

Assignment 1 (Chapter 14) **SOLUTION**

2. Label each of the following statement true, false, or uncertain. Explain briefly.

a) The yield curve normally slopes up.

True. The normal yield curve is a yield curve in which short-term debt instruments have a lower yield than long-term debt instruments of the same credit quality. This gives the yield curve an upward slope. This is the most often seen yield curve shape.

b) The price of one-year bond increases when the nominal one-year interest rate increases.

False. The price of a bond is inversely related to the nominal interest rate. This means that when the interest rate increases, the price of the bond decreases.

c) Worries about future inflation would tend to make the yield curve slope down.

False. Future short-term nominal interests are expected to increase. So the yield curve should be upward sloping.

d) An equal increase in expected inflation and nominal interest rate at all maturities should lead to a fall in stock prices.

False. As there is no change in real interest rate, no change in real dividends. Therefore, no change in real stock prices.

e) A rational investor should never pay a positive price for a stock that will never pay dividends.

False. According to the Rational Speculative Bubble, even if all future dividends are zero, a rational investor may still want to pay positive price for a stock if he/she expected that the future price of this stock is positive.

3. The equity premium and the value of stocks (Question 4 of Chapter 14 in 7th edition)

a. Explain why, in equation (14.14), it is important that the stock is ex-dividend, that is, it has just paid its dividend and expects to pay its next dividend in one year.

b. Using equation (14.14), explain the contribution of each component to today's stock price.

c. If the risk premium is larger, all else equal, what happens to the price of the stock today?

d. If the one-period interest rate increases, what happens to the price of the stock today?

e. If the expected value of the stock at the beginning of period $t+1$ increases, what happens to the value of the stock today?

f. Now look carefully at equation (14.15). Set $i_{1t} = i_{1t+n} = 0.05$ for all n . Set $x = 0.03$. Compute the coefficients on $\$D^e_{t+3}$ and $\$D^e_{t+10}$. Compare the effect of a \$1 expected increase in a dividend 3 years from now and 10 years from now.

g. Repeat the computation in (f) with $i_{1t} = i_{1t+n} = 0.08$ for all n and $x = 0.05$.

$$\$Q_t = \frac{\$D_{t+1}^e}{(1 + i_{1t} + x)} + \frac{\$Q_{t+1}^e}{(1 + i_{1t} + x)} \quad (14.14)$$

$$\begin{aligned} \$Q_t = & \frac{\$D_{t+1}^e}{(1 + i_{1t} + x)} + \frac{\$D_{t+2}^e}{(1 + i_{1t} + x)(1 + i_{1t+1}^e + x)} + \cdots \\ & + \frac{\$D_{t+n}^e}{(1 + i_{1t} + x) \cdots (1 + i_{1t+n-1}^e + x)} + \frac{\$Q_{t+n}^e}{(1 + i_{1t} + x) \cdots (1 + i_{1t+n-1}^e + x)} \end{aligned} \quad (14.15)$$

- a. The equation discounts the first dividend received so it must be received one period in the future.
- b. The first component is the discounted value of the expected dividend. The second component imagines the stock is sold in one period. It discounts the expected price of that sale.
- c. The price of stock falls today.
- d. The price of the stock falls today.
- e. The price of the stock rises today.
- f. The coefficient on $\$D_{t+3}^e$ is 0.79 and on $\$D_{t+10}^e$ is 0.46. Thus an expected \$1 increase in a dividend 3 years hence adds 79 cents to the share price today. An expected one dollar increase in a dividend 10 years hence adds only 46 cents to the share price today.
- g. The new values are 0.69 and 0.29. Higher discount rates make future events less important.

4. Monetary policy and the stock market (Question 6 of Chapter 14 in 7th edition)

Assume all policy rates, current and expected into the future had been 2%. Suppose the Fed decides to tighten monetary policy and increase the short-term policy rate (r_{1t}) from 2% to 3%.

