CHAPTER 5

Smart *Excel* Appendix

Appendix Contents

Use the Smart *Excel* spreadsheets and animated tutorials at the Smart Finance section of http://www.cengage.co.uk/megginson.

EXCEL PREREQUISITES

You need to be familiar with the following *Excel* features to use this appendix:

- The use of the fill-series feature on the edit menu
- Creating a cumulative formula

If this is new to you, be sure to complete the ***Excel Prereqs*** tab of the Chapter 5 *Excel* file before proceeding.

CALCULATING EURO AND PERCENT RETURNS

In the text, the return on an investment in equity is shown as

$$r = (D_1 + P_1 - P_0) / P_0$$

The numerator provides the euro return, and dividing that by the purchase price converts the return into percentage form.

Problem: You just bought shares in FastFood, Inc. at €42 per share. You expect the dividend per share for the stock to total €1.20 over the next year and believe the price will rise to €46.50. Under these assumptions, find the euro and percent return on an investment in one share. Now suppose the stock price falls to €38.50. What is the return?

Approach: Create a simple model that allows you to find the euro and percent return on an equity investment.

Try it yourself in a blank *Excel* file. Think about what to include in inputs and how to set up your calculations and output. Alternatively, you can use the setup file provided on the Return tab of the Chapter 5 *Excel* file at the Smart Finance Web site.

If the ending price is €46.50, the capital gain is €4.50. With the dividend, the euro return is €5.70 and the percent return is 13.6%. Assuming an ending price of €38.50, there is a capital loss of €3.50. With the dividend, the euro loss is €2.30 and the percent return is –5.5%.

STOCK VALUATION UNDER CONSTANT GROWTH

Problem: Campus Bookstores' stock dividend has grown at 7% per year for many years. The firm just paid a dividend of €2.20, and investors believe that dividends will continue to grow at 7% indefinitely. If the market assessment of the required return for Campus Bookstores is 10%, what should the stock sell for today?

To determine a stock price you must design a model to forecast the stock's cash flows and calculate the present value of these cash flows. Remember the components of a basic model: inputs, calculations, and output. The output is the stock price. The inputs are the assumptions about future dividends, growth, and the required return on the stock. In the calculations section, find the dividend expected next year. The stock price is the output derived from the Gordon Constant Growth model.

Approach 1: Gordon model

Try it yourself in a blank *Excel* file. Think about what to include in inputs and how to set up your calculations and output. Alternatively, you can use the setup file provided on the *Stockval const growth* tab of the Chapter 5 *Excel* file.

You should get a price of €78.47. (If you get a slightly different price, it may be the result of rounding. We did not round the Year 1 dividend).

Apply it

Suppose the growth is 9%, 0%, or 23%.

At a growth rate of 9%, the price is €239.80.
At a growth rate of 0%, the price is €22.00.
At a growth rate of 23%, the price is €16.42.

Approach 2: Valuation Based on Dividends Received Over a Finite Time Period

It is interesting to know how much of the stock's value comes from cash flows (dividends) in early years versus the value derived from later cash flows. Another approach sometimes used in valuation is to look at a predetermined finite horizon (as with bonds). Unlike bonds, stocks do not mature, but this approach enables you to see how much a stock's value depends on dividend payments over different horizons.

Again, solve the Campus Bookstores' problem, but now consider only the value of dividends received over the next fifty years.

Under this approach, you will need to estimate the dividends over some selected time period (here fifty years) and then find the present value of these dividends using the required return as the discount rate. It is quite similar to the bond valuation approach except that the cash flows are dividends.

1. On the ***Stockval const growth*** tab of the Chapter 5 *Excel* file, fill in the input assumptions.
2. In the Calculations section, fill in the Year numbers from 0 through 50. This is simple if you use the fill-series feature described on the ***Prereqs*** tab.
3. In the Calculations section, you need to enter the last dividend paid under Year 0 for use in the formula for future dividends. Enter the last dividend in the Year 0 column by using a cell reference to the input assumption. (In cell C41 type =C35)
4. Next, create a formula for the dividend in Year 1. It is equal to the previous year's dividend (shown in Year 0) multiplied by 1 plus the growth rate. Copy this formula across for all years.

If you have an error, check that you used an absolute reference for the growth rate and that you used parentheses. The formula is:

$=D_0*(1+g)$

5. Create a formula to find the present value of the dividend in each year. Copy across. You will get an error if you do not absolute reference the required return. The formula is:

   =Div / (1+ req return)^ year #

6. Now create a cumulative formula (covered on the ***Prereqs*** tab) to find the cumulative present value of dividends throughout each year.
   The formula under Year 1 is:

   =sum(D42:D42)

   This row will show you what a stock is worth if based on dividends it pays over some finite time horizon. In this example, the total present value of the first ten years of dividends is €18.96.
   The first part of your calculations should look like this:

7. Under Output, use a cell reference to the Cumulative *PV* of dividends in Year 50 to show the value based off a fifty-year time horizon.

Solutions are provided in the file. The formula result is €58.78. This is significantly less than the price of €78.47 found using the Gordon model. This suggests that about €20 of the €78.47 stock price found under the Gordon model comes from dividends received after the first fifty years.

Apply it

- *Suppose the growth is 9%, 0%, or 23%.*

  At a growth rate of 9%, the price is €87.91 (compared to €239.80 using the Gordon model).
  At a growth rate of 0%, the price is €21.81 (compared to €22.00 using the Gordon model).
  At a growth rate of 23%, the price is €16.38 (compared to €16.42 using the Gordon model).

Between the Gordon approach and the finite horizon approach, how is the difference in price related to the growth rate?

