Econ 156
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Final Exam Answers

1. $(1 + 0.08 - 0.016)^{30} = 6.4306$ vs. $(1 + 0.08 - 0.002)^{30} = 9.5184$. Wealth is 50% higher with the low-expense fund; for example, with an initial $10,000 investment, $95,184 versus $64,306.

2. The monthly payments are $(0.05/12)\$800{,}000 = \$3{,}333.33$ or $(0.0575/12)\$800{,}000 = \$3{,}833.33$. After points, Smith receives $(1 - 0.015)\$800{,}000 = \$788{,}000$ or $(1 - 0.0025)\$800{,}000 = \$798{,}000$. In each case, he pays back $800,000 after 5 years. If his annual required return is R, the NPVs are

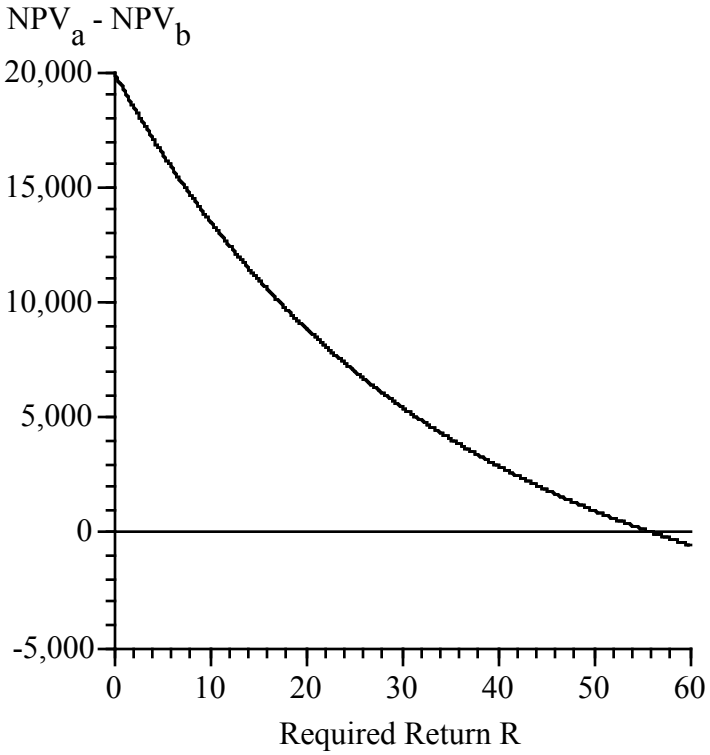
$$NPV_a = \$788{,}000 - \sum_{t=1}^{60} \frac{\$3{,}333.33}{(1+R/12)^t} - \frac{\$800{,}000}{(1+R/12)^{60}}$$

$$NPV_b = \$798{,}000 - \sum_{t=1}^{60} \frac{\$3{,}833.33}{(1+R/12)^t} - \frac{\$800{,}000}{(1+R/12)^{60}}$$

The difference in NPVs is

$$NPV_a - NPV_b = -\$10{,}000 + \sum_{t=1}^{60} \frac{\$500.00}{(1+R/12)^t}$$

Choose (a) if the difference in NPVs is positive; choose (b) if the difference is negative.
Option (a) wins for any required return that is less than 56.14%:



3. The real value is obtained by discounting by the rate of inflation:

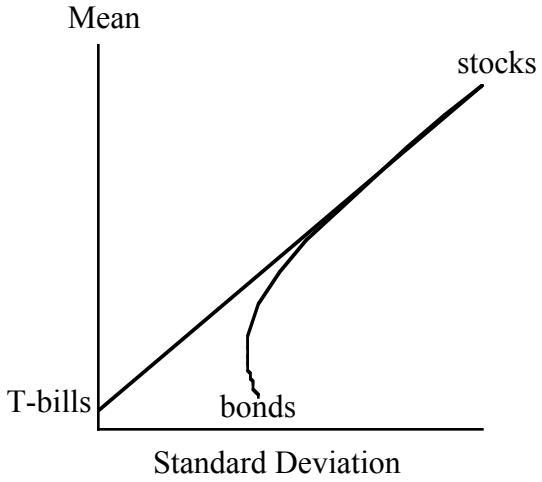
$$\text{real value} = \frac{\$1{,}000}{1.05^{20}}$$

The present value is obtained by discounting this nominal payment by the nominal required rate of return, which is approximately 10%:

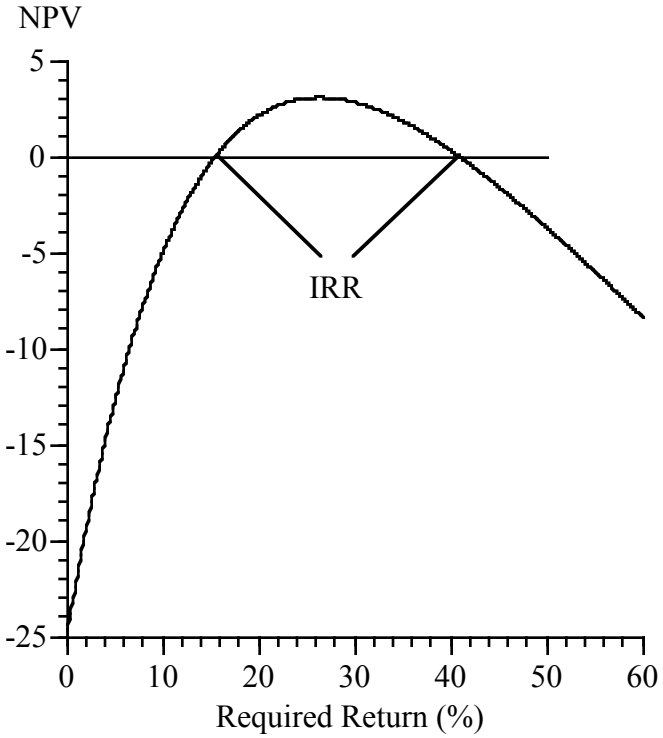
$$\text{present value} \approx \frac{\$1{,}000}{1.10^{20}}$$

The present value is smaller than the real value.

4. The stock-bond frontier is bowed the wrong direction. It should be something like this:



5. The IRR is the required return for which the NPV equals 0. An asset can have two IRRs when there are two sign changes in the cash flow. For example, an asset that has these cash flow: - 100 now, +100 after 1 year, +100 after 2 years, +100 after 3 years, and - 225 after 4 years has IRRs at 15.5% and 40.9%:



6. The current Ratio = 800/16 = 50.
   a. Because the price of gold is historically high relative to the price of silver you should sell gold and buy silver.

b. Let Pg be the price of gold and Ps be the price of silver on the delivery date. If you buy 50 silver contracts for every 1 gold contract, your net profit will be

$$50(Ps - 16) + (800 - Pg) = 50Ps - Pg$$

If the price of gold is still 50 times the price of silver, you will have no profit. You will make money if the price of gold is less than 50 times the price of silver.

7. The initial total value of its portfolio was \$18(5 million) = \$90 million. After the share issue, the total value of the portfolio was \$90 million + \$38.4 million = \$128.4 million, and the NAV was (\$128.4 million)/(6.2 million) = \$20.71. The NAV went up because the fund was essentially selling shares for more than they were really worth.

8. The price of a two-year coupon bond with a 6% annual coupon is given by this equation:

$$P = \frac{6}{(1.05)^1} + \frac{106}{(1+R_2)^2}$$

The yield to maturity is given by this equation

$$P = \frac{6}{(1.06)^1} + \frac{106}{(1.06)^2}$$

a. If the term structure is upward sloping, then the yield to maturity on a coupon bond is less than the interest rate on a zero. So, the 2-year zero rate is greater than 6%,
b. P = 100 since a bond sells for par if the yield to maturity is equal to the coupon rate. Thus, the 2-year zero rate is determined by

$$100 = \frac{6}{(1.05)^1} + \frac{106}{(1+R_2)^2}$$

The answer works out to be 6.03%

9. a. Evidently the market feels that this merger will not create enough value to justify the 25% premium.
b. The investor can buy 1 share of B and sell 2.5 shares of A short.
c. The position in Part (b) gives the investor a profit of 2.5(\$18) - \$44 = 1. This is a perfect hedge in that the investor can use the 2.5 shares of A she receives for the 1 share of B to cover the short position.
d. Ditto.

10. Consider the dividend-discount model,

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

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

If the firm has a low g, then it must have a low P and high D/P to provides shareholders their required return. (Less satisfactory is the alternative explanation that firms that pay large dividends retain less and therefore grow slower; their growth rate also depends on their profitability. More importantly, the dividend yield depends on the market price; investors presumably price the stock so that the dividend yield plus the anticipated capital gains give them their required return.)

