Spreadsheet Case 9

Garwood Properties Inc.

Problem: Develop a sensitivity analysis

Management skills: Planning

Deciding

PC skills: Data base creation
Data table building
Financial functions

File: GARW_Q.XLS

Garwood Properties is one of the hottest real estate developers in the San Diego metropolitan area. It handles both residential and commercial properties, and has an unmatched reputation for spotting the best new areas to develop ahead of the competition. Garwood Properties has managed to purchase the right properties in the right locations right before development took off.

Garwood's president, Michael Clausen, is considered one of the shrewdest evaluators of properties in the business. Garwood is considering purchasing an apartment building in an upcoming residential area. The building was renovated in the early 1990's to attract young working professionals and it anticipates a steady growth in revenue from rentals to this group.

The owners of this property are asking $12,000,000. Thanks to economic revival and gentrification, properties had been appreciating at close to 9% a year in real terms. At this rate of appreciation, they claim that the building will have a market value of over $26,000,000 in ten years.

Garwood never bets on historic costs of appreciation or on sentiment, history, and location. The firm insists that buildings must be evaluated solely in terms of what they produce in income. A real estate investment is worth no more than the rents it will produce and the final sale price over the next ten years.

Garwood prefers to use the discounted cash flow method for determining the value of a real estate investment. The value of the investment results from cash flow from rental income produced over a period of years plus the value of the property when sold.

This analysis calls for basing the anticipated sale price of the property in 2008 on the cash flow for the year 2009 and the anticipated interest rate which investors could receive on the open market. In a nutshell, Garwood analysts must determine the 2008 sale price by dividing the cash flow in year 2009 by the "going out rate."

These values in turn must be discounted to account for the declining time value of money. A dollar earned ten years from now will not be worth one of today's dollars because of inflation. To arrive at the value of the investment today's dollars, Garwood first calculates the present value of the expected cash flows from the building and expected sale price. The purchase price of the property in today's dollars is then subtracted from present value of the future payments or earnings to arrive at the net present value of the investment. The net present value can then be compared to the asking price and to what historic appreciation would suggest the building is worth in 10 years.

Since real estate investment is highly sensitive to changes in interest rates, the firm insists on examining net present value under a wide range of situations. Net present value of the property must be calculated using a variety of capitalization and discount rates.

On your data file GARW_Q.XLS the assumptions for Garwood's analysis are displayed in the upper left hand corner of the template. The discount rate is the rate at which money loses value over time (roughly the rate of inflation.) The "going out rate," or capitalization rate, is in essence the prevailing interest rate of Treasury bills. Garwood depends very heavily on this rate for its analysis. The growth rate is the rate at which net rental income from the property is expected to grow each year. There are invariably costs for selling a building. In this case, 2.25% of the building's market price must go to pay the costs of selling.

Garwood must adjust its sale price by the cost of selling the property and add the result to revenue from the ten years of cash flow produced by building rentals. Garwood's analysts will then establish a present value for the sum of the adjusted sale price plus ten years of cash flows. The difference between the present value of these future earnings and the purchase price is the net present value. If the net present value is positive, the investment could be acceptable. If the net present value is negative, the investment should be rejected.

Since real estate investments are highly sensitive to changes in interest rates, Garwood analysts must also perform a *sensitivity analysis* in the form of a data table which shows what impact changes in the discount rate and "going out rate" have on the net present value of the building.

Tasks

There are 7 tasks in this case:

1. Print out the data file GARW_Q.XLS to see the assumptions for the problem and the basic outline of the template.

2. Calculate the net income (cash flow) of the property for years 1999-2009.

3. Calculate the sale price of the property using Garwood's method of dividing the cash flow in 2009 by the "going out rate".

4. Calculate the total value of the investment by adjusting the sale price by the cost to sell, and adding the result to the total cash flow for 10 years. Calculate the present value of this amount using the =NPV function of your spreadsheet software. Then calculate the net present value of the investment by subtracting the purchase price from the present value. Round the net present value using the =ROUND function of your spreadsheet software and divide the rounded figure by 1000.

5. Develop a data table that shows the impact of different discount rates and "going out rates" on the net present value of the investment. The discount rate should be on the X axis and the "going out rate" should be on the Y axis. The discount rate should begin with a value of 3% and end with 11% in half percent increments. The "going out rate" should begin with 6% and end with 12% in half per cent increments. It is helpful to use the Edit/Fill/Series commands of your spreadsheet software to set up these values on the data table.

7. Write a one-paragraph evaluation of the proposed investment. Should it be purchased? Should it be rejected at all costs? Or are there are conditions under which it would be a worthwhile investment?

Time Estimates

Expert: 1 hour
Intermediate: 2 hours
Novice: 3 hours

Excel Tutorial For Spreadsheet Case 9

This case requires knowledge of the table-building features of spreadsheet software and of the =ROUND and =NPV functions of Excel.

