Corporate Finance, Module 11: "Maximizing Net Present Value"

Homework Assignment: Economic Income

(The attached PDF file has better formatting.)

We examine economic income and depreciation in this homework assignment. Read the practice problems for this module first, which explain the procedures.

A project requires a $10 million investment and produces cash flows of $2.8 million each year for 5 years. The capitalization rate for this project is 10%. Fill in the cells of the table below (figures are in thousands of dollars) and answer the questions below the table. The questions explain how to complete the table; you complete the figures.

All cash flows occur at the end of the year. (In practice, we assume cash flows occur evenly over the year or at mid-year.)

Year	0	1	2	3	4	5
Cash Flow		2,800	2,800	2,800	2,800	2,800
PV @ Year End						
Economic Depreciation						
Economic Income						

A. What is the present value of the project at each year-end? (At the end of year 5, after the receipt of the last cash flow, the present value of the project is zero. At the end of year 4, the present value of the project is $2.8 million discounted for one year. We add the $2.8 million cash flow in year 4 and discount back another year to get the present value of the project at the end of year 3. We continue back to time 0. Do *not* subtract the initial investment from the present value at time 0.)

B. What is the net present value of the project? (This is the present value at the end of year 0 *minus* the initial investment of $10 million.)

C. What is the economic depreciation each year? (The economic depreciation is the reduction in the present value during the year. Economic depreciation in year 5 is the present value at the end of year 4 minus the present value at the end of year 5. These present values are at different dates.)

D. What is the economic income each year? (Economic income can be determined two ways: (i) cash flow minus economic depreciation, and (ii) the present value at the end of the previous year times the cost of capital. Both definitions give the same result; they are mathematically equivalent.)

E. If we use straight line depreciation over five years, what is the accounting depreciation each year? (This is the initial investment of $10 million divided by 5 years.)

F. If we use straight line depreciation over five years, what is accounting income? (This is the cash flow minus the depreciation; it is the same each year, since the cash flows are the same and the depreciation is straight line.)

G. Does the accounting income overstate or understate economic income? (Compare the accounting income and economic income for each of the five years.)

Question: Do we expect accounting income to overstate or understate economic income?

Answer: If the net present value is zero, and if all assets are depreciated over the lifetime of the project, the total nominal depreciation is the same for accounting and economic income. Since the cash flows are also the same, the total nominal income is the same, though income recognition still differs.

But these conditions are not generally satisfied. GAAP writes off many expenses when they are incurred. Even when assets are depreciated or expenses are amortized, GAAP often depreciates them more quickly than economic accounting does. As a result, GAAP shows losses in early years and profits in later years.

Economic income has the opposite pattern. The present value of future cash flows is greatest in early years, so economic income is greatest in early years.

For positive NPV projects, the economic profits are booked at inception; they are not deferred over the lifetime of the project (as GAAP does). Remember than economic income and economic profits (positive NPV) are different concepts. For positive NPV projects, the recognition of economic income and profits is much quicker.