

Additional Problems: Chapter Eight: After-Tax Analysis

8S.1

It is July 1, and an Australian company is considering the immediate purchase of a new sheep-shearing machine. It costs \$9 600, and has a useful life of twelve years, after which it will have a salvage value of \$1 600. It costs \$2 100/year to operate. The company pays taxes at 50%, and its after-tax MARR is 8%. What is the after-tax equivalent annual cost of the machine?

***8S.2**

A Californian company needs to purchase ten oscilloscopes during the coming year. The oscilloscopes are top-of-the-line models, with a built-in Pentium 4 processor, and cost \$80 000 each. The company is presenting an argument to the Internal Revenue Service ('IRS') that they should be considered as computers, and depreciated over a five-year period. The IRS thinks that they are generic electronic equipment, which is depreciated over a seven-year period. The company pays tax at 50%, and its pre-tax cash flow every year is at least \$500 000. Its after-tax MARR is 5%. What is the present value to the company of convincing the IRS that they are computers?

8S.3

A large London printing company has a printing press with five years of life remaining to it, and its function will be needed for exactly that period. It costs £19 000 per year to operate. Right now its market value is £8 000, and in five years time its salvage value will be £1 000. A new press of advanced design can perform the same function as the current machine for an operating cost of just £12 000 per year. It will cost £24 000 to purchase, and will have a salvage value of £6 000 after five years of use.

The company has a 52% effective tax rate, and its after-tax MARR is 20%. Both machines are depreciated by declining balance depreciation at 25%. Should the machine be replaced?

***8S.4**

You operate a deep mine in South Africa, which will be productive for the next five years. Groundwater seeps into the mine, and a powerful pump must be purchased to remove it.

The Mandela pump sells for R 14 000, costs R 6 000 a year to operate, and will have a salvage value of R 5 000 in five years time. The Kruger pump sells for R 10 000, costs R 7 000 a year to operate, and will have a salvage value of R 2 000 in five years time. A third alternative is to apply a waterproofing treatment to the mine walls now. This will require the immediate expenditure of R 25 000, and R 1 000 annual maintenance thereafter. If your pre-tax MARR is 20%, which option will you choose?

Repeat the study, this time with an after-tax analysis, assuming that your tax rate is 50%, the pumps are depreciable at 20% per annum, and your after-tax MARR is 10%. The initial cost of waterproofing is deductible from your pre-tax income for the current year. Does your conclusion change?

8S.5

(This question is modelled on Problem 7S.4, but moved to a Canadian context and posed as an after-tax problem.)

You run a CAD/CAM consultancy in South Ontario. You employ ten analysts, each on an annual salary of \$100 000, and have an ageing collection of ten workstations of various kinds. You are considering four possible strategies: replace all the workstations with new, low-end workstations costing \$50 000 each; rent ten low-end workstations at \$20 000 per year each; buy five high-end workstations at \$150 000; or carry on with your current equipment, in which case you can expect an annual total repair bill of \$100 000, going up by 20% per year. If you buy the high-end workstations, you can retire one of your analysts at once. The same four options are available to you every year over the next five years; after that, the technology will have changed too much to make any useful predictions. Your current workstations have zero salvage value; the cost of the low-end workstations will drop by 40% per year, while the high-end workstations cost drops at 30% per year. Rental costs stay the same from year to year. Your company is taxed at 50%, and has an after-tax MARR of 10%. Based on an after-tax analysis, what is the best strategy?

Note that the market value of the computers may not match the depreciation rate specified by Canadian tax regulations. Canada tax law says that they're in Asset Class 10, which means that you can't depreciate them by more than 30% per year. You can assume that salaries, repairs and rental costs can be deducted from your pre-tax cash flows in the year in which they occur.

*8S.6

You have started a company to develop and market a device you invented in the final year of your undergraduate career. You borrowed \$250 000 from the bank at 10% interest and put up \$100 000 which you saved from your last co-op job income. Over the company's first three years, the net value of its assets grows by 15% per year. What is your leverage factor, and what is the increase in your personal wealth, before taxes?

After three years, you go public and sell \$200 000 worth of common stock in the company. Assume that you invest the \$200 000 received in the company: its total equity is now \$400 000, of which you own half and your shareholders own half. You offer no dividends, but stockholders are attracted by the prospect of continued growth. What is the weighted cost of capital to the company? What would a reasonable figure for the MARR be? The company is still classified as a small business, and pays 20% tax on income. Expanding the business requires that you obtain a gas chromatograph. You can either buy one at \$150 000, or rent one at \$50 000/year. The chromatograph will have to be replaced in five years; if you have bought it, you can expect a salvage value of \$50 000. It falls into Asset class 8, giving you 20% depreciation per year by the declining balance method. Should you buy it or rent it?

Five years later, the total equity in the business is \$1 200 000. What rate of return have the stockholders received? You are now no longer a small business, and your tax rate has gone up to 50%. You need to replace the gas chromatograph, and you are again offered the choice between buying and leasing, at the same terms as before. Does your choice change?

