15.414 - Recitation III

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Topics in Today's Recitation:

I. Capital Budgeting Problem: Q3 in HBS Case 9-298-068.

II. Getting Cashflows from Incomplete Forecasting Data: The Use of Assumptions.

III. Dividend Discount Model of Stock Prices.

I. Capital Budgeting Problem.

Capital Budgeting Problem: Q3 in HBS Case 9-298-068.

See: Piper, Thomas R. *Capital Budgeting: Discounted Cash Cash Flow Analysis*. Boston, MA: Harvard Business School Publishing, 2000. Case No. 9-298-068.

II. Getting Cashflows From Incomplete Forecasting Data.

• **Remember:** If we know NI, DEP, CAPX, and $\triangle$NWC every year of the projects life, we know cashflows.

$\hookrightarrow$ So, given incomplete info, we need to come up with our own forecasts for missing elements of these four components.

$\star$ What are reasonable ways of getting forecasts?

$\star$ **Some ideas...**

1. If you have historical data and management remains unchanged from past to future (or new management has roughly same level of competence), then *extrapolation* is a legitimate forecasting approach.

$\hookrightarrow$ Different ways to extrapolate.

$\hookrightarrow$ Can you think of any pitfalls? How would you address them?

II. Continued...

2. If you don't have a history of data from which to extrapolate, but do have one year's worth of data for all entries and some basis for forecasting in at least one entry, you could perform forecasts for the other entries using a *stable ratio* assumption.

$\hookrightarrow$ For example, assume you have income statement forecasts (notably sales forecasts), but only a one year snapshot of the balance sheet. May be reasonable to assume that $\frac{CAPX}{Sales}$ and $\frac{NWC}{Sales}$ are constant.

$\hookrightarrow$ Why does this make sense?

$\hookrightarrow$ What are the drawback of using just one data point to estimate a stable ratio?

$\hookrightarrow$ What might happen if new (and improved) management took over the firm? Would you expect this ratio to change?

II. Continued...

3. Of course, remember that, in practice, when you receive incomplete forecasts, you can usually find someone with intimate knowledge of the details of the project who can give you more accurate values for these entries than any statistical or intuitive entries you can come up with.

↪ So why do we give you problems with incomplete forecasts?

↪ Because you have to be able to <u>notice</u> when important information is missing. By making and keeping track of assumptions that are needed, you acquire this skill. Indeed, once you re-enter the corporate world, the process of making assumptions will probably replaced with the process of asking questions.

↪ If you do this well, people will think you're smart and, presumably, you should get more $$$. Maybe this is a naive characterization, but it certainly sounds good...

II. Continued...

⋆ ⋆ ⋆ Points 1 and 2 are pretty intuitive. You can probably think of other forecasting methods. The main points are that, with so little information, there is a fair amount of flexibility in this process.

↪ This is one reason why stuff like sensitivity analysis is important.

↪ It also highlights why a good communication channel between the management (or, more generally, the firm's financial planners) and the employees with intimate knowledge of project details is vital. Indeed, PV analysis works most effectively when you use the best forecasts available!

III. Dividend Discount Model.

- As we quickly described in Recitation I, we can use,

$$PV(E) = \frac{Div_1}{1 + r_E} + ... + \frac{Div_t}{(1 + r_E)^t} + ..., \quad (2)$$

to compute the PV of holding one unit of stock (where Div_t is the forecasted dividend per share in period t). Sometimes referred to as the *fundamental value* of the stock.

- **Dividend Discount Model (DDM):** The market price of the stock is equal to its fundamental value (i.e. $S = PV(E)$).
↪ Is this true? If it is, then stock prices should only move when either: (1) information about future dividends change, or (2) information about dividend risks change (i.e. discount rate changes).
↪ What about market crashes? Severe swings in market prices without much, if any, fundamental news. Is this consistent with the DDM?

III. Continued...

↪ Bubbles in asset prices are deviations of market prices from their fundamental value. Do you think they exist? Examples?

⋆ Remember, finance and economics, especially it's components that describe or rely on individual behavior, are inexact sciences. Therefore, we shouldn't expect models, like the DDM, to be perfect descriptions of the real world.
↪ A better judgement test is whether they are good descriptions of reality.
↪ In the case of DDM, we should ask whether important deviations from fundamental value are rare and generally isolated.
↪ Even this is debatable... though there is some evidence that the answer is yes, at least for mature companies.

III. Continued...

⋆ Leaving this debate to the side for now (and possibly forever), let's see how the DDM can be used in practice...

● **Use #1: You already have dividend forecasts and the discount rate.** This is just like the PV calculations we did before...
↪ **Familiar Examples...** Constant dividends = perpetuity. Constant dividend growth = growth perpetuity.

○ **More Challenging Example: Changing Growth.** XYZ Corp. has just paid a dividend of $1. Assume it pays dividends yearly and that these dividends are expected to grow by 25% a year for the next 5 years. Dividends will remain stable following year 5. What is the price of the stock if the discount rate for XYZ Corp. is 10% and the DDM holds?
↪ Any suggestions?

III. Continued...

• **Use #2: You have the discount rate and observe the price.** You can reverse the PV calculation in order to get a forecast of the dividend growth rate.

⋆ Examples on the blackboard...
↪ What assumptions are being made here?

• **Use #3: Other ways to infer the growth rate of dividends?** The important question is really how we achieve growth.
↪ One way to get growth is to reinvest money into the firm.
↪ Assuming that profitability characteristics don't change, that new investments are as profitable as investments already in place, and that the payout ratio doesn't change, we get

$$g = ROE * plowback. \qquad (3)$$

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