With lower growth rates, the dividends received in the earlier years account for a higher fraction of today's stock prices. Thus, when the growth rate is low, the two approaches yield fairly close results. With high dividend growth the results differ dramatically.

STOCK VALUATION UNDER VARIABLE GROWTH

Problem: SnackHappy Foods has created a line of low carbohydrate desserts. Demand for these products has pushed the firm's growth rate from its historical average of 7% to 40% over the last year. Management knows this rate is not sustainable but does expect several years of high growth. It estimates dividend growth over the next two years to be 30%, followed by 15% growth in Years 3–5 before a return to the long-run dividend growth rate of 7%. Use the model developed in the chapter to

find the expected stock price of SnackHappy, assuming the firm just paid an annual dividend of €0.85 and the market's required return for SnackHappy is 11.5%.

Approach 1: Gordon model

Recall from the text that under variable growth, you need to break the future stream of cash flows into two parts: the variable growth phase and the stable or constant growth phase.

Your model must calculate the present value of dividends, one dividend at a time, during the high growth phase. The model must also calculate the price of the stock at the end of the high growth phase using the Gordon model.

The stock price is the sum of the present value of the dividends during the variable growth period and the present value of the stock price when growth becomes stable.

The key to using this model is to remember that you forecast the dividend into the first constant growth period to find the stock price when growth stabilizes.

Recall that the formula to find the price of a constant growth stock today is $P_0 = D_1 / (r - g)$.

You must use the NEXT dividend expected. To value today (time 0), use the expected Year 1 dividend.

Likewise, if growth stabilizes beginning in Year 6, you would find the present value of dividends during the first five years. Then, find the price of the stock when growth becomes constant, at the end of the five years. Use the dividend expected in Year 6 in the formula.

The price at the end of Year 5 is:

$$P_5 = D_6 / (r - g)$$

Since this is the value at the end of Year 5, it must be discounted for five years to find the present value.

Open the Chapter 5 *Excel* file and turn to the ***Stockval var growth*** tab.

Enter the input information. **Careful: Start the years row with 0 since we need Year 0.**

Note that the calculations section is in two parts: the first part is used to determine the dividends during the variable growth phase (the first five years). Then, these dividends are stated in present-value form.

The second part is used to find the value of the stock when growth becomes stable. This price is also then stated in present-value form.

Your results should look like this:

Inputs

Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Last dividend (just paid)	€0.85						
r = required return	11.5%						
g = growth rate expected		30%	30%	15%	15%	15%	7%

Calculations

Variable growth phase							
Dividends	€0.85	€1.11	€1.44	€1.65	€1.90	€2.18	
Present value of dividends		€0.99	€1.16	€1.19	€1.23	€1.27	
Stable growth phase							
Dividend in first year of stable growth							€2.34
Stock price when growth becomes stable						€51.95	
Present value of price	€27.03						

Output

Stock price	**€32.87**

The output, stock price, is the sum of the present value of dividends paid during the variable growth phase (the *PV* of dividends received in Years 1–5) and the present value of the stock when stable growth is reached. The value of the stock as the firm enters stable growth is €51.95. The present value of €51.95 to be received in five years discounted at 11.5%, is €27.03.

If you find this confusing, recall that the dividend in Year 6 is found only to estimate the price in Year 5, just as, under constant growth, the dividend in Year 1 is used to estimate the price today.

$P_0 = D_1 / (r - g)$ and $P_5 = D_6 / (r - g)$

Apply it

After you complete the model, change the expected growth rates and watch how price reacts.

Approach 2: Valuation Based on Dividends Received Over a Finite Time Period

As with constant growth stocks, you may want to determine the price based on a finite time period.

Again, solve the SnackHappy problem, but now consider only the value of dividends received over the next forty years. The main difference from the solution on the previous tab is that the dividend calculation refers to growth rate estimates in the inputs. Use the fill-series feature to input the years.

With this approach, there is no need to use the two stages because dividends are simply estimated and then put in present-value form for the desired time horizon.

The first part of your model should look like this (Years 11–40 are not displayed here):

Inputs

Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Last dividend	€0.85										
r = required return	11.5%										
g = growth rate expected		30%	30%	15%	15%	15%	7%	7%	7%	7%	7%
Calculations											
Dividend	€0.85	€1.11	€1.44	€1.65	€1.90	€2.18	€2.34	€2.50	€2.68	€2.86	€3.06
PV of dividend		€0.99	€1.16	€1.19	€1.23	€1.27	€1.22	€1.17	€1.12	€1.08	€1.03
Cumulative PV of dividends		€0.99	€2.15	€3.34	€4.57	€5.84	€7.05	€8.22	€9.34	€10.41	€11.45

Output

Price for 40-year time horizon	€28.85

Note that the value under a forty-year time horizon is about €4 less than under the infinite horizon price of €32.87.

FREE CASH FLOW VALUATION OF AN ENTERPRISE

Problem: Turn to the Morton's valuation in Section 5.5 of the text. Set up a model to value the enterprise, using the free cash flow approach.

We will value the enterprise, using the two approaches from the previous problem.

Open the setup file on the tab labeled ***EnterValue***. The first approach is similar to the calculations in the text. Complete the model and compare to the solution.

In the second approach, assume you have been asked to value the enterprise based upon fifty years of free cash flows to assess how much of the enterprise value is derived from cash flows in the early years.

Apply it

Change your growth estimates and analyze the effect on enterprise value and stock price.

Small changes in growth rates can have large effects on values. Also, as growth rate estimates increase, the difference in values between the two approaches becomes greater. At higher growth rates a larger fraction of today’s price comes from dividends in later years.