

## **CHAPTER 9**

### **CONCEPT REVIEW QUESTIONS**

1. Why is it important for the financial analyst to (a) focus on incremental cash flows, (b) ignore financing costs, (c) consider taxes, and (d) adjust for noncash expenses when estimating a project's relevant cash flows?
  - a. To properly evaluate the costs and benefits of a capital investment project, a manager must be able to identify the additional cash inflows and outflows that will result solely from acceptance of the project, so only these incremental CFs are important.
  - b. An analyst should ignore financing costs for individual projects, and instead should use a single weighted average cost of capital for evaluating all capital investment projects that have the same risk as the firm's other assets. Otherwise, the analysts will be entangling investment and capital structure (the mix of long-term debt and equity) decisions.
  - c. Taxes influence the capital budgeting decision because they can change the net value of cash flows received or paid out that result from accepting a project. Taxes on cash inflows reduce the value of these receipts, while tax credits and deductions that result from accepting a project increase its attractiveness.
  - d. Non-cash expenses are important if these reduce the taxes that must be paid on incremental cash inflows. The most important non-cash expense for most firms is depreciation, and this deduction works to reduce the tax liabilities of profitable firms.

2. Why do we consider *changes* in net working capital associated with a project to be cash inflows or outflows rather than consider the absolute level of net working capital?

Changes in net working capital are important. The company starts out with a certain amount of working capital – since it already has this, it is not relevant to the cash flow equation. If it needs to change the amount of working capital that it has, then that change is relevant.

3. For what kinds of investments does terminal value account for a substantial fraction of the total project *NPV*, and for what kinds of investments is terminal value relatively unimportant?

The higher the growth rate of cash flows, the higher the terminal value of the project. A project where cash flows level off in time will have a much smaller terminal value.

4. What is meant by a potential investment's *relevant cash flows*? What are *sunk costs* and *cannibalization*, and do they affect the process of determining a proposed investment's incremental cash flows?

The relevant cash flows for an investment are its incremental, after-tax, cash flows, which ignore financing costs and reflect adjustments for any noncash charges, typically depreciation.

- A sunk cost is a cost that has already been paid and is therefore not recoverable.
- Cannibalization is the “substitution effect” that frequently occurs when a firm introduces a new product. Typically, some of the new product's sales will come at the expense of the firm's existing products.

While sunk costs are irrelevant and should be ignored when determining an investment's incremental cash flows, the incremental cash outflows from existing

product sales that are cannibalized by a newer product should be taken into consideration when considering a new investment

5. A real estate development firm owns a fully leased forty-story office building. A tenant recently moved its offices out of two stories of the building, leaving the space temporarily vacant. If the real estate firm considers moving its own offices into this forty-story office building, what cost should it assign for the space? Is the cost of the vacant space zero because the firm paid for the building long ago, a cost that is *sunk*, or is there an incremental *opportunity cost*?

The cost for the space is the opportunity cost of not renting it out to a new tenant. It will lose the rentals it could have gained if it chooses to occupy the space with its own offices

6. Suppose that an analyst makes a mistake and calculates the *NPV* of an investment project by discounting the project's *contribution to net income* each year rather than by discounting its *relevant cash flows*. Would you expect the *NPV* based on net income to be higher or lower than the *NPV* calculated using the relevant cash flows?

*NPV* based on net income could be higher if the company has low depreciation and high additional working capital and ongoing capital expenditures needed for the project. *NPV* based on net income could be lower if the company had a substantial depreciation expense that was not added back into cash flows.

7. Embedded in the analysis of the proposal is an assumption about how GameBuzz.Tv's customers will behave when they are able to choose from a new set of CDs. What is that assumption?

The company is assuming that its customers will see value in the addition of new CDs and will add those to their collection. Any customer's choice to buy from this new set of CDs must be embedded in the incremental cash flows.

8. What other ways might GameBuzz.Tv estimate the *terminal value* of this project?

GameBuzz.Tv could have assumed a stable perpetuity, rather than a growing perpetuity, which would have given it a lower terminal value.

