *Suppose the rate of return on a coupon bond is 4%, the annual coupon payment is \$25, and the current price of the coupon bond is \$500. Given that information, calculate the expected price of the coupon bond next period.*

$$P = C/(1+R) + P_{+1}/(1+R)$$

$$500 = 25/(1+0.04) + P_{+1}/(1+0.04)$$

$$P_{+1} = 500 \times (1.04) - 25$$

$$P_{+1} = 520 - 25$$

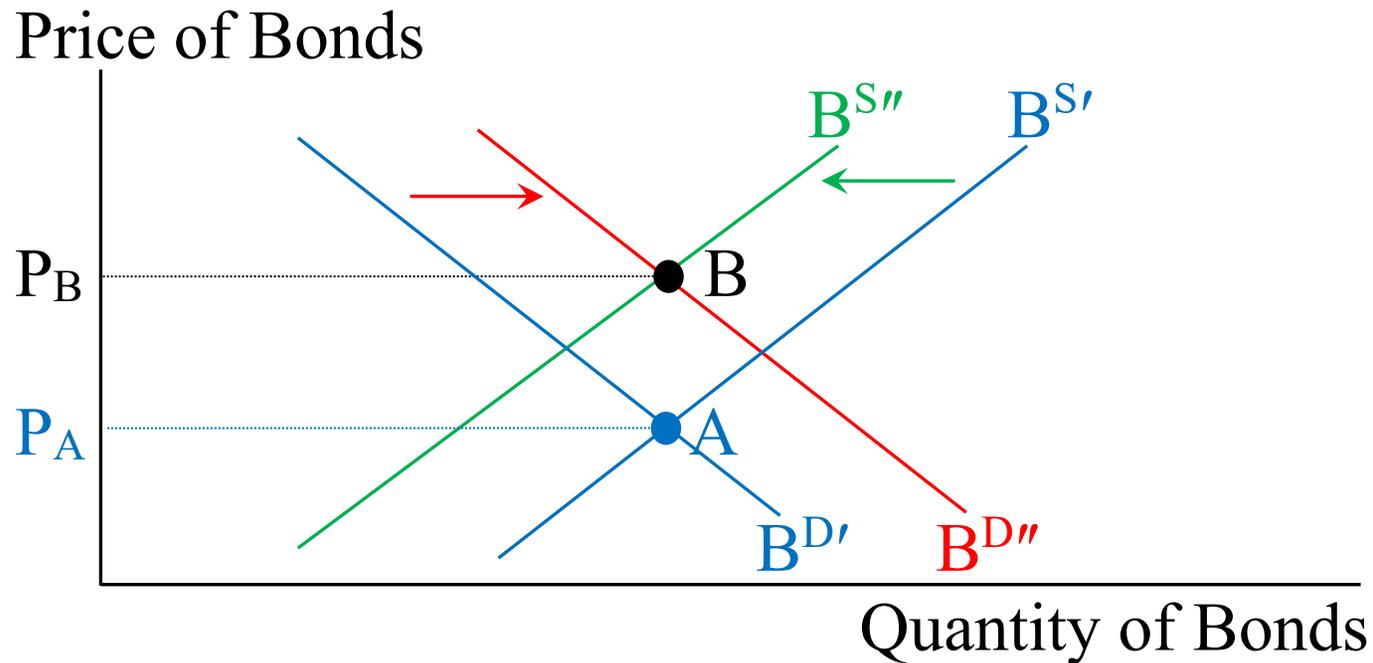
$$P_{+1} = \$495$$

11. *Briefly explain the interest rate risk to bonds? Is that risk higher with short-term bonds or long-term bonds? Briefly explain.*

Interest-rate risk is the risk to a bond's rate of return caused by interest rate changes. Long-term bonds have a much larger interest rate risk than short-term bonds because small changes in interest rates have larger effects on the present value of long-term bonds than they do on short-term bonds.

12. *Explain how each of the following impacts the price, quantity, and interest rate of government bonds. Use a graph of the government bonds market to support each answer.*

