C H A P T E R   6
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:

- Exponentiation in *Excel*
- Statistical functions

 If this is new to you, be sure to complete the **Excel Prereqs** tab of the Chapter 6 *Excel* file **at the Smart Finance Web site** before proceeding.

CALCULATING EURO AND PERCENT RETURNS

Problem: Exactly one year ago, you bought 50 shares of FastFood, Inc. at a price of €32 per share. You received dividends of €1.20 per share. Today, the price of FastFood is €38.75. Your sister bought 75 shares of PriceyCoffee exactly one year ago at a price of €29.75. She received dividends of €0.80 per share. PriceyCoffee is trading today at €34.50. Find the euro and percent returns of each investment. Who earned a higher return?

 In an equity investment, return is derived from two sources: dividend income and capital gains. The dividend income is equal to the dividend per share multiplied by the number of shares purchased. The capital gain (or loss) is equal to the change in price multiplied by the number of shares purchased.

Approach: Create a simple model that allows you to find the dividend income and capital gain as well as the total 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 **Returns** tab of the Chapter 6 *Excel* file.

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 We set up the model as follows:

Inputs   Beginning stock price
      Ending stock price
      Annual dividend
      # shares purchased

Calculations	Funds invested
	Capital gain/loss
	Total €dividends

| **Output** | **Euro return** |
| | **`Percent return`** |

Calculate funds invested by multiplying the beginning price by the number of shares purchased. You should find that your euro returns was €397.50 which translates into a percentage return of 24.8%. Your sister had a higher euro return, €416.25, but a lower percent return, 18.7%, due to her higher initial investment.

Apply it
What if you change the number of shares purchased?

Suppose you each purchase 100 shares.
   The euro return varies (you earn €795 and she earns €555.), but the percent returns are not affected because the return on investment remains constant.

NOMINAL AND REAL RETURNS

Create a simple model in *Excel* to solve for real or nominal returns.

Problem: You are considering a one-year investment with a nominal return of 11%. You think inflation will be 2.5% this year. If so, what is your expected real rate of return?

   To determine the real rate of return, use the text equation:

   (1+ nominal return) = (1+ real return) * (1+ inflation rate)

   Solving the equation for real return yields:

   Real return = (1+ nominal return) / (1+ inflation rate) – 1

Approach: Set up a basic model to solve for the real rate of return.

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 ***Nom & Real Return*** tab of the Chapter 6 *Excel* file. You should get a real rate of return of 8.3%.

Apply it
What if inflation is not what you expected?

Suppose inflation is 4.5%? 1.5%?
   Higher levels of inflation lead to lower real returns. At 4.5% inflation, the real rate of return is 6.2%; at 1.5% inflation, the real rate of return is 9.4%.

CALCULATING THE AVERAGE, VARIANCE, AND STANDARD DEVIATION

Problem: Table 6.3 in the text examined stock returns from 1994–2003. Use the text data in that table and calculate the average return, variance of returns, and standard deviation of returns for the 1994–2003 period.

Approach 1: Use the mathematical equations.

Open the Chapter 6 *Excel* file and turn to the ***Stats*** tab.
   Enter the year and return data in the input section.

Next, create a formula to calculate average return.

The model also includes calculations to facilitate calculation of variance. Complete these calculations. Find the desired output: average return, variance, and standard deviation.

You should get the following results. Note that these values differ just slightly from those in the text because we did not round here.

Output

Average Return	12.46
Variance	442.36
Std deviation	21.03

Approach 2: Use the statistical functions in *Excel*.

Excel includes a number of built-in statistical functions, including average, variance, and standard deviation. Use of these functions is detailed on the ***Prereqs*** tab of the Chapter 6 *Excel* file.

The **average** function returns the average of a group of numbers. You can use the function by either typing in individual values or using cell references.

The format is:

=average(value1, value2,….) or =average(cell ref:cell ref)

The **variance** function returns the variance of a group of numbers. You can use the function by either typing in individual values or using cell references.

The format is:

=var(value1, value2,….) or =var(cell ref:cell ref)

The **standard deviation** function returns the standard deviation of a group of numbers. You can use the function by either typing in individual values or using cell references.

The format is:

=stdev(value1, value2,….) or =stdev(cell ref:cell ref)

To solve, using Approach 2, again enter the years and returns as inputs. Then use the built-in statistical functions to find the average return, variance of returns, and standard deviation of returns.

You should get the same results as with Approach 1.

Apply it
An advantage of using the built-in functions is that it is easy to look at statistics for sub-periods.
Find the average return, variance of returns, and standard deviation of returns for

- *1995–1999*
- *1996–2000*
- *2000–2003*

You should get the following results.

1995–1999		*1996–2000*		*2000–2003*	
Average return	27.18	**Average return**	17.72	**Average return**	(2.80)
Variance	41.21	**Variance**	270.62	**Variance**	547.94
Std deviation	6.42	**Std deviation**	16.45	**Std deviation**	23.41

Interpret

The period selected for analysis has a tremendous impact on the results.

CALCULATING PORTFOLIO RISK AND RETURN STATISTICS

You may also want to find the average return, variance of returns, and standard deviation of returns for a portfolio.
Problem: Solve Problem 6-19 in which you were asked to compare investments in Merck, AMD, and a portfolio with 50% invested in each.

Approach: Build a basic model and use the statistical functions.

Open the Chapter 6 *Excel* file and turn to the *Portfolios* tab.

Enter the year and return data for AMD and Merck in the input section. Then, enter the percent of the portfolio invested in each. The percents must add up to 100% each year. Because there is 50% invested in each firm in each year, type in 50% for the percent in AMD in 1994. Then, copy down for Merck and across all years.

Calculate portfolio return in Year 1 as the weighted average return. Your formula in 1994 should be:

=C15*C17+C16*C18

Copy the formula across for all years.
Then, use the statistical functions to find the average return for AMD, Merck, and the portfolio. Here are our results:

Apply it
Output

	AMD	Merck	Portfolio
Average return	0.18	0.18	0.18
Variance	0.32	0.11	0.08
Std deviation	0.56	0.33	0.29

What if you vary the percent of the portfolio invested in AMD and Merck?

- *Consider a portfolio with 75% in AMD and 25% in Merck.*
- *Consider a portfolio with 25% in AMD and 75% in Merck.*

Interpret

Interestingly, in this example, varying the percents invested in each stock does not change the average portfolio return.
Is this typical?
No. This occurs only because AMD and Merck have approximately the same average return. The variance and standard deviation of the portfolio are, however, affected. With 75% in AMD and 25% in Merck, the variance is 0.17 and the standard deviation 0.41. With 25% in AMD and 75% in Merck, the variance drops to 0.06 and standard deviation to 0.25.