9. Suppose that a new tax law allows the company to reclassify computers as three-year equipment rather than five-year equipment. In general, what impact would this legislation have on the project's *NPV*?

This change would be an advantage to companies. They would be able to depreciate their purchases faster, meaning there will be more depreciation, less taxable income and therefore less in taxes. It is to a company's benefit to depreciate equipment as quickly as possible. In fact, assuming it had sufficient income, it would receive the most benefit by not depreciating equipment, and simply expensing it when it occurred.

10. Given that a company can in certain circumstances produce one set of accounts for taxation and the other for shareholders, and that depreciation schedules are a matter of both accounting policy and tax law, can we ever be really sure that a project is worth taking on?

No. Managers tend to be favorably biased toward projects stemming from their own ideas. They may consciously or unconsciously manipulate the projects they favor to show positive cash flows when in fact such results might be questionable. This optimism could cause a negative NPV project to be accepted

11. When a firm is faced with *capital rationing*, how can the *profitability index (PI)* be used to select the best projects? Why does choosing the projects with the highest *PI* not always lead to the best decision?

When managers are constrained by the availability of funds and they cannot invest in every project that has a positive NPV, they face the so-called capital-rationing. Whenever managers have to choose from a set of possible investments they must choose a combination of projects that maximizes shareholder wealth, subject to the constraint of limited funds. The PI is very functional in such situations. Once managers rank projects, they select the investment with the highest *PI*. If the total amount of capital available has not been fully exhausted, then managers invest in the project with the second-highest *PI*, and so on until no more capital remains to invest. By following this routine, managers will select a portfolio of projects that in aggregate generates a higher *NPV* than any other combination of projects. However, this method may not maximize shareholder wealth when capital is rationed not only at the beginning of an investment's life, but also in all subsequent periods. This method can also lead to suboptimal decisions when projects are interdependent—that is, when one investment is contingent on another.

12. Under what circumstance is the use of the *equivalent annual cost (EAC) method* to compare substitutable projects with different lives clearly more efficient computationally than using multiple investments over a common period where both projects terminate in the same year?

Using equivalent annual cost is more efficient when it would take a large number of repetitions of the NPV calculations in order to find a value. For example, suppose one project lasts 11 years and a second project lasts 13 years. You would have to replicate this project over a  $13 \times 11 = 143$  years in order to find a common time horizon

13. In almost every example so far, firms must decide to invest in a project immediately or not at all. But suppose that a firm could invest in a project today or it could wait one year before investing. How could you use *NPV* analysis to decide whether to invest now or later?

You could compute two NPVs – now and a year from now, with appropriate changes in the cash flows. You could also look at the opportunity cost of investing now vs. later. If the company chooses to wait a year, are there projects it could fund now and still be able to receive positive NPV from the original project if it began it in a year? If so, then waiting could be the best decision.

14. Can you articulate circumstances under which the cost of excess capacity is zero?

Think about why the cost of excess capacity normally is not zero. The cost of excess capacity would be zero if there were no current or future uses for that excess capacity. For example, if sales in the original product were not expected to increase, or perhaps even decline, so therefore the original product would never be able to make use of the excess capacity.

15: In the situation above when we examined the equivalent annual cost, we worked the solution out ‘manually’. Is there an algebraic formulation that allows us to consider any given question of that type?

Calculating the EAC relies on estimating the project’s NPV relative to the original outflow. For example, suppose you have a choice of two projects with the following cash flows:

Year	0	1	2
Project A cash flow	-50	100	200
Project B cash flow	-100	50	175

Assuming a 10% discount rate, project A has an NPV of €40.9. Project B has an NPV of €62.8. Since 63 is greater than 41, Project B looks like it is a better project. However, you could do two project As for the price of one project B. Two times Project A's NPV is  $40.9 \times 2 = €81.8$ . Project A is the better project. The same applies if projects have unequal lives – you want to know the costs or cash flows on a present value basis per year in order to make the correct, most value-adding decision.