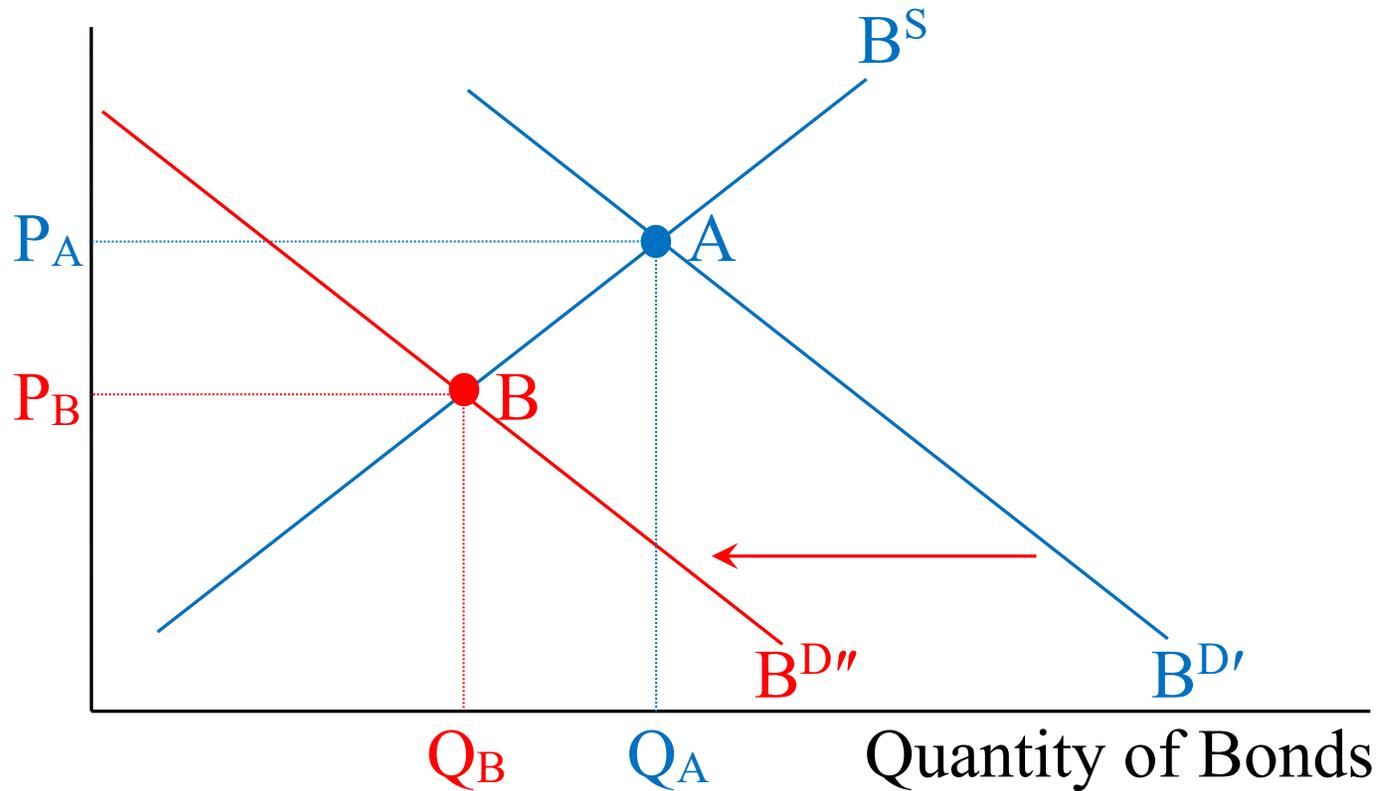
- a. *The Fed unexpectedly announces that it believes the economy will experience deflation over the next year (the price level was previously expected to rise).*



Bond demand shifts right [Red] while bond supply shifts left [Green]. Bond prices rise and interest rates fall, but we cannot determine how the quantity of bonds sold change.

