

CHAPTER 9

Smart *Excel* Appendix

Appendix Contents

Excel prerequisites

No new *Excel* prerequisites

Learn to create models to solve for

NPV

Internal rate of return

Equivalent annual cost

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

EXCEL PREREQUISITES

There are no new *Excel* prerequisites in this chapter.

CAPITAL BUDGETING ANALYSIS

Problem: Evaluate the capital budgeting decision faced by Gamebuzz.tv, described in Chapter 9.

Chapter 9 described the decision faced by Gamebuzz.tv. The firm is considering a proposal to expand its music selection to include jazz recordings. We will create a model in *Excel* to analyze the decision. The emphasis here is on creating a model that allows the user to easily change input assumptions and to view the effect of these changing assumptions on net present value and internal rate of return.

CREATE A MODEL

Approach: Create a capital budgeting model to find *NPV* and *IRR* that allows inputs to be easily changed.

Open the Chapter 9 *Excel* file located at the Smart Finance Web site. Open the *Gamebuzz.tv* tab.

Look at the setup of the model.

Notice:

1. The format uses blue-shaded cells to denote inputs that can be changed and green shading for calculations and output that should not be changed.
2. The price per unit beginning in year 1 is shaded in green—the result of a calculation rather than an input.
3. There is an input for growth in price.
4. Inputs are organized into three categories: income statement projections, balance-sheet projections, and other.
5. Before completing the cash flow projection, there are separate calculations for investment in net working capital and fixed assets.

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Step 1: Enter the input information for years 0 through 6 and enter the year 0 price per unit of €13.50. In the text, there is a footnote that states that the price is assumed to grow at 2 percent per year. Thus, the price in year 1 = €13.50 * (1.02) = €13.77. In year 2, the price is €13.77 * (1.02) = €14.045. In the text table, this is rounded to €14.05, but the revenue calculation is based on the price of €14.045, NOT the rounded €14.05. To match the text revenue numbers, we create a formula for price, based on the 2 percent annual increase.

Step 2: Fill in the assumptions on growth in price as 2% for each year. Next create a formula for year 1 price in cell E18.

Price = year 0 price *(1+growth in price)
= D18*(1+E19)

Copy the formula across through year 6.

Step 3: Complete the remaining input assumptions.

Step 4: Now begin the calculations section. The first calculation is working capital.

Investment in working capital calcs

Current assets

Net working capital

NEW investment in working capital

Create a formula for current assets equal to the sum of cash, accounts receivable, and inventory.

Net working capital is current assets minus accounts payable.

NEW investment in working capital is the change from one year to another in net working capital. For year 0, the new investment is the total investment. In year 1, the new investment is the net working capital in year 1 minus the net working capital in year 0. The year-1 formula can be copied across.

Your results should match:

<i>Current assets</i>	5,500	13,934	32,932	52,665	72,854	80,806	85,850
<i>Net working capital</i>	3,000	9,614	21,916	34,687	47,640	52,749	56,040
NEW investment in working capital	3,000	6,614	12,302	12,771	12,953	5,109	3,291

Step 5: Complete the calculations on investment in fixed assets. The year 0 figures are:

<i>Change in gross fixed assets</i>	50,000
<i>Accumulated depreciation</i>	10,000
Net PP&E	40,000

Step 6: Find the operating cash flows. Do you find these results?

Operating cash flow	(6,000)	(7,826)	989	9,311	16,539	22,436	29,942
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Step 7: Now use a cell reference to pull through the subtotals for New investment in net working capital, new investment in fixed assets, operating cash flow, and depreciation. Then create a formula for total project cash flow. Don't forget to include depreciation, since this was deducted in the operating cash flows but is a noncash expense.

Total Project Cash Flow	(49,000)	(6,440)	(2,513)	(14,180)	(12,542)	27,535	35,163
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The total project cash flows represent all cash flows related to the project during years 0 through 6. We have not yet considered the project cash flows after year 6.

Step 8: Find the project's terminal value. The text describes two approaches for incorporating project cash flows after year 6: find a terminal value based on the project continuing at a steady state of growth, or find a terminal value, based on asset book value. Both approaches are included in the model. Complete this now. Remember, using either approach, this is the project value at the end of year 6.

If valued as an ongoing project,

$$\begin{aligned} \text{the terminal value at year 6} &= \text{Project Cash Flow in year 7} / (\text{Discount rate} - \text{growth rate}) \\ &= \text{year 6 Cash Flow} * (1 + \text{growth rate}) / (\text{Discount rate} - \text{growth rate}) \\ &= \mathbf{448,324} \end{aligned}$$

If book value is used,

$$\begin{aligned} \text{The terminal value at year 6} &= \text{Book value of PP\&E plus current assets minus current liabilities} \\ &= \mathbf{87,368} \end{aligned}$$

Step 9: Total the cash flows to value the firm, using each approach. The cash flows in years 0 through 5 remain as above but the year 6 cash flow must include the terminal value.

