Homework Solutions - Lecture 2 Part 1

1. Consider a $100 investment that doubles in value during the first year and loses half its value in the second year. Calculate both the arithmetic average return and the geometric average return across this two-year period. Which average is a better representation of the investment's past performance?

The return in the first year equals (200 - 100)/100 = 100.0%

The return in the second year equals (100 - 200)/200 = -50.0%

The arithmetic average is a simple average of the two returns, or:

$$\overline{R}_A = \frac{[(100\%) + (-50\%)]}{2} = 25\%$$

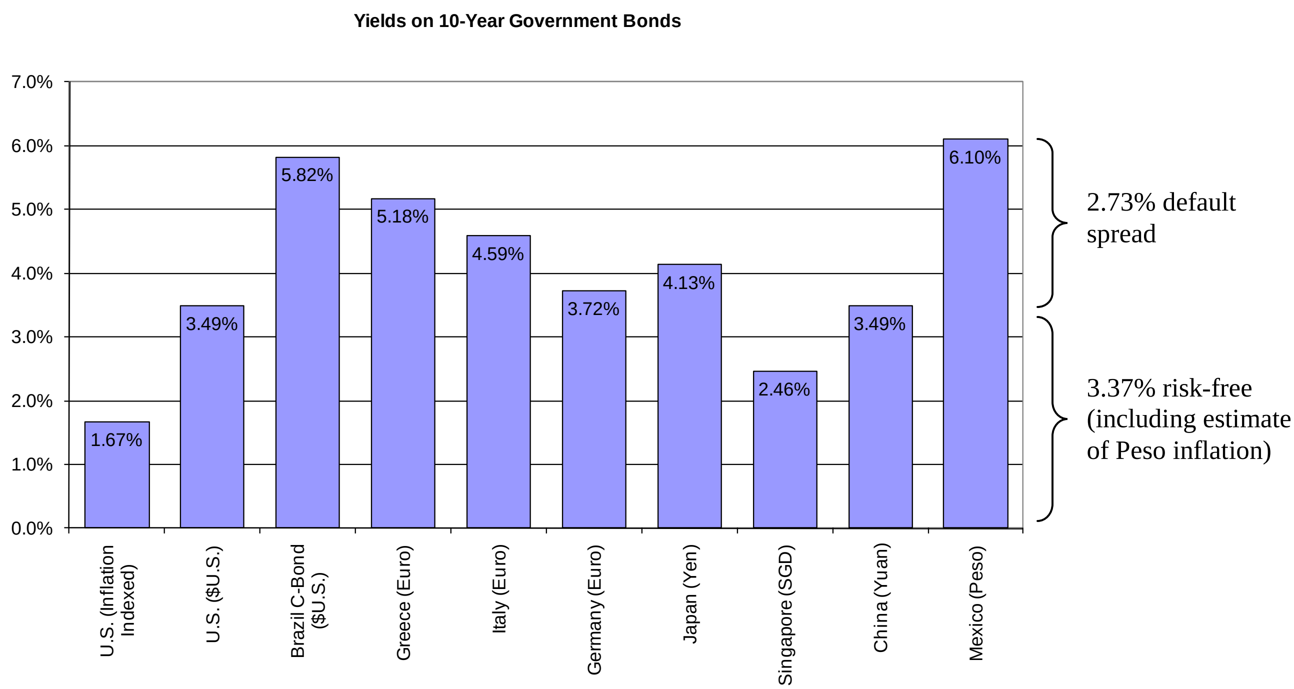
The geometric average incorporates the compounding of returns across the two years, giving:

$$\overline{R}_G = [(1+1.0)\times(1-0.5)]^{1/2} - 1 = 0\%$$

In general, the arithmetic average is a good measure of the expected return one period ahead. However, because it incorporates compounding, the geometric average is a better measure of past compounded performance and a better estimate of expected return over a multi-period horizon.

2. An analyst at your firm comes to you with a valuation of a Mexican firm done with Peso cash flows. The analyst has used the 6.10% yield on the Peso-denominated Mexican government bond as the risk-free rate in the cost of equity calculation, along with the 4.5% U.S. equity risk premium. What assumptions is this analyst making about country risk? Would it be appropriate for the analyst to add a separate country risk premium to the CAPM equation?

The **6.10%** yield on the Peso bond includes a real risk-free rate, an expectation of inflation, and a default spread. Including the default spread is one method of estimating country risk. As a result, an additional country risk term should not be added separately.



$$E(R) = R_f + \beta\left(Risk\ Premium_{U.S.}\right) + Country\ Spread$$

3.37% Peso risk-free rate (excluding 2.73% country default spread)

2.73% country-bond default spread for Mexican BBB rated bonds.

6.10%

3. The current value of the S&P 500 index is 825.88 and the treasury rate is 2.87%. In a typical year, stock repurchases increase the average payout ratio on S&P 500 stocks to over 4%.

   a. Calculate the implied equity premium assuming the dividend yield in the most recent year was 4% of the current index value and dividends are expected to grow at a constant rate of 5% annually. How does this implied premium compare to the value we calculated when ignoring repurchases?

$$Div_1 = 825.88(.04)(1.05) = 34.69$$

$$R = g + \frac{Div_1}{CurrentValue} = .05 + \frac{34.69}{825.88} = .05 + .0420 = 9.20\%$$

$$\text{Implied Risk Premium} = 9.20 - 2.87 = 6.33\%$$

   All of the values in this problem are the same as the problem we did in class except the dividend yield. Because the current value of the index (825.88) does not change, but the forecasted dividends here are higher, the implied premium is higher than the one we calculated in class.

   b. Calculate the implied equity premium assuming the dividend yield in the most recent year was 4% of the current index value, dividends are expected to grow at an annual rate of 10% for the next five years, and at a constant rate of 5% thereafter (Hint: you can use the solver function in excel). How does this implied premium compare to the value we calculated when ignoring repurchases?

   Here you will need to use the Solver function in excel. Specifically, you should solve for the required return that sets the present value of future dividends equal to the current index value.

$$Div_1 = 825.88(.04)(1.10) = 36.34$$

$$825.88 = \frac{36.34}{(1+R)} + \frac{39.97}{(1+R)^2} + \frac{43.97}{(1+R)^3} + \frac{48.37}{(1+R)^4} + \frac{53.20}{(1+R)^5} + \frac{55.86/(R-.05)}{(1+R)^5}$$

$$R = 10.20\%$$

$$\text{Implied Risk Premium} = 10.20 - 2.87 = 7.33\%$$

   Again, all of the values in this problem are the same as the problem we did in class except the dividend yield. Because the current value of the index (825.88) does not change, but the forecasted dividends here are higher, the implied premium is higher than the one we calculated in class.