b. *The default risk on corporate bonds declines.*

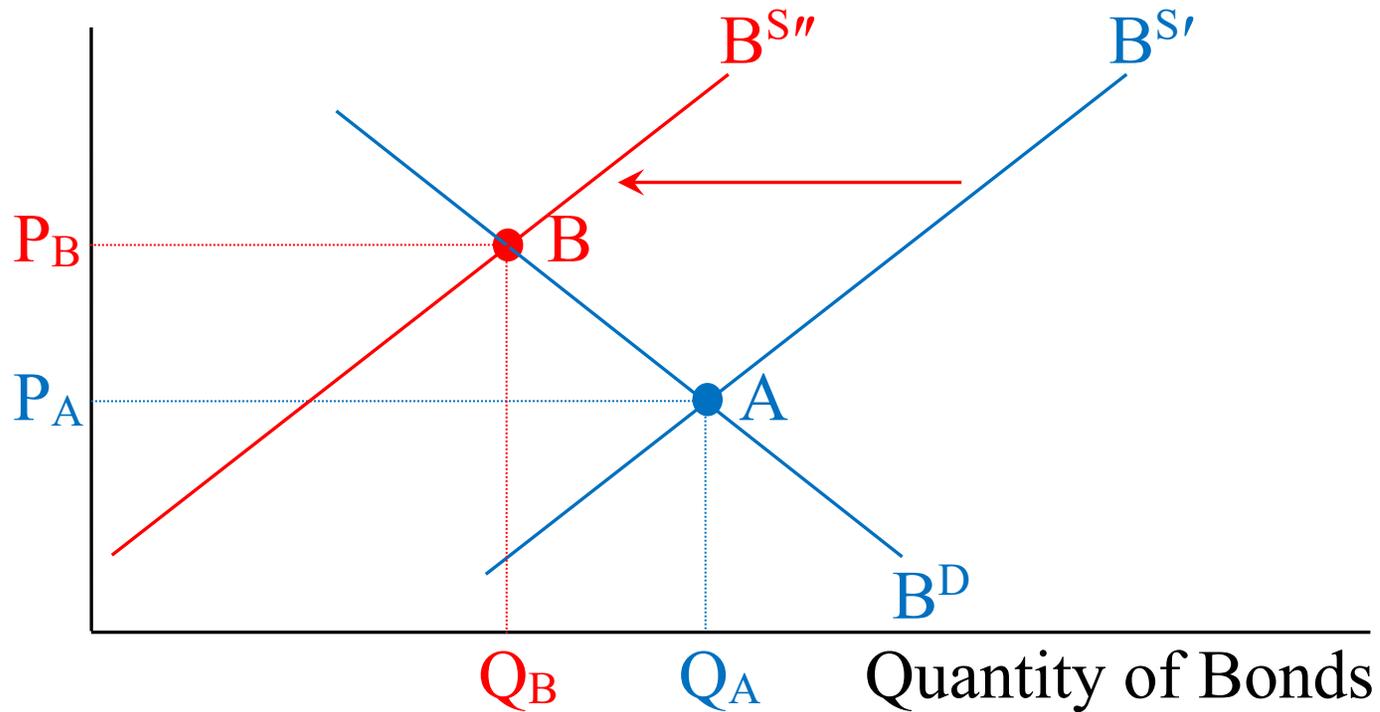
Price of Bonds



Demand for Gov. bonds shifts left [Red] causing their price and quantity to fall and their interest rate to rise.

- c. *The government implements an austerity program to reduce its budget deficit.*

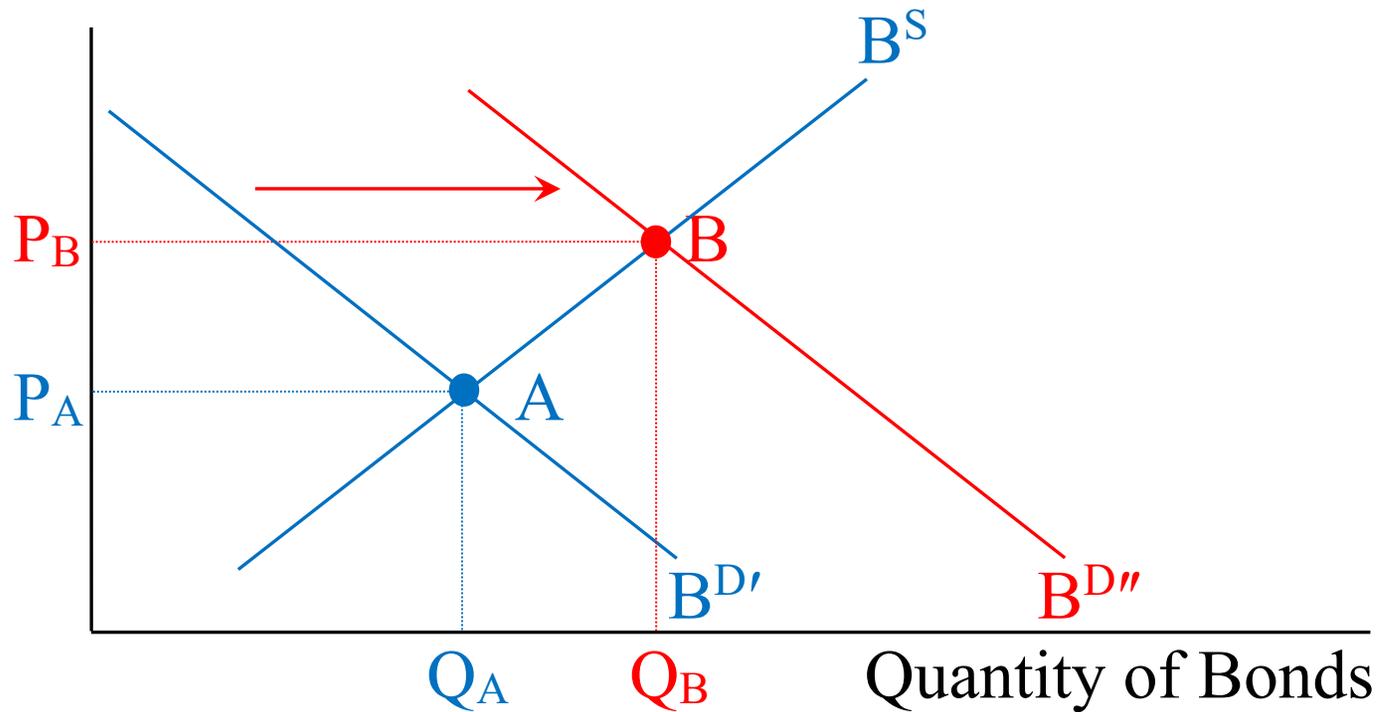
Price of Bonds



Supply of Gov. bonds shifts left [**Red**] causing their price to rise and their quantity and interest rate to fall.