- a. What happens to stock prices if the change in r_{1t} is expected to be temporary, that is, last for only one period? Assume expected real dividends do not change. Use equation (14.17).
- b. What happens to stock prices if the change in r_{1t} is expected to be permanent, that is, is expected to persist? Assume expected real dividends do not change. Use equation (14.17).
- c. What happens to stock prices today if the change in r_{1t} is expected to be permanent and that change increases expected future output and expected future dividends? Use equation (14.17).

$$Q_t = \frac{D_{t+1}^e}{(1 + r_{1t} + x)} + \frac{D_{t+2}^e}{(1 + r_{1t} + x)(1 + r_{1t+1}^e + x)} + \dots \quad (14.17)$$

(Reference:)

- a. Very little will happen to stock prices. Only the term in from of the first dividend gets slightly (the first discount factor is slightly smaller).
- b. Now all the discount factors get slightly smaller and the terms in front of all expected dividends are slightly larger. Stock prices decrease.
- c. Stock prices are uncertain. When the expected dividends increase, stock prices increases while when the interest rate increases, stock prices decreases.

5. Housing price and bubbles (Question 8 of Chapter 14 in 7th edition)

Houses can be thought of as assets with a fundamental value equal to the expected present discounted value of their future real rents.

- a. Would you prefer to use real payments and real interest rates to value a house or nominal payments and nominal interest rates?
- b. The rent on a house, whether you live in the house yourself and thus save paying the rent to an owner, or whether you own the house and rent it, is like the dividend on a stock. Write the equivalent of equation (14.17) for a house.

$$Q_t = \frac{R_{t+1}^e}{(1 + r_{1t} + x)} + \frac{R_{t+2}^e}{(1 + r_{1t} + x)(1 + r_{1t+1}^e + x)} + \dots \quad (14.17)$$

- c. Why would low interest rates help explain an increase in the price-to-rent ratio?
- d. If housing is perceived as a safer investment, what will happen to the price-to-rent ratio?
- e. The Focus box “The Increase in U.S. Housing Prices: Fundamental or Bubble?” has a graph of the price-to-rent ratio. You should be able to find the value of the Case-Shiller home price index and the rental component of the consumer price index in the FRED economic database maintained at the Federal Reserve Bank of St. Louis (variablesSPCS20RSA and CUSR0000SEHA respectively). The graph in Figure 1 in this Focus box ends in June 2015. Calculate the percentage increase in the home price index between June and the latest date available. Calculate the percentage increase in the rent price index from June 2015 to the latest date available. Has the price-to-rent ratio increased or decreased since June 2015?

- a. Houses last a long time. Rents are likely to rise with inflation. Real interest rates would be better.
- b. Let R_{t+n}^e be the expected real rent on the house. Let Q_{Ht} be the price of a house. We can let x_H be the risk premium on a house. The equation would be

$$Q_{Ht} = \frac{R_{t+1}^e}{(1 + r_{1t} + x_H)} + \frac{R_{t+2}^e}{(1 + r_{1t} + x_H)(1 + r_{1t+1}^e + x_H)} + \dots$$

c. The future rents would be discounted less and the price would rise. Price-to-rent ratio would be higher.

d. x_H would decline in value. The discount factors would be less and the price would rise. Price-to-rent ratio would be higher.

e.

Observation date	Home price index	Rent index
2015-06-01	178.8378	285.4910
2018-06-01	211.4109	318.7580
% change	18.2138	11.6526

- price-to-rent ratio increased

6. Suppose the yield curve is initially upward sloping. Use your knowledge of the IS-LM model and the yield curve to explain what effect each of the following events will have on the shape of the yield curve.

a) Financial markets expect a future reduction in consumer confidence which results in a reduction in consumer spending.

A reduction in consumer spending will cause the IS curve to shift left. Given horizontal LM curve, the expected future one-year rate will be unchanged. Yield curve will be the same.

b) Financial markets expect a future Fed monetary expansion.

A monetary expansion will cause the LM curve to shift down. The expected future one-year rate will fall causing the yield curve to become flatter.

c) Financial markets expect a future reduction in government spending which is accompanied by a Fed monetary expansion.

A reduction in government spending will shift the IS curve to the left and a monetary expansion will shift the LM curve down. The expected future one-year rate will fall causing the yield curve to become flatter.

d) Financial markets expect a future tax cut.

A tax cut will shift the IS curve to the right due to the increase in the disposable income of consumer. Given horizontal LM curve, the expected future one-year rate will be unchanged. Yield curve will be the same.