11. If $\rho = R$, then there would be no economic value added, and $P = A$.The economic value added each period is the profits ρA minus the cost of capital, RA: $EVA = (\rho - R)A$ Using the present value of a perpetuity, the value of the firm is

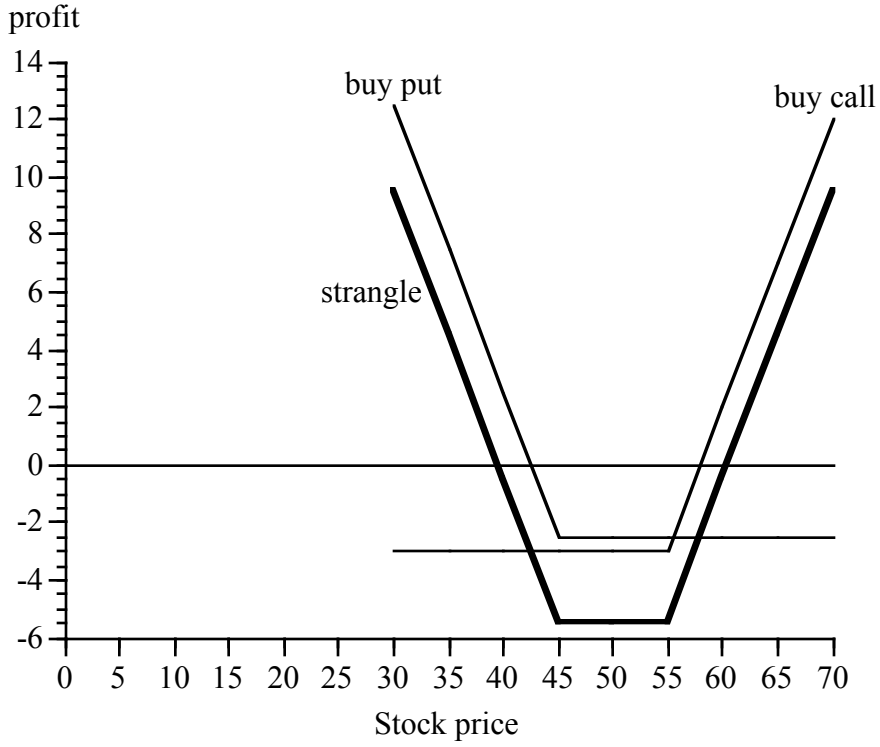
$$P = A + \frac{(\rho - R)A}{R}$$
$$= \frac{\rho A}{R}$$

12. The implicit assumption is that Freddie Mac will pay more than these old low-interest loans are worth. If these loans are fairly priced to give rates of return comparable to new loans, there is no advantage to selling the old loans and making new ones.

13. According to CAPM, it is not the total variance that matters but rather than macro risk that cannot be diversified away. This macro risk is gauged by the asset's covariance with the overall market.

14. $1{,}787(0.534^9) = 6.3$, so in fact there were fewer consistent performers than might be expected by chance! [Morningstar, "The Inevitable Pull Toward Mediocrity", Barron's Advertisement, February 6, 2006.]

15. Here is a graph of the profits on the expiration date:



This is a strategy for betting that the stock's price will change a lot, either up or down.

16. We should use the annual dividend with the annual required return and growth rate (or else use the quarterly required return and quarterly growth rate with the quarterly dividend). In the dividend growth model used here, the dividend growth takes into account the capital gains, and it is double counting to add together both present values. Using annual values, the implied required return is 9.534%:

$$35.28 = \frac{1.00}{0.09534 - 0.067}$$

17. We can answer this question by thinking of the durations—the present-value weighted average wait until the cash flow is received. An interest-only mortgage has more of the payments at the end than does an amortized mortgage. A 5% interest-only mortgage has lower monthly payments than does a 10% interest-only mortgage, with the same payment at the end. Zeros have even longer durations. The assets are in order, from lowest sensitivity to highest: a, b, c, d, and e. (The 5 durations, in order, are 8.49 years, 9.58 years, 15.59 years, 30 years, and 40 years.)

18. The growth rate is g = (1 - d)ρ = 0.6(0.10) = 0.06. Using the constant-growth model, the present value of the dividend stream is

$$V = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \ldots$$
$$= \frac{D_1}{R - g} = \frac{4}{0.08 - 0.06} = 200$$

Tobin's q is (market value)/(book value) = 200/100 = 2

19. It depends on the spread between corporate and municipal bond rates. Suppose the municipal bond's interest rate is M and the before-tax interest rate on an otherwise comparable corporate bond is C. If your tax rate is t, then the effective after-tax interest rates are M and (1 - t)C. If t = 0.15 and, say, C = 5%, then the after-tax corporate rate is (1 - 0.15)5% = 4.25%. Municipal bonds have a higher rate if M > 4.25% and a lower rate if M < 4.25%. (In general, the municipal bond rate is higher if M > (1 - t)C, or 1 - t < M/C or t > (C - M)/C.)

20. The present values should be in the same year. We should also sum over months, not years, using a monthly real R (since Social Security payments are fully indexed for inflation).

$$P_{66} = \sum_{t=1}^{12(n-66)} \frac{\$1,791}{(1+R)^t}$$
$$P_{70} = \frac{1}{(1+R)^{48}} \sum_{t=1}^{12(n-70)} \frac{\$2,407}{(1+R)^t}$$