- d. *Technological advances increase the liquidity of government bonds.*

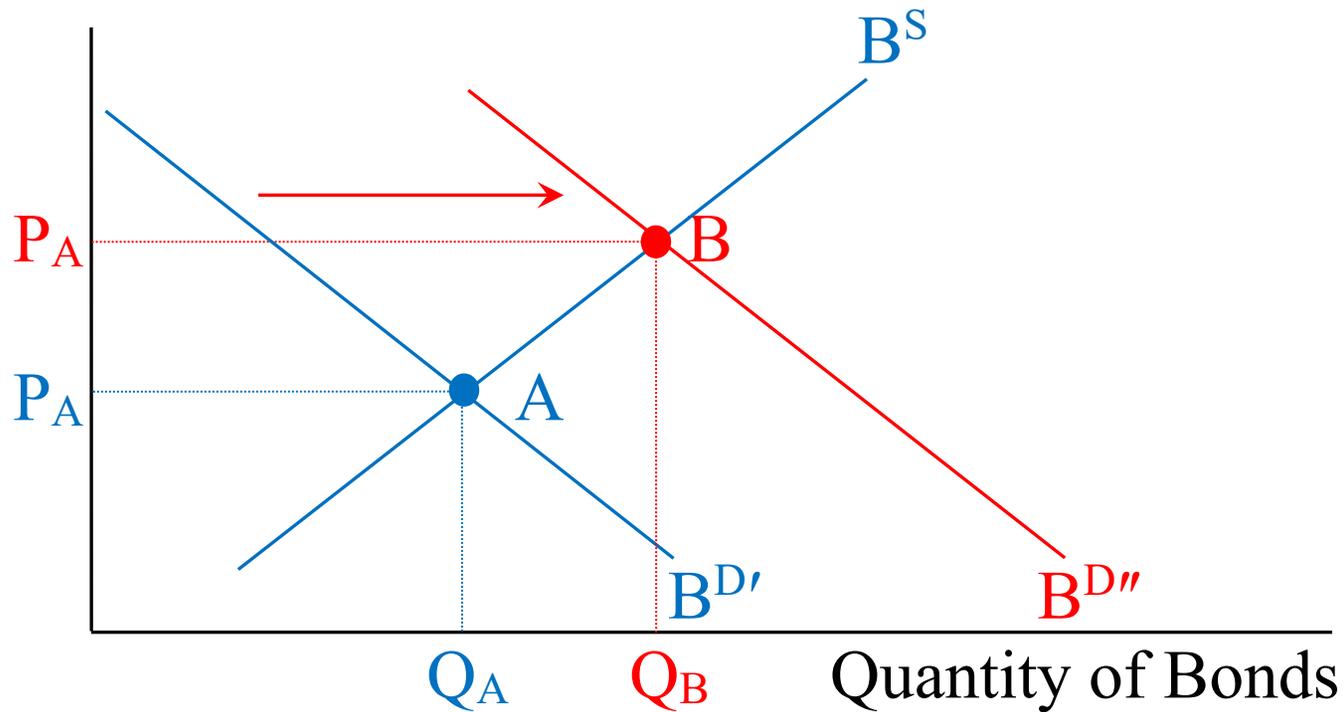
Price of Bonds



Demand for Gov. bonds shifts right [Red] causing their price and quantity to rise and their interest rate to fall.