Sensitivity analysis is the process of exploring various "what-if" situations in order to determine the impact of one or several variables on a model. Table-building automates the "what-if" process so that sensitivity analysis does not have to be performed manually. Instead of performing repeated "what-if" analyses, the Excel table-building function allows various values to be substituted for existing values in your worksheet. A table will then be generated to detail the results.

To demonstrate, let's create a new worksheet that calculates sales commissions. You want to see the impact on commissions on sales of $5000 when they are based on different percentage rates. In order to fully display the data table on your worksheet screen, we will not enter documentation into the first four rows.

Set up your worksheet so that the labels PERCENT, SALES, and COMMISSION are in cells A1, B1 and C1, respectively, and the values for percent (5%) and sales ($5000) that we want to use in our calculation are in cells A2 and B2, respectively. In cell C2, place the formula, =A2*B2, for calculating the commission.

You could enter different percentages in the A column and then copy the formula for commission calculation to appropriate cells in the C column. However, you can also use the **Data/Table...** commands to perform this analysis automatically.

The Edit/Fill/Series Command

Before using these commands, you must enter the different percentage values in a column. Instead of entering each value individually, you can use the **Edit/Fill/Series** command. This command fills a range of cells with a series of numbers or dates that increase or decrease by a specified increment or decrement, or increase or decrease with a multiplicative growth factor.

Firstly enter .05 in cell A9. After accessing the **Edit** menu, select the **Fill** item, and select **Series** in the submenu. In the dialog box, check the Series in Columns setting and the Type is Linear. In the Step window type .01 and in the Stop window type .1. Press the OK Button when finished.

Alternatively, if you did not have a required Stop value but have a desired range for the series, you could select the range with the first cell containing the starting value and select **Edit/Fill/Series**. In the dialog box do not specify a Stop value; Excel will finish Filling when it reaches the end of the selection.

Data/Table Commands

After generating the column of interest rates in range A9:A14, we must enter either the formula for calculating commissions or the cell address from which to draw the formula. *This entry goes next to the column of percentages and one row above the first entry.*

Enter =C2 in cell B8. You could also have entered the formula for computing commission in B8.

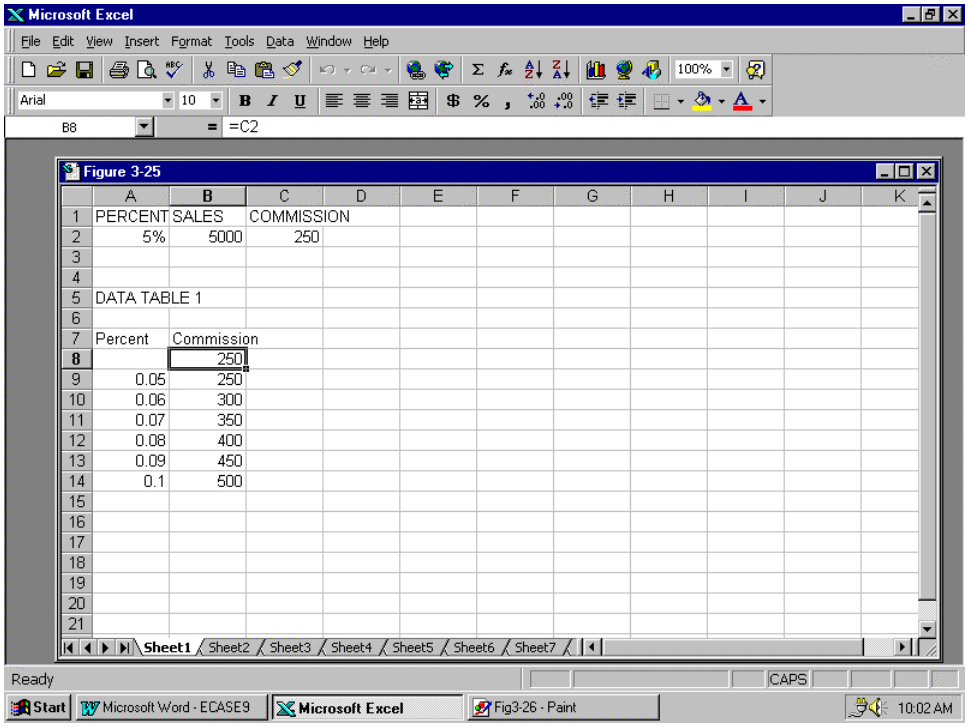
Select the range A8:B14, the range containing the percentage values, the formula and the blank cell where the results will go. Next, select the **Table** item from the **Data** menu. The Table dialog box has two available settings: the Row Input Cell and the Column Input Cell. Since you are only examining the impact of changes in one variable -- percentage -- you will enter a cell reference in only one of these. The variable numbers you are examining is in a column so the cell reference for the percentage variable should be entered. Enter the reference A2 in Column Input Cell and select the OK Button.

By entering only a single input cell reference in the dialog box, you are examining the impact of changes to one value in a formula. If you entered both the Row Input Cell and Column Input Cell, you would show the impact of changes to two values in a formula.

The results should look like Figure 3-15.

