Homework Assignment 1

1) Stone Container is a major producer of cardboard boxes. Stone Container has \$10M in outstanding equity. In addition, it has \$2M in outstanding debt. The debt is a ten-year mortgage and is rated AAA. This is low risk debt. \$2M is both the book and market value of the debt. In addition to its cardboard box production and sales facilities, Stone Container also has a portfolio of 3 month government T-bills.[1] These are currently worth \$3M. The market price of risk (e.g. $E[r_m - r_f]$) is 8.5 percent.

A) Stone Container's debt has a β of 0.20. The equity β was estimated using the following equation:

$$r_{Stone\,Container's\,equity} - r_{risk\ free} = 0.0 + 1.4\left(r_{Stock\,market\,return} - r_{risk\ free}\right) + \varepsilon \quad \textbf{(1)}$$

Calculate the β which measures of the risk of Stone Container's assets.

B) Stone Container is considering expanding its capacity by 15 percent. It will do this by building a new production facility. It will also expand its sales force by 15% to market the additional cardboard boxes. This project will require an investment of \$2M. The firm will liquidate part of its T-bill portfolio to pay for the investment. Since Stone Container will lose the 3 percent yield on the bonds, should 3 percent be the discount rate it uses for evaluating its capacity expansion? Explain briefly.

C) An alternative method for deriving a discount rate is to use the Capital Asset Pricing Model. What discount rate for the capacity expansion investment does CAPM suggest?[2]

[1] T-bills are short term obligations of the US government. In this case, short term means maturities of less than one year. I will consider T-bills to be a risk-free bond.

[2] It may help to think about what Stone Container’s balance sheet looks like.

2) Petroleo Brasileiro (PBR) has just issued 1M one year bonds. Each bond has a face value of 1,000 Reais. Owners of the bonds are entitled to receive $R 1000 back at the end of the year along with 80 of interest. The bonds were sold for par which means each bond was sold for $R 1,000 or a price which is equal to face value.

A) What is the coupon rate on the bond? What is the promised rate on the bond?

B) The current one year risk free rate is 5% and the market price of risk is 8.5. If the return on the bond is uncorrelated with the return on the market, what is the expected return on the bond? Hint: If the return on the bond is uncorrelated with the market, what does this imply about the β of the bond?

C) Petroleo Brasileiro bonds are risky in the sense they could default. If the market is assuming that investors will receive only 750 for each bond they own if the bonds default, what does the market think is the probability that the bonds will default. Hint: how is the probability of default related to the expected return on the bonds.