- e. *Steadily rising asset prices increases household wealth.*

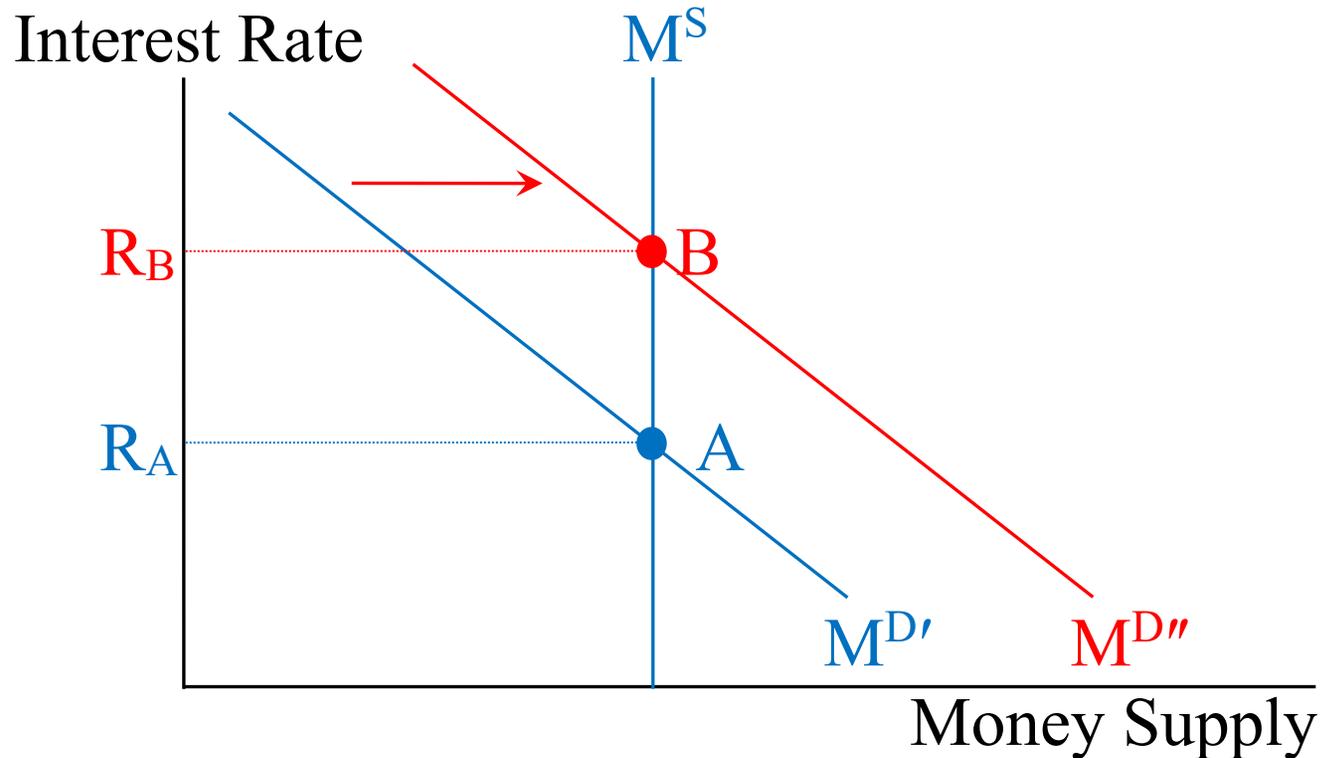
Price of Bonds



Demand for Gov. bonds shifts right [Red] causing their price and quantity to rise and their interest rate to fall.

13. Use a graph of the money market to support each answer.

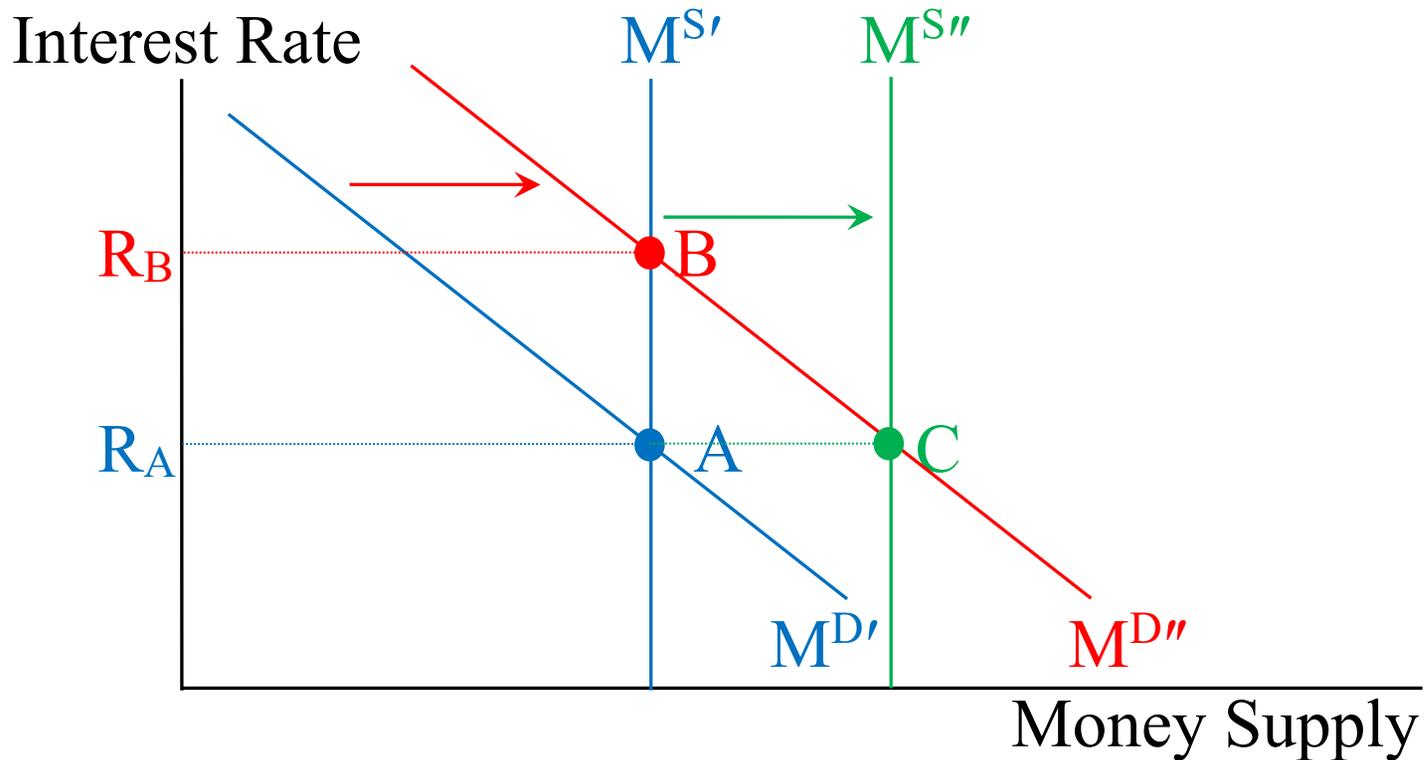
a. What is the impact of an increase in output on the interest rate?



