Econ 156
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Final Examination Answers

1. It ignores the time value of money and the yen received after yen in equals yen out.

2. a. The total return from stocks should include dividends.
   b. He should use the return on zeros, not the interest rates.
   c. Looking forward, over a 1-year horizon, 1-year T-bills are risk-free.

3. a. Plausible. Stocks with high dividend yields are appealing. The basic idea is that contrarian investors should buck the trend by buying out-of-favor stocks that have low prices and high dividend yields.
   b. No logical foundation since the price of one share of stock depends on how many shares the company has outstanding. If a company were to double the number of shares, each share would be worth half as much. There is no reason why a Dow stock with more shares outstanding (and a higher price per share) should be a better investment than a Dow stock with fewer shares outstanding (and a lower price per share). Warren Buffett's Berkshire Hathaway stock (which is not in the Dow) has *very* few shares outstanding and consequently sells for a mind boggling price of nearly $200,000 per share. Yet it has been a great investment.
   c. Why, after selecting the five stocks with the lowest price, as if it is good to have a low price, would we cross out the stock with the lowest price? Why indeed.
   d. Why invest twice as much money in the next lowest priced stock as in the other three stocks? We all know the answer. Because it worked historically. Period.

   I'm skeptical because of the obvious data mining.

   Shortly after the Gardners launched the Foolish Four Strategy, two skeptical finance professors tested it using data from the years 1949-1972, just prior to the period data mined by the Gardners. It didn't work. The professors also retested the Foolish Four strategy during the years that were data mined by the Gardners, but with a clever twist. Instead of choosing the portfolio on the first trading day in January, they implemented the strategy on the first trading day of July. If the strategy has any merit, it shouldn't be sensitive to the starting month. But, of course, it was.

   In 1997, only one year after the introduction of the Foolish Four, the Gardners tweaked their system and renamed it the UV4. Their explanation confirms their data mining: "Why the switch? History shows that the UV4 has actually done better than the old Foolish Four." It is hardly surprising that a data-mined strategy doesn't do as well outside the years used to concoct the theory. The Gardners admitted as much when the Motley Fool stopped recommending both the Foolish Four and UV4 strategies in 2000.

   The Foolish Four strategy was indeed foolish.

4. The bondholders have implicitly bought a bond and sold a call; a corporation that issues a callable bond has sold a bond and purchased a call.

5. [Fidelity Investments, Why Bond Prices Change," Investment Vision, June 1987, p. 3] The prices of long-term (actually long-duration) bonds are more sensitive to interest rates, but not because interest rates are more likely to change in the future than in the present. It is just a mathematical fact that a given interest rate change has a larger percentage effect on the present value of a cash payment the more distant is the cash payment. (It is unclear why the quotation distinguishes between interest rates and bond yields.)

6. Financial intermediaries, such as savings and loan associations, that have borrowed short-term and lent

long-term, will benefit from a decline in interest rates since the market value of their assets will increase by more than the market value of their liabilities.

7. [Shawn Tully, "Can Time Inc. Make it Alone?," Fortune, April 8, 2013, 93-96.] By the conservation of value principle, the value of the two separate companies should equal the value of the combined company unless the spin-off of Time changes the total cash flow. More debt for Time means less debt for Time-Warner. Less cash flow for Time after interest, taxes, and debt repayment means more for Time-Warner. Shifting assets or liabilities between these two companies does not directly benefit to shareholders.

   Perhaps the key issue is whether Time or Time-Warner will have more attractive opportunities for investing this cash flow in new projects.

8. a. It benefited Mexico.
   b. ($33 billion/$1.07625^{30}$) - ($40 billion/1.07925^{30})= $3.640 billion - $3.349 billion = $291 million.
   c. The term structure was downward sloping, because (as shown in Figure 5-5 in the textbook) coupon-bond yields were higher than zero yields.

9. If their tax rate is t and the first payment to the granddaughter begins one year after the contribution, then the appropriate present-value equation is

$$\$100{,}000 - t(\$41{,}000) = \frac{\$9{,}000}{(1+R)^1} + \frac{\$9{,}000}{(1+R)^2} + \ldots + \frac{\$9{,}000}{(1+R)^{10}}$$

