BEM 103 Introduction to Finance.

Homework 2: More time, more money

Due Monday October 14 5pm (in TA or instructor boxes).

1. Financial Literacy: Answer these questions in 3 steps. (1) give an answer to the question, (2) look over the material assigned for class and find a definition (3) modify if need be your first answer. The goal is not for you to memorize a given answer but to be sure you can explain the concept to someone. If you can't, then you do not control that concept.
    a. Equity
    b. Shares
    c. Discount rate
    d. Arbitrage opportunity
    e. Expected value
    f. Yield curve
    g. Spread

2. Present value:

Early Tuesday October 1, Tesla Motors shares traded at $190, thus it equity value was in excess of 20 billion dollars. This year it expects to sell 20,000 cars at 70,000 dollars each.

A. Supposing a generous 25% net profit per car, how many cars per year does Tesla have to sell 5 years hence (assume linear growth in car sales) and for the next 20 years to justify a market cap of 20 billion dollars. Assume that the interest rate is 5%

B. How likely is it that there is enough demand for $70,000 electric cars that Tesla will reach that target number of sales?

C. What data could you use to give a more accurate answer to the question (you do not need to find the data)?

D. Suppose five years hence Tesla has 30% of the luxury car sales market (200,000 units of its current model per year). Tesla has announced that it intends to introduce a $30,000 sedan in the next three years. How many such cars at the same net profit margin would it need to produce to justify the market cap it has reached recently?

E. Suppose Tesla runs into development problems and instead of introducing the new model in 2016 it has to delay to 2018. How would that affect your calculations in D?

F. What do you think Tesla Price should be? What calculation justifies your answer?

More real data at: TESLA

3. Perpetuities

A. What is the capital value of an annuity that pays x forever if the interest is r.

B. What should happen to its price if the interest jumps from r to 2r

C. Now consider a perpetuity that pay X the first year and grows at a rate g

each year is: $PV = \sum_{t=1}^{\infty} \frac{X(1+g)^{t-1}}{(1+r)^t}$. Show this simplifies to $PV = \frac{X}{r-g}$

4. Modigliani Miller

Two Caltech undergraduates (J&J) create a new windmill that is adaptable to extremely cold and wet climates. To develop this invention they need 50 million dollars in capital for plant, equipment, and advances to power companies in Greenland and Nova Scotia. Net of variable costs (labor, supplies, shipping…) the firm would clear 5 million dollars a year two years after starting.

A. What interest rate makes investors indifferent between starting the firm or not?
B. If the interest rate is 5% and there is no equity premium show that J&J are indifferent between financing their capital needs by debt or by equity. What fraction of the firm's income do the two inventors retain?
C. Now suppose there is a 20% possibility that the government of Nova Scotia decides at the end of year 1 to ban the new windmill reducing income by 50%. Show again that if markets are efficient, combinations of debt and equity do not affect the value of the firm.
D. What financial structure implies that after an adverse regulatory decision by the government of Nova Scotia, the company would belong to bond holders?
E. Suppose now that interest rates are 6% What financial structure implies that after an adverse regulatory decision by the government of Nova Scotia, the company would belong to bond holders?
F. Suppose that J&J are risk averse, what would financial structure are they likely to choose? (1) if they are sure there will be no bad news, or if they have to worry about regulatory decisions.