Project cash flows – ongoing	(49,000)	(6,440)	(2,513)	(14,180)	(12,542)	27,535	438,487
Project cash flows – project assets sold	(49,000)	(6,440)	(2,513)	(14,180)	(12,542)	27,535	122,531

Step 10: Find NPV and IRR.

Assuming project continues with 2% growth rate

NPV	€13,862
IRR	42.4%

Assuming project assets sold at book value

<i>NPV</i>	€10,112
<i>IRR</i>	12.9%

Apply it

- **How important is the assumption about terminal value?**
The approach used to estimate terminal value has a very significant effect on *NPV* and *IRR*.

EXAMINE PROJECTION ASSUMPTIONS

Problem: Analyze the assumptions embedded in the projections for Gamebuzz.tv.

The projection information provided by Gamebuzz.tv contains estimates about growth in unit sales and new investments in assets, as well as assumptions regarding future expenditures for production. Let us examine these embedded assumptions to evaluate the reasonableness of the assumptions.

Approach: Find the assumptions embedded in the projection so that a user can more easily understand and change assumptions.

Open the Chapter 9 Excel file located at the Smart Finance Web site. Open the *Proj Calcs* tab.

The input information has been entered for you.

Examine price per unit in row 20. Create a formula in row 21 to find the growth rate implied by the prices listed for year 1.

The growth rate is = Price year 1 / Price year 0–1

The result is about 2 percent in each year. It is not exactly 2 percent because, in the input assumptions, we used rounded numbers for price.

Perform the same analysis on unit growth to find the implied growth rate of units sold. You must begin in year 2, since there were no year 0 sales.

The result is:

Year 2	Year 3	Year 4	Year 5	Year 6
150.0%	60.0%	37.5%	9.1%	4.2%

Management may or may not believe this is accurate. Viewing the implied growth rate often provides valuable information. If the results appear unlikely, the input assumptions can be altered.

Complete the projection calculations.

Apply it

- **Which projection assumptions seem most reasonable?**
- **Which assumptions might you question?**

Unit growth would be expected to be highest early on, with slower growth rates in later years. It is difficult to assess the accuracy of the estimates. The projections imply cost of goods sold and SG&A will decrease moderately as a percent of revenues over the six years, whereas accounts receivable, inventory, and accounts payable are assumed to maintain a constant relationship with revenues. The PP&E values might be questioned, since there is not a clear relationship between the values and revenues.

CHANGE KEY ASSUMPTIONS

Problem: Based on your analysis of the assumptions embedded in the projections for Gamebuzz.tv, alter some key assumptions and examine the impact on NPV and IRR.

The original solution is provided on the *Gamebuzz.tv* (2) tab of the file. Use this tab and alter some key assumptions.

Apply it

- **Hold all else constant and assume units sold start at 4000 and increase by 4000 each year.**
Your result should be:

Assuming project continues with 2% growth rate

NPV	€45,158
IRR	17.4%

Assuming project assets sold at book value

NPV	(€2,942)
IRR	#NUM!

NPV is much lower. For the second approach to terminal value, NPV is negative and there is no result for IRR. The #NUM! message results because Excel cannot calculate the IRR for this series of cash flows. A glance at the cash flows indicates that there is no positive discount rate that will yield an NPV of 0. Therefore, it is clear the project is undesirable.

The solution is provided on the *Classic units* tab.

- **Now begin with the original inputs but assume growth in price is 3 percent.**
Now the NPVs are €37,206 and €4,513. The project looks more attractive.
The solution is provided on the *Classic price* tab.
- **What if COGS remains at 76 percent of revenues all six years?**
Now the NPVs are €31,681 and (€4,417). The project looks less attractive. It should only be undertaken if the project is expected to be ongoing.
The solution is provided on the *Classic COGS* tab.

This analysis points out that changes in key assumptions can quickly make an attractive project look far more or far less attractive.

EQUIVALENT ANNUAL COST

Problem: Solve Problem 9-19 in the text.

Approach: Create a capital budgeting model to find NPV and equivalent annual cost.

Open the Chapter 9 Excel file located at the Smart Finance Web site. Open the *EAC* tab.

First, find each project's net present value.

Next, find each equivalent annual cost.

The equivalent annual cost is the annual expenditure that, if made in each year of the project's life, leads to the net present value. The payment function in Excel can calculate equivalent annual cost.

The format of the payment function is: $= -\text{pmt}(\text{rate}, \text{nper}, \text{pv}, \text{fv}, \text{type})$

When using the function to find EAC, fv and type are left out or set at 0. Nper is the number of years in the project's life, and pv is the project net present value. The negative sign is inserted before the pmt function to handle Excel's treatment of cash inflows and outflows.

For this problem,

$= -\text{pmt}(\text{discount rate}, \# \text{ years}, \text{npv})$

The costs of the computers are:

NPV A	€ (78,780)	Middle
NPV B	€ (75,482)	Best
NPV C	€124,886)	Worst

EAC A	€ (19,161)	Best
EAC B	€ (24,851)	Middle
EAC C	€ (34,645)	Worst

Apply it

- **Which project would you recommend?**

Because our goal is to minimize cost, select computer A—it has the lowest annual cost.