

Corporate Finance, Module 4: “Net Present Value vs Other Valuation Models”

*Homework Assignments*

(The attached PDF file has better formatting.)

Exercise 4.1: Project Duration

A firm has two potential projects, with the following expected cash flows:

	<i>Cash Flows in Year X</i>			
	<i>Yr 1</i>	<i>Yr 2</i>	<i>Yr 3</i>	<i>Yr 4</i>
<i>Project #1</i>	(400)	220	310	–
<i>Project #2</i>	(400)	130	190	260

The firm’s opportunity cost of capital is 13% per annum.

- A. What is the net present value of Project #1?
- B. What is the net present value of Project #2?
- C. What project is better from an NPV perspective?
- D. What is the internal rate of return of Project #1? (You may use financial calculator to determine the IRR, or you may solve a quadratic equation; you can also use trial and error to get an approximate figure.)
- E. What is the internal rate of return of Project #2? (To see if the IRR for Project #2 is higher or lower than the IRR for Project #1, use the Project #1 IRR as the hurdle rate to compute the NPV of Project #2.)
- F. What project is better from an IRR perspective?
- G. Explain why the two performance measurement yardsticks give different answers. (See the corresponding practice problem for the explanation.)

Exercise 4.2: Project Size

A firm has two potential projects, with the following expected cash flows:

	<i>Cash Flows in Year X</i>			
	<i>Yr 1</i>	<i>Yr 2</i>	<i>Yr 3</i>	<i>Yr 4</i>
<i>Project #1</i>	(800)	360	360	360
<i>Project #2</i>	(400)	130	190	260

The firm’s opportunity cost of capital is 13% per annum. (Project #2 is the same as in the previous homework assignment.)

- A. What is the net present value of Project #1?
- B. What is the net present value of Project #2?
- C. What project is better from an NPV perspective?
- D. What is the internal rate of return of Project #1?
- E. What is the internal rate of return of Project #2?
- F. What project is better from an IRR perspective?
- G. Explain why the two performance measurement yardsticks give different answers. (See the corresponding practice problem for the explanation.)

{Comments from a discussion forum thread:}

*Question:* What is the initial investment?

*Answer:* The initial investment is the negative cash flow at time 1.

*Question:* Does a project always have a negative cash flow followed by positive cash flows?

*Answer:* Not necessarily. A loan is a project. The borrower has a positive cash flow at time 0 and negative cash flows at each coupon payment date and at maturity.

*Question:* Are there other examples besides loans?

*Answer:* A state lottery collects money from consumers, and pays the winnings a few weeks later.

*Question:* Why do the examples generally have a negative initial cash flow followed by positive cash flows?

*Answer:* That is the most common sequence. Even for the state lottery, the state must spend money (an initial investment) preparing the structure: tickets, sales offices, advertisements, and so forth. This is an initial investment. The sequence of cash flows is a small initial investment at time 0, a large cash inflow at time 1, and a cash outflow at time 2.

*Question:* If a firm borrows money, is there a similar initial investment?

*Answer:* No one walks into a bank and says: "I'm setting up a firm which needs to borrow \$100,000." A person first sets up a firm, creates a business plan, creates a prototype of the product, and does all the work to show that the firm might succeed. This may cost \$100,000, which is the initial investment. The firm then borrows \$200,000 from the bank, to cover its production and operating costs.

*Question:* Does the initial investment have to be at time zero?

*Answer:* The time index is arbitrary. We can call it time 0, time 1, or time 2006.

*Question:* What should we focus on for the final exam?

*Answer:* The final exam may give a multiple choice question asking which project has the higher IRR and which has the higher NPV. Understand why a larger project or a longer project may have a higher NPV but a lower IRR. Know also two principles:

- Both profit measures give the same accept/reject decision.
- A change in the opportunity cost of capital changes the NPV but not the IRR.

*Question:* These two principles are not consistent. If a change in the opportunity cost of capital changes the NPV but not the IRR, why do the two measure give the same accept vs reject decision?

*Answer:* The hurdle rate for the IRR measure is the opportunity cost of capital. A higher opportunity cost of capital reduces the NPV (for investment projects, not loans) and increases the hurdle rate.