   If they are in a 33% tax bracket, then

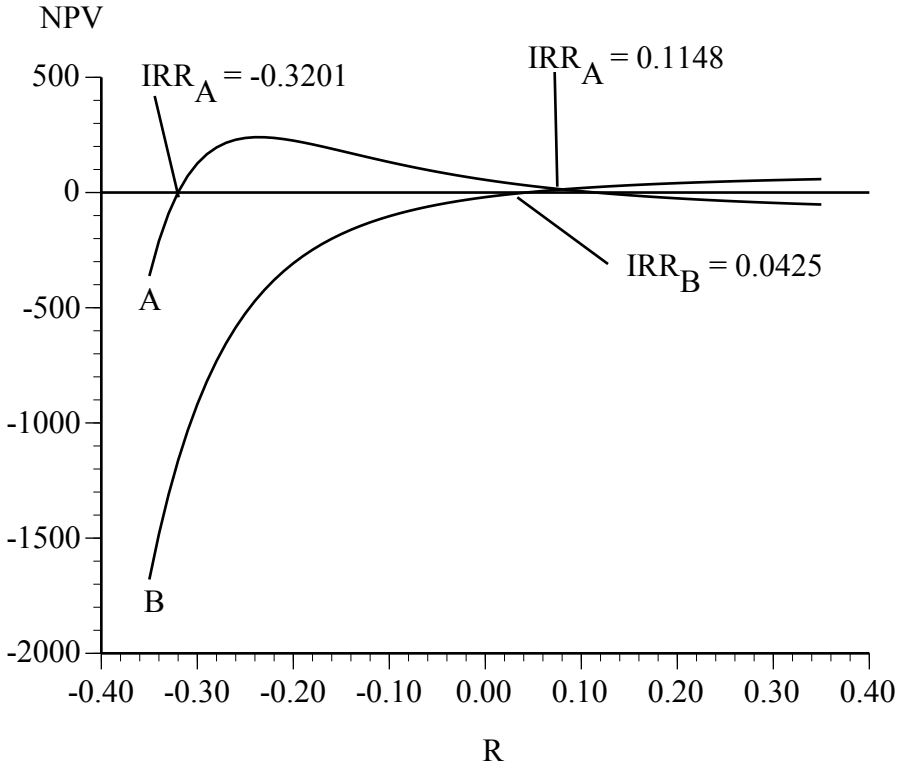
$$\$100{,}000 - \$13{,}530 = \frac{\$9{,}000}{(1+R)^1} + \frac{\$9{,}000}{(1+R)^2} + \ldots + \frac{\$9{,}000}{(1+R)^{10}}$$

   and the value of R works out to be 0.73%. In a 28% tax bracket, R = 0.30%.

10. a. Alpha is the estimate of excess return beyond that explained by the model, so one question is whether it is statistically significant.
    b. The t-value needs to be above (approximately) 2 for the usual criteria of statistically significance at the 5% level.
    c. The case study is interpreting the three factors as various risks, so that alpha is risk-adjusted performance. An alternative explanation is that some types of stocks systematically beat the market because of market inefficiencies. Legg-Mason apparently achieved its above-average return by having relatively large investments in small, value stocks. ["Understanding Risk and Return, the CAPM, and the Fama-French Three-Factor Model, The Tuck School of Business at Dartmouth, 2003.]

11. Project A has two sign changes in the cash flow and two IRRs, -32.01% and 11.48. Project B's IRR is 4.25% but the "backwards" nature of the cash flow (an initial profit followed by expenses, instead of an initial expense followed by profits) means that the project is more attractive for required returns higher than the IRR.

    An NPV graph makes this all clear.



Project A is attractive for a required return between -32.01% and 11.48%. Project B is attractive for a required return above 4.25%. Project B is more attractive for a required return above 8.03%. So, the decision rule is choose A for a required return up to 8.03%; choose B for a required return above 8.03%. (And neither for the implausible case of a required return below -32.01%.)

12. [Burton G. Malkiel, *A Random Walk Down Wall Street*, 4th ed., 1985, p. 85.] The company with the high dividend payout (Company 1) is fueling its growth by a high rate of return on equity, rather than, as with Company 2, retained earnings and diminished dividends—which makes Company 1 more valuable to investors.

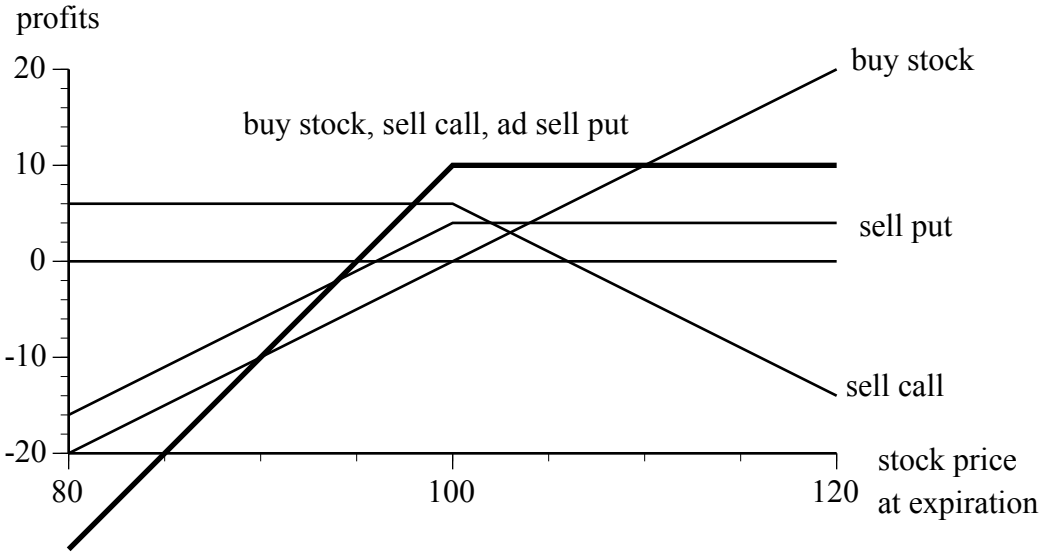
    Mathematically, using subscripts 1 and 2 for the two companies, and remembering that they have the same growth rate g:

