Debre Markos University

Institute of Technology

Construction Technology & Management Academic program

Development and Construction Economics

(CoTM 5271)

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Chapter Outline

- Introduction to Development Economics
- Economic Growth & Development
- Sustainable Development
- Time value of money

Introduction

What is Development Economics?

- Development economics is **a branch of economics which *deals with economic aspects of the development process*** in low-income countries.
- Its focus is ***not only on methods of promoting economic growth*** (macro-economy, agriculture, industrialization, trade, foreign capital flow, financial policy, exchange rate policy, etc.) ***and structural change but, also on improving the potentials for the mass of the population.***
- For example, through health and education and workplace conditions, whether through public or private channels.

Engineering/Construction Economics

- Construction plays an important role to the economy. It produces and ***maintains the built environment***. These built structures are needed for other goods/services production.
- Construction economics is ***concerned with the allocation of scarce resources and the effectiveness of construction and production***.
- Many of the world's resources are finite, however, people have infinite wants. We are, therefore, faced with a two-pronged problem.
- ***At any point in time there is a fixed stock of resources, set against many wants.***
- To resolve this problem, we must make ***careful choices in terms of construction, choices of investments, method of construction***.
- Therefore, ***economics is 'the science of choice'.***

Construction Economics cont'd…

- *For every want that is satisfied, some other wants remain unsatisfied.*
- *Choosing one thing requires giving-up something else. As a result, an opportunity has been missed or forgone.*
- ***Thus, Opportunity cost is the value of the alternative forgone by choosing a particular activity.***
- *Therefore,* ***whenever an economic decision is made there is a trade-off between the uses of one resource for one or more alternative uses****.*

What is Economic Growth & Development?

A country's economic condition can usually be measured the country's economic growth and development.

Economic Growth:

- Economic growth is an increase in a country's per capita output.
- A country's economic growth is usually indicated by **increase in the country's GDP**.

Economic Development:

- Economic development is ***an improvement in the economic welfare of the population*** (increase in the standard of living and life expectancy).
- Economic development ***encourages entrepreneurship and supports emerging industries.***
- This can be accomplished through the ***use of private and public resources and investments.***

Distinction between economic growth & development

- *Economic growth takes place when there is a sustained increase in a country's output* (as measured by GDP or GNP) or in the per capita output (GDP or GNP person).
- ***Economic development – occurs when the standard of living of a large majority of the population rises,*** including both income and other dimensions like health and literacy.
- For example, *in a hypothetical nation where the majority of people are nomadic and rely on traditional agriculture. If a foreign firm exploits a discovery of oil in this nation and there is no accompanying increase in schooling, literacy, health etc.* ***then growth may occur but not development.***

What is sustainable development?

- Sustainable development is ***development that meets the needs of the present without compromising the ability of future*** generations to meet their own needs.
- In other words, we have to live our lives using water, electricity, and oil, in such a way that our children and all the generations coming in the future will also have the same chance of living.
- ***Objectives of development:***
  - ***Life sustaining goods and services:*** *increase the availability of food, shelter, health and protection*
  - ***Higher incomes:*** *raise levels of living, provision of more jobs, better education, and greater attention to human values,*
  - ***Freedom to make economic and social choices:*** *expand the range of economic and social choices available to individuals and nations*

Time Value of Money
(Change in the value of money with time)

- In most decisions the change in the value of money needs to be accounted
- The manifestation of time value of money is called interest.
- Interest ; Money paid by Borrower for the use of funds provided by the lender
- Therefore time value of money is the relationship between time and money.

Interest and Interest Rate

- Interest – the manifestation of the time value of money
  - Fee that one pays to use someone else's money
  - Difference between an ending amount of money and a beginning amount of money
  - Interest = amount owed now – principal
- Interest rate – Interest paid over a time period expressed as a percentage of principal

$$\text{Interest rate}\,(\%) = \frac{\text{interest accrued per time unit}}{\text{principal}} \times 100\%$$

- It is clearly explained in quote;

"A bird in hand is more than two in bush"

* the reason for the time value of money is inflation, risk and cost of money.
* Interest could be simple or compound

- Simple; The interest doesn't attract any interest during the repayment period
- Compound; The interest amount it self also attracts further interest.

Consider the following statement by a Bank

"Interest on the deposit will be payable at the rate of eight percent compound quarterly"

A year for Quarterly compounding of interest:-

Four periods (3 months of each)

- If the amount was 100 Birr

1^{st} period = 100 + (100*8%/4)
= 102

2^{nd} Period = 102 + (102*8%/4)
= 104.04

3^{rd} Period = 104.04 + (104.04*8%/4)
=106.12

4^{th} Period = 106.12 + (106.12*8%/4)
= 108.24

- From the Example it is clear that Birr 8.24 can be seen as the interest amount attracted by 100 Birr in one year period under a given rate (8%) and condition of quarterly compounding.

NOMINAL & EFFECTIVE RATES

- Nominal and Effective Interest rates are common in business, finance, and engineering economy
- ***Nominal*** **Interest Rate, i (inom)**
- A Nominal Interest Rate, *i*, is an interest Rate that does not include any consideration of compounding
- i = (interest rate per period)(No. of Periods)

The Effective Interest Rate /i_{effe}

It is a rate that applies for a stated period of time

It is conventional to use the year as the time standard

So, the EIR is often referred to as the Effective Annual Interest Rate (EAIR)

- $i_{effe} = (1 + i/m)^m - 1$
- where:
- m = number of compounding periods per year
- i = nominal interest rate per year
- i_{effe} = effective interest rate per year

From the above example Calculate i_{eff} for the given i_{nom}

Quarterly 5% & 10% - inom , answer 5.09 and 10.38 Respectively

Monthly 5% & 10% - inom ,answer 5.12 and 10.47 Respectively

Eg.

inom	M period	ieffe
5	2	5.06
10	4	10.38
15	6	15.97
20	12	21.94
5	12	5.12
10	6	10.43
15	4	15.87
20	2	21.00

Please Check All

E.g. An engineer deposits $1,000 in a savings account at the end of each year. If the bank pays interest at the rate of 6% per year, compounded quarterly, how much money will have accumulated in the account after 5 years?

$$i_{effe} = (1 + i/m)^m - 1 = (1 + 0.06/4)^4 - 1$$
$$= 0.06136 = (6.136\%)$$

F = *$1,000 (F/A,6.136%,5)* ????

Using formula: F = $5,652 ????

Interest Formulas

Simple Interest

The interest payment each year is found by multiply the interest rate I by the principal, P

$I = Pi$. After any n time periods,

The accumulated value of money owed under *simple interest*, F_n, would be:

$F_1=$	$P + Pi$
$F_1=$	$P(1+i)$

F_1= Total accumulated after one year

$$F_n = P(1 + ni)$$

For n years

Compound Interest

The interest payment each year, or each period, is found by multiplying the interest rate i by the accumulated value of money, both principal and interest.

For an amount *P* invested of *n* periods at *i* rate of interest compound interest calculations would be:

$\mathbf{F_2}=$	$\mathbf{F_1 + F_1 i}$
$\mathbf{F_2}=$	$P(1+i) + P(1+i)i$
$\mathbf{F_2}=$	$P(1+i+i+i^2)$
$\mathbf{F_2}=$	$P(1+2i+i^2)$
$\mathbf{F_2}=$	$P(1+i)^2$

$$F_n = P(1 + i)^n$$

Thank you ☺

Any Questions?