Lecture 4: Future Worth, Annual Worth, and the Temporal Horizon

Sunk Costs

Although we have discussed formulae for moving money from the future to the present, and vice-versa, we have never discussed how to assess the present value of money we've spent in the past. The reason for this is simply that past expenditures are irrelevant to present decisions. Thus, having invested large sums of money in a particular option in the recent past is no reason for sticking with that option if better options are now available. Admittedly, having to send $25,000 of Betamax tapes to the scrap heap can cause you some mental anguish, and lead to embarrassing questions from your stockholders; but from an economic viewpoint, it's the best thing to do.

Future Worth

In the last lecture, we discussed the comparison of alternatives by reducing the payouts and receipts associated with each strategy to their equivalent present worth. We can equally well compare them by selecting some future date and calculating their equivalent worth at that date. This will lead to the same conclusions as the present-worth comparison. The only reason that we have the two separate methods is that it sometimes seems more natural to look at a future date; for example, different strategies of investment for retirement income could be evaluated in terms of the capital they make available at your retirement date.

Annual Worth

Many of the expenses a company must meet -- rent, wages, taxes -- occur on a regular periodic basis. It is therefore attractive to present investment options in terms of their *equivalent uniform annual cost*. The calculations for this approach are simple -- we convert present worth to equivalent annual worth by multiplying by the appropriate conversion factor -- but some care is needed in deciding what period of time to consider.

For example, suppose we have a machine that we purchase for a given cost P, and which we expect to sell after N years for a salvage cost S. What is the equivalent annual cost of the machine? (This number is useful if we want to compare buying the machine outright with renting it for a period.) The equivalent cost is conventionally referred to as *capital recovery*, and can be calculated from

CR=P(A/P,i,N) - S(A/F,i,N)

where the first term on the right-hand side is known as the *capital recovery factor*.

We encounter a possible difficulty if we want to compare two alternatives which have different life expectancies. There are two ways of dealing with this: firstly, if we expect the two alternatives to be available into the indefinite future, we can choose a time period which is a common multiple of their life expectancies. Secondly, if we expect the situation to change before the common multiple is reached, we can choose a shorter study period and estimate the salvage values of the equipment at the end of that period.

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