Using the BA II Plus to Compute the Modified Internal Rate of Return (MIRR)

The IRR has been a popular metric for evaluating investments for many years — primarily due to the simplicity with which it can be interpreted. However, the IRR suffers from a couple of serious flaws. The most important flaw is that it implicitly assumes that the cash flows will be reinvested for the life of the project at a rate that equals the IRR. A good project may have an IRR that is considerably greater than any reasonable reinvestment assumption. Therefore, the IRR can be misleadingly high at times.

The modified internal rate of return (MIRR) solves this problem by using an explicit reinvestment rate. Unfortunately, financial calculators don't have an MIRR key like they have an IRR key. That means that we have to use a little ingenuity to calculate the MIRR. Fortunately, it isn't difficult. Here are the steps in the algorithm that we will use:

1. Calculate the total present value of the after-tax cash flows, starting from year 1 to year 5 (leave out the initial outlay) using the calculator's NPV function. Use the 10% cost of capital rate as your discount rate (I) to find the present value.
2. Calculate the future value as of the end of the project life of the present value from step 1. The interest rate that you will use to find the future value is the reinvestment rate.
3. Finally, find the discount rate that equates the initial cost of the investment with the future value of the cash flows. This discount rate is the MIRR, and it can be interpreted as the compound average annual rate of return that you will earn on an investment if you reinvest the cash flows at the reinvestment rate.

Suppose we use the data from the class problem: The Net After-Tax Cash Flows were 87,000, 99,000, 69,000, 61,000, and 92,800. The WACC was 10%. Make certain you set the P/Y value to 1. What is the MIRR if the reinvestment rate is 10% per year?

Let's go through our algorithm step-by-step:

1. Clear the TVM keys. Enter the cash flows (remember that we are ignoring the cost of the investment at this point – CFo = 0): Using the [CF] function and [↓] key: Use the [ENTER] key load the following values: 0 for CFo, 87000 for C01, 99000 for C02, 69000 for C03, 61000 for C04, and 92800 for C05. Press [2nd] [CPT] to QUIT. Press the [NPV] key, enter 10[%] for I and press the [ENTER] key (I = 10.00). Arrow down and press the [CPT] key. We find that the present value is $312,035.13. [2nd] [CPT] to QUIT
2. To find the future value of the cash flows, enter -312035.13 into [PV], 5 into [N], and 10 into [I/YR]. Now [CPT] [FV]: The future value is $502,535.70
3. At this point our problem has transformed a $275,000 investment to a lump sum future cash flow of $502,535.70 at the end of year 5. The MIRR is the discount rate (I/YR) that equates these two numbers. Enter -275,000 into [PV] and then [CPT] [I/YR]. The MIRR is 12.81% per year.