More output raises money demand & the interest rate.

[Red] [ $Y \uparrow \rightarrow M^D \uparrow \rightarrow R \uparrow$ ]

- b. *What can the central bank do to prevent the interest rate from changing in part a?*

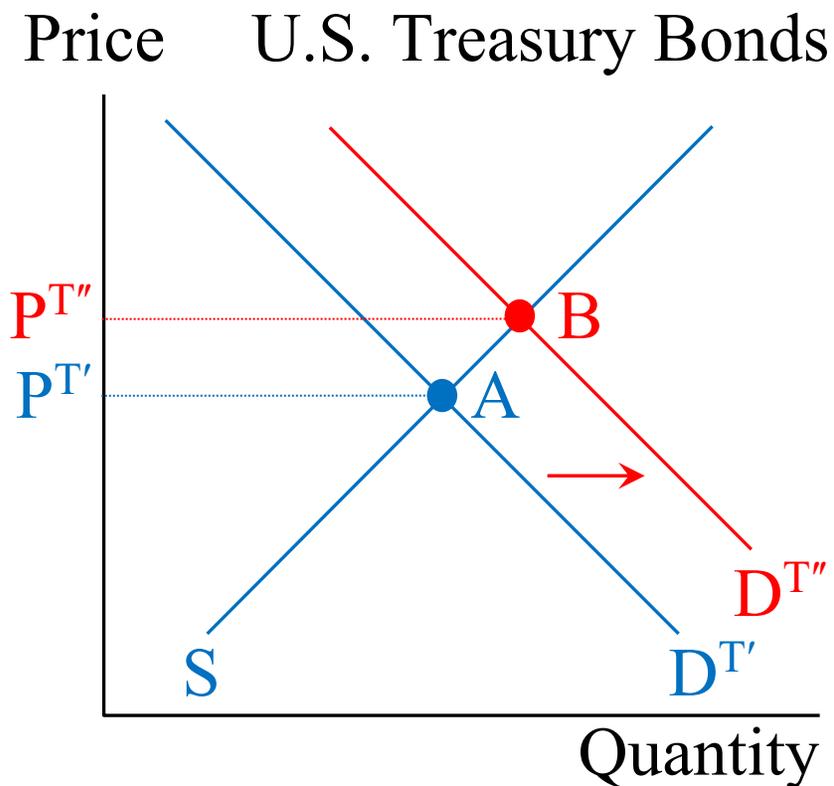
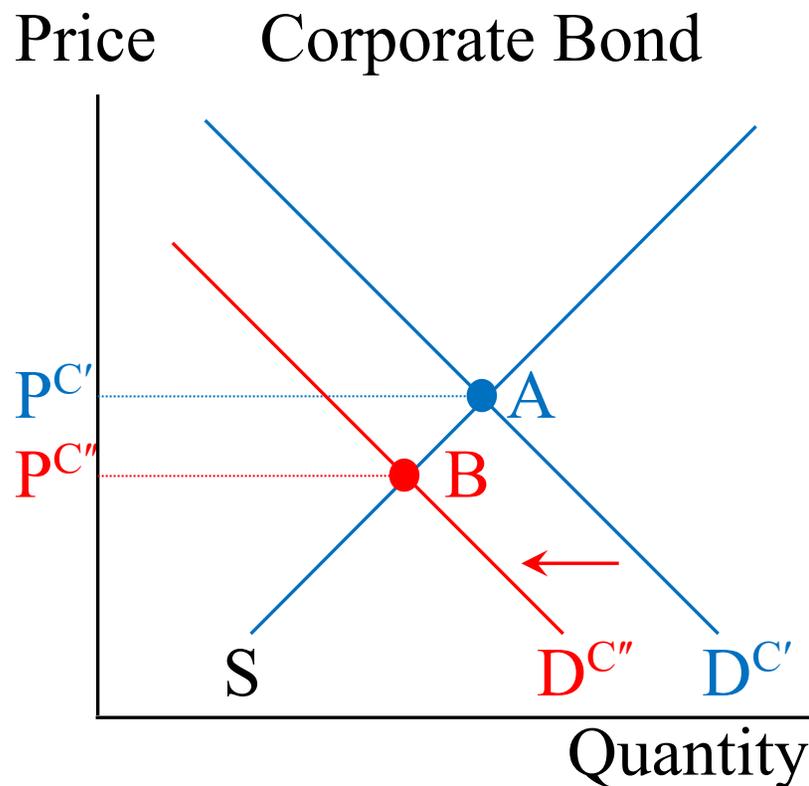