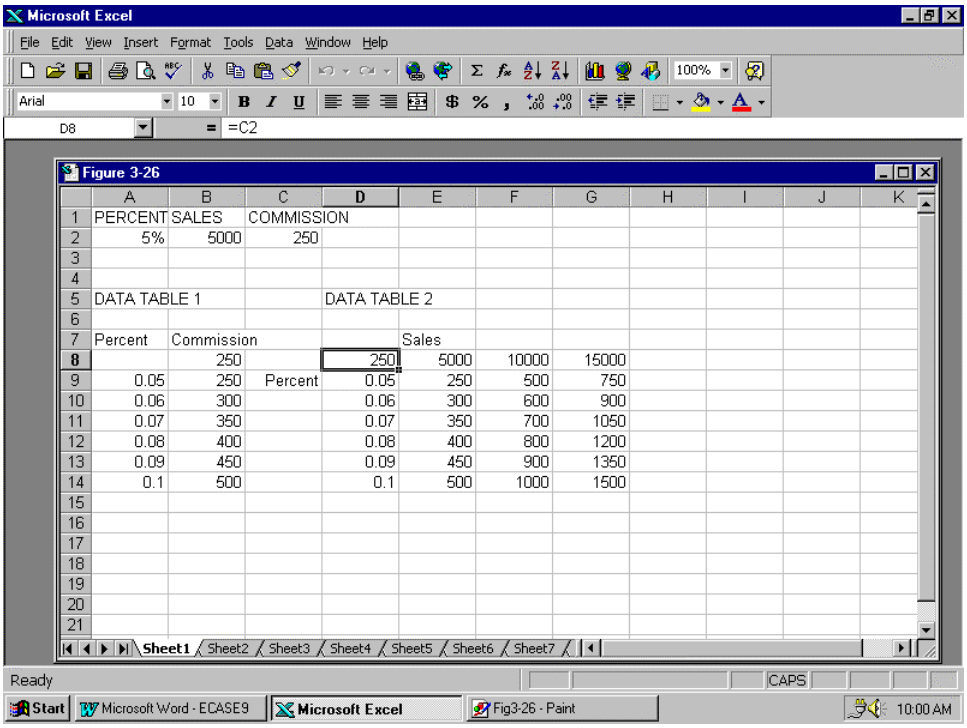
Now examine the impact on commissions if the sales amount, as well as the percentage, is variable. What happens when sales are $5000, $10,000 and $15,000? You would enter the values for our second variable (Sales) in the row just above the first entry of our first variable (Percentage). Enter the Sales values in range E8:G8 and the Percentage values in range D9:D14. *The address of the formula (=C2), must be entered in the cell directly above the first entry of the first variable.* (In your example, this would be in cell D8.)

Figure 3-15



Select the range of the table (D8:G14) and then choose **Data/Table**. In the Table dialog box choose cell reference A2 as the Row Input Cell and cell reference B2 as the Column Input Cell. Then select the OK Button. The two-dimensional data table should look like Figure 3-16:

Figure 3-16



	A	B	C	D	E	F	G	H	I	J	K
1	PERCENT	SALES	COMMISSION								
2	5%	5000	250								
3											
4											
5	DATA TABLE 1			DATA TABLE 2							
6											
7	Percent	Commission			Sales						
8		250		250	5000	10000	15000				
9	0.05	250	Percent	0.05	250	500	750				
10	0.06	300		0.06	300	600	900				
11	0.07	350		0.07	350	700	1050				
12	0.08	400		0.08	400	800	1200				
13	0.09	450		0.09	450	900	1350				
14	0.1	500		0.1	500	1000	1500				
15											
16											
17											
18											
19											
20											
21											

=NPV and =ROUND Functions

Spreadsheet Case 9 requires that you compute the projected value of an investment in today's dollars. The **=NPV** function computes the present value of a stream of cash flows discounted at a fixed periodic interest rate. The form of this function is:

=NPV(*Discount Rate*, *Value1, Value2, ...*)

The discount rate is the interest rate, and the Values are the series of cash flows to be discounted. The interval between cash flows must be constant and must agree with the period of the discount rate. The Value parameters can be both values in the formula, references to cells, and references to ranges of cells. Up to 29 Value parameters are allowed, although each can of course be several values in a range on the worksheet. It is important to realize that Excel takes the order of Value1, Value2 and so on, as the sequence of the cash flows.

The **=ROUND** function rounds numbers to a specified number of places. The form of this function is:

=ROUND(number, num_digits)

Number signifies the number you want to round. Num_digits specifies the number of digits to which you want to round the number.

If num_digits is greater than 0, the number is rounded to the specified number of decimal places.

If num_digits is less than 0, the number is rounded to the left of the decimal point.

If num_digits equals 0, the number is rounded to the nearest integer.

For example,
=ROUND(2.15, 1) equals 2.2

=ROUND(2.149, 1) equals 2.1

=ROUND(21.5, -1) equals 20

=ROUND(-1.475, 2) equals -1.48