

6.1 Solution: The total return of the stock $R = \frac{X_1}{X_0}$

$$\text{The total return on the short position} = \frac{X_0 + (X_0 - X_1)}{X_0}$$

$$= \frac{2X_0 - X_1}{X_0}$$

$$= 2 - \frac{X_1}{X_0}$$

$$= 2 - R$$

6.5 Solution: (a) ~~payoff~~ $10^6 + 0.5u$

If rain, receive u

If not rain, receive 3×10^6

$$\text{Expected return} \quad \frac{0.5 \times 3 \times 10^6 + 0.5 \times u}{10^6 + 0.5u} - 1 = \frac{0.5 \times 10^6}{10^6 + 0.5u}$$

(b) If $u = 3 \times 10^6$, then he has the same return in both scenarios, so the variance is 0. The expected return is 20%

7.1 Solution: (a)
$$r = 7\% + \frac{\sigma}{32\%} (23\% - 7\%)$$
$$= 7\% + 0.5\sigma$$

(b) $39\% = 7\% + 0.5\sigma \Rightarrow \sigma = 64\%$

The proportion invested in the market should be $\frac{64\%}{32\%} = 2$
and the proportion invested in the T-bills should be $1 - 2 = -1$
i.e. borrow \$100 and invest \$200 in market

(c) In this case, $\sigma = 0.7 \times 32\%$

$$\Rightarrow r = 7\% + 0.5 \times 0.7 \times 32\% = 18.2\%$$

You should expect \$1182 at the end of the year.

7) Calculate the WACC for GM assuming a $r_f=3\%$ and a 5% market risk premium.

A: On 3/2/2011, the yield of GM bonds was $r_D=7\%$ [1], market cap $E=49.32B$ [2], beta=1.37 [2], and total liabilities at the end of 2010 of $D=103.72B$ [3]. The CAPM estimate of $r_E=3\%+(1.37)5\%=9.85\%$. So WACC = 7.9%.

[1] <http://reports.finance.yahoo.com/z1?is=general+motors>)

[2] <http://www.google.com/finance?client=ob&q=NYSE:GM>

[3] <http://www.google.com/finance?q=NYSE:GM&fstype=ii>