The central bank can increase the money supply to counteract the rise in money demand to keep the interest rate constant. [Green] [ $M^S \uparrow \rightarrow R \downarrow$ ]

14. *What is meant by a default risk on a bond? Give an example of a type of bond that is considered to have no default risk? If the risk premium for a corporate bond rises, what happens to the price and interest rate for both that corporate bond and the default-free bond? Use a graph to support your answer.*

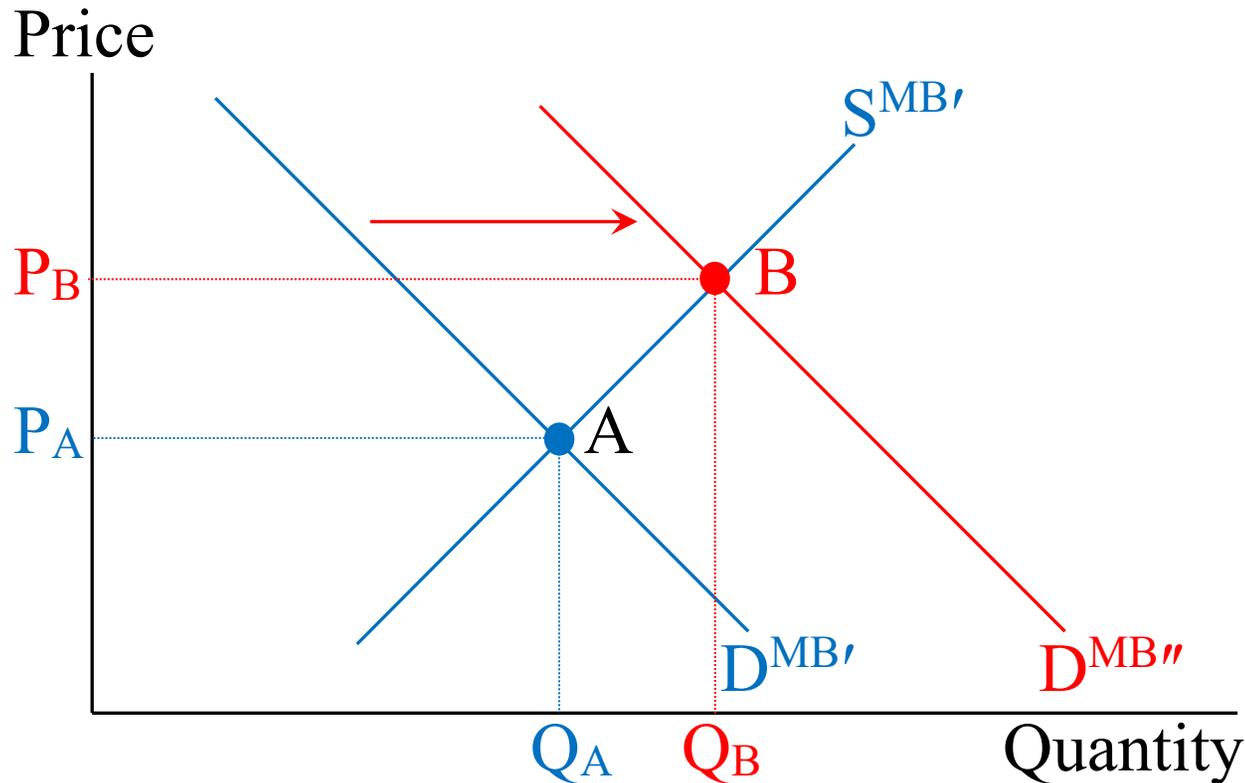
Default risk accounts for the probability the issuer of a bond is unable or unwilling to make interest payments on time or to pay the face value of the bond at maturity. U.S. Treasury bonds are considered to have no default risk.

Suppose the default risk for a corporate bond increases. The demand for the corporate bond falls, which pushes down its price and raises its interest rate. [Red] The demand for U.S. Treasury bonds increases which raises their price and lowers their interest rate.



