Economics 136. Financial Economics

Suggested solution, Midterm 2, Fall 2009

1. True or false. (25 points, 5 each)

(i) False. Historically, low dividend-price ratios predicted low (negative) subsequent price growth and no changes in dividends.

(ii) False. The semi-strong form claims that prices incorporate public information; but before the public announcement, information is still private, and hence it need not be fully incorporated in the price.

(iii) False. Stocks with high price earnings ratios, called growth stocks, have historically underperformed stocks with low price earnings ratios, called value stocks.

(iv) False. A call option is typically riskier than the underlying stock, since you may lose your entire investment if the stock price $S_T<X$. Hence the expected return on a call is generally higher than on the underlying stock.

(v) False, in our opinion. The Golden Gate is more beautiful. [All students get full score for this question.]

2. CAL and portfolio choice (25 points, 5 each)

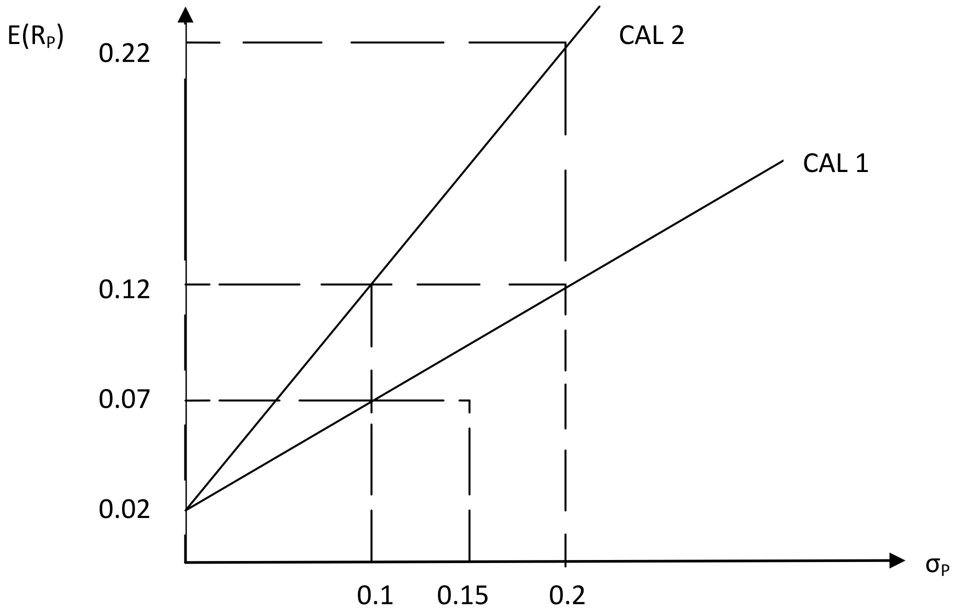
(a) See the figure.

(b) See the figure. A portfolio that has 50% stocks and 50% riskfree has an expected return of 0.5*12%+0.5*2%=7% and a standard deviation of 0.5*20%=10%, and hence dominates the current portfolio because has the same expected return but lower risk.

(c) The optimal stock share is $w_S=(ER-R_f)/(A\sigma^2)=(0.12-0.02)/(5*0.2^2)=0.1/(5*0.04)=0.5=50\%$. The mean return of this portfolio was computed in (a) to be 7% and the standard deviation is 10%.

(d) See the figure. The optimal stock share is now $w_S=(ER-R_f)/(A\sigma^2)=(0.12-0.02)/(5*0.1^2)=0.1/(5*0.01)=2=200\%$. The expected return is now 2*12%+(-1)*2%=22%, and the standard deviation is 2*10%=20%.

(e) The statement is false. In this example, as the standard deviation of stocks fall, portfolio risk rises from $\sigma=0.1$ to $\sigma=0.2$. This is because lower risk induces the investor to hold more stocks.



3. Stock valuation (20 points, 5 each)

(a) Dividends are $D_1=E_1\cdot(1-B)=\$10*0.5=\$5$. The growth rate is $G=ROE\cdot B=0.12*0.5=0.06=6\%$. The current price is $P_0=D_1/(R-G)=\$5/(0.08-0.06)=\$5/.02=\$250$.

(b) Since ROE<R, it is optimal to retain no earnings, i.e., B=0. Dividends are now $D_1=E_1(1-B)=\$10$. The growth rate is $G=ROE\cdot B=0$. The current price is $P_0=D_1/(R-G)=\$10/.08=\$125$.

(c) The statement is false. In the example, dividends D_1 go up as we move from (a) to (b), while the stock price falls. This is because bad news about ROE simultaneously implies a drop in the stock price and that it's optimal for the firm to stop growing and pay out earnings in the form of dividends.

(d) The expected return is the same, and equal to R=8%.

4. Portfolio choice and market timing (30 points, 5 each)

(a) See the figure below. The net return between t=0 and t=1 is 130/100-1=0.3 or 30% if the index goes up and 90/100-1=-0.1 or -10% if the index goes down. The expected return is (0.3-0.1)/2=0.1=10%.

(b) The expected return between t=1 and t=2 if the index is up at t=1 is (160∗(1/4)+120*(3/4))/130-1=0%. This is lower than the expected return of 10% between t=0 and t=1.

(c) The probability of reaching each node is 1/8, 3/8, 3/8 and 1/8. Te realized return for these nodes is 160/100-1=0.6=60%, 120/100-1=0.2=20%, and 80/100-1=-0.2=-20%.

Expected return: (1/8)*0.6+(6/8)*0.2+1/8∗(-0.2)=0.2=20%.

Variance of return: $(1/8)*(0.6-0.2)^2+(6/8)*(0.2-0.2)^2+(1/8)*(-0.2-0.2)^2=2/8*(0.4^2)=0.04$.

(d) The optimal share of stocks is (0.2-0)/(5*0.04)=100%. The portfolio return in the four final states is therefore 0.6=60%, 0.2=20%, 0.2=20%, and -0.2=-20%. The mean portfolio return is the same as the mean index return of 0.2=20% and the variance is 0.04.

(e) $100 becomes $130 if the market goes up at t=1, and remains $130 at t=2 since it is reinvested in the risk-free asset. In the other two states, the portfolio value will continue to be $120 and $80. The net returns in the four nodes are thus 0.3=30%, 0.3=30%, 0.2=20% and finally -0.2=-20%.

(f) The expected return is (1/2)*0.3+(3/8)*0.2+(1/8)∗(-0.2)=0.2, which is the same as in (d). The variance of the portfolio return is $(1/2)*0.1^2+(3/8)*0^2+1/8*(-0.4)^2=0.025$.

We find the same expected return but lower variance: a risk-averse investor would thus prefer strategy (e). Market timing can benefit investors.