$$g = (1 - d_1)ROE_1$$
$$g = (1 - d_2)ROE_2$$
$$d_1 > d_2 \text{ implies } (1 - d_1) < (1 - d_2) \text{ implies } ROE_1 > ROE_2$$

    If shareholders apply the same required return R to both companies, the first is more valuable:

$$PV_1 = \frac{d_1}{R - g} > PV_2 = \frac{d_1}{R - g} \text{ if } > d_2$$

13. This strategy earns additional income from the sale of the call and the put, does not make additional profits if the price of the stock rises, and loses $2 for every $1 drop in the price of the stock:



14. [Barry B. Bannister, "In Search of Excellence: A Portfolio Management Perspective," *Financial Analysts Journal*, 46 (2) 1990, 68-71.] Regression to the mean does not assume that competition affects financial ratios. Regression is based on the fact that observed measurements of an underlying trait that are far from the mean are probably farther from the mean than are the traits.

15. [Scott Cendrowski, "It's All About the Dividends," Fortune, April 9, 2012.] The conservation of value principle says that these are equivalent ways of distributing cash to shareholders, except for tax issues or information asymmetries. The problem with dividends is that shareholders must pay taxes on the dividends. With repurchases, you only have to pay taxes if you sell, and you only pay taxes on the capital gains, not the entire amount of cash received.

16. [Ben Inker, GMO, quoted in Morningstar Advisor, October/November 2010, p. 40.] It may have an infinite life, but the duration is finite. If the duration were infinite, then a one percentage-point change in the required return would have an infinite effect on the value of the stock, which is clearly untrue. We can estimate the duration by taking the derivative of the value of the stock with respect to the discount rate or directly from the duration formula. Taking derivatives:

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

$$\frac{\partial P}{\partial R} = -\frac{X}{(R-g)^2}$$

$$-\frac{1}{P}\frac{\partial P}{\partial R} = \frac{1}{R-g}$$

Because we have to multiply by 1 + R to obtain Macauley duration,

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

$$\frac{\partial P}{\partial R} = -\frac{X}{(R-g)^2}$$

$$-\frac{1+R}{P}\frac{\partial P}{\partial R} = \frac{1+R}{R-g}$$

The duration is not infinite unless g = R, in which case the value is also infinite.

17. To the extent stock analysts can predict changes in the economy, stock prices will change before the economy does. (Or perhaps it is changes in stock prices that cause changes in the economy). On the other hand, to the extent that the stock market is efficient, stock prices can't be predicted from well-known economic forecasts. People won't sell if it is easy to predict that stock prices will soon rise, and they won't buy if price declines are easily foretold. [Kenneth L. Fisher, *The Wall Street Waltz*, Chicago: Contemporary Books, 1987, p. 62.]

18. [William F. Sharpe, *Investments*, 3rd edition, p. 556.] Such predictions ignored the possibility of arbitrage between the index futures and the stocks in the index, which imply that the price of the futures contract F should be related to the current value of the index P, *not* the anticipated future value of the index, by an amount that depends on the Treasury-bill rate R and the dividend yield d on these stocks: F = P(1+R-d).

19. Their total returns have not doubled. If they had invested directly, they would have each earned 15%. Now, one earns 10% and the other 20%, an average of 15%. The widow gets an extra 5% in dividends, but gives up 10% in capital gains; the executive gets an extra 10% in capital gains and gives up 5% in dividends.

20. The business has the use of $180,000 and after five years must pay interest on $200,000. The effective interest rate R can be determined by calculating the total amount due after 5 years ($200,000(1.10^5) = $322,120) and subtracting the $20,000 held as a compensating balance:

$$\begin{aligned} \$180{,}000(1+R)^5 &= \$200{,}000(1+0.10/12)^{60} - \$20{,}000 \\ &= \$322{,}102 - \$20{,}000 \\ &= \$309{,}062 \end{aligned}$$

The effective interest rate works out to be 11.42%.

Equivalently, the NPV equation is:

$$0 = \$200{,}000 - \$20{,}000 - \frac{\$200{,}000(1+0.10/12)^{60}}{(1+R)^5} + \frac{\$20{,}000}{(1+R)^5}$$