

Midterm Answers

1. $\$10,000(1.123)^{22} = \$128,338$, which is 74% more than $\$10,000(1.095)^{22} = \$73,639$. [Josh Enomoto, "Only Buy Berkshire Hathaway Inc Stock If You Fit Buffett's Demographic," InvestorPlace, May 30, 2018]
2. The buyer is hoping that a drop in interest rates will give a capital gain larger than the loan rate.
3. The dividends from stocks are expected to increase over time; the coupons from a bond won't.
4. In the absence of liquidity preference, if investors expect no change in interest rates, the term structure will be flat. With these same expectations, the liquidity-preference hypothesis implies that long-term rates will be higher than short-term rates. In general, the liquidity preference hypothesis implies that long-term rates will be somewhat higher than the values predicted by the expectations hypothesis. For a flat term structure, we need a situation in which investors expect interest rates to be lower in the future than they are today.
5. $(1+.020/30)^{360} = 1.2711$, an effective annual rate of 27.11%
6. A high growth rate is good; so is a low P/E. So a low (P/E)/g is good. However, using the constant-dividend growth model

$$P = \frac{D}{R - g}$$

$$\frac{P}{E} = \frac{D/E}{R - g} = \frac{d}{R - g}$$

$$\frac{P/E}{g} = \frac{d/g}{R - g}$$

There is no simple relationship between the PEG and the underlying parameters. Most glaringly, the PEG ignores R. In an era of high interest rates, R will be high and PEGs may be low—signaling that all stocks are attractive, when they are not necessarily so. For the specific case of $d = 0.5$, $(P/E)/g = 0.5$ if $R = 2g$

$$0.5 = \frac{0.5/g}{R - g}$$

$$g = R - g$$

$$R = 2g$$

A stock with a 5% growth rate and a 10% required return is fairly priced, not an immediate buy, if PEG = 0.5.

7. The fact that those who go to college make higher incomes on average, does not prove that it is college attendance that is responsible for their high income. No doubt, many are motivated to pursue successful careers, with college one step on this path, and would earn higher-than-average incomes even if they didn't attend college. The correct comparison is not the income of those who attend college with the income of those who don't, but the income of those who attend college with what their incomes would have been if they hadn't attended.

The letter also assumes that without financial aid from the federal government, the average person attending college would not have attended. Most likely, many of those who attend college and pursue

successful careers would attend college even without federal aid. The relevant comparison is the incomes with and without college enrollment of those who attend because of the additional federal aid.

The rate of return calculations are very misleading. The ratio $\$192,000/\$36,800 = 5.22$, represents a 422% return, not a 500% return (just as \$1 that grows to \$1.10 is a 10% return, not 110%). In addition, the letter neglects the fact that the tuition is paid now, while the assumed additional tax revenue occurs in the future. If these additional tax dollars are spread evenly over 45 years, the annual amount is $\$192,000/45 = \$4,266.67$. Spreading the cost of college equally, too, the IRR is determined by this equation

$$0 = -\$9,200 - \frac{\$9,200}{(1+R)^1} - \frac{\$9,200}{(1+R)^2} - \frac{\$9,200}{(1+R)^3} + \frac{\$4,266.67}{(1+R)^4} + \frac{\$4,266.67}{(1+R)^5} + \dots + \frac{\$4,266.67}{(1+R)^{48}}$$

The solution is $R = 0.099$ (9.9%). The IRR would be even lower if the \$192,000 in taxes were tilted more to the future because of the growth of income.

7. As per the IS-LM curves, a strong economy due to increased spending by households, businesses, or government, or strong export demand (shifts in the IS curve) should raise interest rates. However, *ceteris paribus*, if the Fed were to raise interest rates (a shift in the LM curve), that would be bad for the stock market, and a Fed lowering of interest rates would be good for stocks.
9. No; $q = (\text{market value})/(\text{replacement cost})$ and neither the numerator or the denominator can be negative, unless you have to pay someone to take the stock from you or the company has to pay someone to take its assets.
10.
 - a. 15-year zero with an 8% yield to maturity.
 - b. same
 - c. 10-year zero with a 10% yield to maturity.
 - d. 10-year zero with a 6% yield to maturity.
 - e. stock with an annual dividend that is currently \$1 and will grow by 10% annually.