15. *What type of government bonds are exempt from federal income tax? If income taxes rise, how does the price and interest rate of tax-exempt government bonds change? Use a graph to support your answer.*

Municipal bonds are exempt from federal income tax. If the federal income tax rises, the demand for municipal bonds increases which raises their price and lowers their interest rate. [Red] [Taxes $\uparrow$   $\rightarrow$   $D^{MB}\uparrow$   $\rightarrow$   $P\uparrow$   $\rightarrow$   $R\downarrow$ ]



16. *Suppose the interest rate on a one-year U.S. Treasury bond is expected to be 1.0% in 2021, 1.5% in 2022, 2.0% in 2023, and 2.5% in 2024 and 2025. What should the interest rate on a five-year U.S. Treasury bond be in 2021 according to the expectations theory of the term structure. If instead, the U.S. Treasury bond markets followed the liquidity premium theory of the term structure, how would the interest rate on the five-year U.S. Treasury bond differ from its value according to the expectations theory. Briefly explain your answer.*

According to the expectations theory, the interest rate on a 5-year bond ( $R_{5,t}$ ) is

$$R_{5,t} = \frac{R_{1,t} + R_{1,t+1} + R_{1,t+2} + R_{1,t+3} + R_{1,t+4}}{n}$$
$$R_{5,t} = \frac{1.0 + 1.5 + 2.0 + 2.5 + 2.5}{5}$$
$$R_{5,t} = \frac{9.5}{5}$$
$$R_{5,t} = 1.9\%.$$

According to the liquidity premium theory, the interest rate on a 5-year bond ( $R_{5,t}$ ) is

$$R_{5,t} = \frac{R_{1,t} + R_{1,t+1} + R_{1,t+2} + R_{1,t+3} + R_{1,t+4}}{n} + l_{5,t}$$

where  $l_{5,t} > 0$  is the liquidity premium on a 5-year bond.

17. *Briefly discuss the segmented markets theory of the term structure. In your answer, mention how this theory views the substitutability of bonds across different maturities. Then, outline how well this theory does in explaining the three facts about the term structure that were discussed in class.*

The segmented markets theory assumes there are separate and segmented markets for each bond maturity so bonds are NOT substitutable across different maturities. This theory CAN explain why the yield curve is upward sloping most of the time but CANNOT explain why interest rates on different maturities move together and why the yield curve is upward (downward) sloping when short-term interest rates are low (high).

18. *Suppose the ABC company is currently profitable but is expected to be out of business by the end of 2026 because it is in a dying industry. If the expected rate of return on equities is 7% and the ABC company is expected to pay a per share dividend of \$12 in 2022, \$10 in 2023, \$7 in 2024, \$4 in 2025, and \$1 in 2026, calculate the share price of ABC company's stock in 2021?*

The stock price for the ABC company in 2021 is

$$P_{21} = \frac{D_{22}}{(1+k)} + \frac{D_{23}}{(1+k)^2} + \frac{D_{24}}{(1+k)^3} + \frac{P_{25}}{(1+k)^4} + \frac{P_{26}}{(1+k)^5}$$

$$P_{21} = \frac{12}{(1.07)} + \frac{10}{(1.07)^2} + \frac{7}{(1.07)^3} + \frac{4}{(1.07)^4} + \frac{1}{(1.07)^5}$$

$$P_{21} = 11.25 + 8.73 + 5.71 + 3.05 + 0.71$$

$$P_{21} = 29.45.$$

19. *Consider a stock where the current dividend is \$5, the required rate of return on equity is 9%, and the constant growth rate of the dividend is expected to be 4%. Using that information, calculate the stock's current price according to the Gordon Growth model.*

The current price in the Gordon Growth model is calculated using the following formula:

$$P_t = \frac{D_t \times (1 + g)}{(k - g)}$$

where  $g$  is the dividend growth rate and  $k$  is the required rate of return. When  $D=5$ ,  $g=0.04$ , and  $k=0.09$ , then

$$P_t = \frac{5 \times (1 + 0.04)}{(0.09 - 0.04)} = \frac{5 \times (1.04)}{(0.05)}$$

$$P_t = \$104.$$

20. *What is rational expectations and how does it relate to the Efficient Market Hypothesis? According to the Efficient Market Hypothesis, what is the role of “smart money” investors in the market? What are the three implications discussed in class of the Efficient Market Hypothesis for the average investor?*

Rational expectations assumes people's expectations are identical to their optimal forecasts using all available information. The efficient market hypothesis is the application of rational expectations to financial markets. Specifically, security prices fully reflect all available information in an efficient market. “Smart money” or well-informed investors eliminate any unexploited profit opportunities in the stock price.

For the average investor, the efficient market hypothesis means 1) Published reports and hot tips are usually already known by the market, so that information is already contained in the stock price; 2) Stock prices only react to announcements when the information is new and unexpected; and 3) Most investors cannot out guess the market, so such a strategy only boosts the income of stockbrokers. Hence, most investors should use a “buy and hold” strategy, where stocks are purchased and held for a long period of time.