Project Management & Economics

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Chapter 1

Time Value of Money

1.1 Types of Interest

Nominal or simple interest means the interest earned per interest period is exclusively a linear function of the principle amount of currency. This is opposite *compound* interest, which means the interest is added to the principal amount at the start of every new interest period and is exponential.

The compounded interest rate per a compound period is given by

$$i = \left(1 + \frac{r}{n}\right)^{nt} - 1 \iff A = P\left(1 + \frac{r}{n}\right)^{nt} \tag{1.1}$$

where r is the nominal interest rate per year, and n is the number of compounding periods per year of t years.

1.2 Interest Rates

The *nominal rate* is the "actual" interest excluding the concept of compounding. This contrasts with the *effective rate* which includes compounding. Depreciation is the reduction of value of an object. For a product costing $\$P$ which in n years is worth $\$S$, then the depreciation rate per year is $1/n\%$.

As well, assuming a linear depreciation then the depreciable asset cost is $\$(P - S)$ such that the annual depreciation is

$$(P - S)/n \tag{1.2}$$

1.3 Data Analysis

Using MATLAB, an income stream array for an investment(s) with a series of returns per period may be created as follows:

```
Stream = [-investment1, return1, etc]; % new stream array
ROR = irr(Stream); % rate
```

where `ROR` is the value(s) of the roots of the rate of return equation; the IRR is best if returns are in the early months rather than the later. For *fixed* regular payments, the periodic interest rate, number of periods, and size of payment must be known. However for *variable* regular payments, the cash flow and interest rate must be known. In MATLAB, these is given by

```matlab
present_value = pvfix(r/m, mt, p/m); % fixed payments
present_value = pvvar(Stream, i, Dates); % var payments
```

Additionally, the declining balance method calculates the annual depreciation via

```matlab
depr = depstln(P, S, n); % year 1 depreciation
dbm = depgendb(P, S, n, 2); % depreciation for each year
```

1.4 Interest Calculations

MATLAB is also able to calculate different interest rates, as given by the following:

```matlab
rate = annurate(mt, A, P, 0, 0) % find annural rate / 12
[P, I, bal, A] = amortize(r/m, mt, P) % find monthly payment
```

where P is the initial amount, A is the payment per period, and r is the annual rate. Given P, A, I where I is the monthly interest rate, the number of periods n can be found via

```matlab
periods = annuterm(I, A, -P) % periods to pay off loan
periods = annuterm(I, A, P, F) % periods until FV is reached
```

Chapter 2

Project Management

2.1   Roles of Members

There are several critical types of members involved in a project, whom's roles are described below:

- *Project Manager*: Makes decisions, and monitors and controls the team. They are also in charge of morale via conflict management and reward adjustment.

- *General Members*: Do their jobs on schedule and in accordance with the budget. They must also communicate and help resolve problems.

- *Functional Managers*: Deliver on resources promised, stay informed on the goings on, and take responsibility for the quality of work.

- *Sponsor*: An entity that has the resources to complete the project and leads the development of the project charter.

- *Senior Management*: Do not obstruct with the project, but rather reward success and give support when needed. As well, they should respect the project management process and take some responsibility.

2.2   Definitions

The typical definition of a *project* is something which delivers a result, often a product or service, in which there is a limited amount of time and money. Additionally, a project usually involves a number of people, and is a unique endeavor.

Project Management (PM) itself can be defined as encompassing several steps, including initiating, planning, executing, monitoring, and closing. Specifically,

- In the *initiation stage*, the nature and scope of a project are defined in the project charter, which also describes what the project will accomplish.

- In the *planning stages*, the project is broken down into smaller modules, the sequence of activities is defined, and the resources are identified.

- In the *execution stage*, work is carried out to deliver the product, service, or desired outcome, at which point the project manager assumes full responsibility and control.

- In the *monitoring stage*, progress reports and consistent assessments are carried out.

- The *closing stage* occurs at the end of the project, in which the manager ensures the client is satisfied with the outcome.

Of course, PM should only be implemented upon a project with specific deliverables.