Economics
Sources of economic growth and its preconditions

- Economic Growth: Percent change in real gross domestic product (GDP)
- Economic growth depends on how much output can be produced using inputs, known as factor of productions.
  - Factors of productions are Land, Labour (human capital), capital good (financial capital, manufactured goods), entrepreneurial activity
  - Economic growth is directly proportional to factors of production
    - Good and apt incentive system is important to achieve economic growth.
    - Markets, Property rights and monetary exchange are important social institutions for progress of incentives
    - Markets facilitates exchange of information and goods through the signals it sends through price. Buyers and suppliers adjust their demand and supply looking at the price signals.
    - Property rights are laws and regulations (for physical and intellectual property) for one to claim his/her ownership over his/her owned asset.
    - Monetary exchange facilitates the exchange of goods and services.

Imagine living in a barter economy !!
Rule of 70

• Not formal rule but rule of thumb
• Tell us the approximate number of years for anything to double for given annual growth rate in percentage

\[
Years\ to\ double\ (approx) = \frac{70}{Growth\ Rate(\%)}
\]

• We will be interested in finding number of years for an economy (GDP) to double; given its growth rate.
• Nominal GDP of a country is 8% and it takes 35 years for real GDP to double. What is the inflation rate of this country?
One third rule

- Labor productivity = Real GDP / Labor Hours

- Two components of labor productivity
  - Growth in physical capital (K) per labor hour (l) i.e. \( \frac{\Delta K}{\Delta l} \)
  - Technological change or progress. It strongly depends on advancement of knowledge and growth in human capital.

- Productivity Curve plots labor productivity (on y axis) against capital per labor hours (on x axis) for a given level of technology.
  - It shows the effect of capital per labor hour on real GDP per labor hours.
Key point about labor productivity curve

- Real GDP per labor hour increases when capital per labor hour increases (for a given technology) which is represented by movement along the curve.
- Increase in real GDP per labor hour gets smaller as more capital per labor hour is added at a given technological level. This is also known as Law of diminishing returns.
- Shift in the curve comes from the technological growth. Curve shifts upwards for technological advancements and shifts downwards if there is technological dis-advancement or set back.
- See figure on next slide
One third rule

Labor Productivity
(real GDP per labor hour)

LP₂
LP₁
LP₀

More Technology

Effect of change in Technology

Less Technology

Effect of increase in Capital

Productivity Curve

Capital per labor hour

C₀
C₁
One third rule

- Productivity growth rate is not constant and always positive.
- “One Third rule”: A 1% increase in capital per labor hour results in a one third of 1% increase in real GDP per labor hour, on average.
- Rule can be used to divide a change in productivity growth in two components viz.
  - Change attributable to a capital per labor hour
  - Change attributable to technological change
- If capital per labor hour grows by \( x\% \) and real GDP per labor hour (labor productivity) grows by \( y\% \) then
  - \( x/3 \% \) increase in labor productivity is contributed by capital
  - \( (y - x/3)\% \) increase in labor productivity is contributed by technological gains or advancements
- A country’s real GDP per labor grew by 10% in 3 years and capital per labor grew by 6%. How much growth in real GDP per labor can be attributed to increase in capital and technological change.
Achieving faster economic growth

• Determinants of achieving faster economic growth
  – Proper and good incentives
  – People specializing in economic activities in which they have comparative advantage
  – Savings and investments in new capital: It increases labor productivity by increasing level of capital per worker
  – Investment in human capital will enhance and bolster technological advancements
  – Discovery of new technologies, Research and Developments
Growth theories

- Growth theories throw light on influence of factors of productions on economic growth and relationship between factors contributing to economic growth.
- Three popular growth theories
  - Classical Growth theory
  - Neo Classical Growth theory
  - New Growth theories
Growth theories: Classical growth theory

- Classical growth theory
  - Growth in GDP is not permanent
  - Population increases when real GDP per person rises above some level, known as subsistence level, which drives GDP per person to subsistence level.
  - Technological advancements → investment in capital → increasing labor productivity → increases real wages and employment → population explosion → real GDP back to its original level
  - Real wages will be driven back to its subsistence level irrespective of technological advances
  - No permanent productivity growth or improvement in standard of living
    - Subsistence real wage: minimum necessary wage to support life
  - See figure on next slide
Growth theories: Classical growth theory

Classical Growth Theory

Labor Productivity (real GDP per labor hour)

LP₂

LP₁

LP₀

Effect of Population Growth

More Technology

Effect of change in Technology

Less Technology

Subsistence Level

C₀

C₁

Capital per labor hour

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Growth theories: Neo Classical growth theory

- **Neo classical Growth theory**
  - Long term growth in real GDP will not occur without technological advancements
  - Economic growth is directly proportional to technological advancements
  - Technological advancements doesn’t depend on economic growth
  - Technological advancements depends positively on R&D
  - Technological advances $\rightarrow$ increase in saving and investments $\rightarrow$ increase in capital per labor hour
  - Unlike classical theory, economic growth doesn’t effect population growth

- **Assumption**
  - People make their saving decisions on a benchmark known as target rate of return.
  - Target rate of return is slope of line tangent to productivity curve
  - Real interest rate at any point of productivity curve is the slope of tangent at that point
  - Economy in equilibrium will have
    - Target rate of return = real interest rate
  - If real interest rates > target rate of return, then people save more $\rightarrow$ increase in growth of capital per labor hour
  - It happens unless;
    - Target rate of return = real interest rates
  - At that point, economy return to equilibrium
Growth theories: Neo Classical growth theory

- Technological advancements shift productivity curve upwards
- Economy move from point A to point B
- At point B, real interest rates > target rate of return
- It results in increase in capital per labor hour
- After a point, diminishing returns will operate on capital which will result in lowering of real interest rate.
- This happens until economy move from point B to point C
- At point C, target rate of return = real interest rate
- Therefore economy is in equilibrium at point C
Neoclassical Growth Theory

Real Productivity (real GDP per labor hour)

Slope = Target rate of return

More Technology

Less Technology

Effect of change in Technology

Capital per labor hour
Growth theories: New Growth theory

• New Growth Theory
  – Based on following
    • Discoveries lead to profit
    • Competition eliminates profit
    • Choices are the result of choices and luck

• Assumptions
  – Discoveries are public capital goods
  – Knowledge capital doesn’t follow law of diminishing returns (Important assumption)
  – Knowledge capital is a public good

• Public goods: Usage by one person doesn’t restrict other person to use. Example, garden, river
• Increasing Knowledge capital increases productivity of capital and labor
• No mechanism to stop economic growth
Growth Theories: New Growth theory

- Discoveries are based on incentives
- Discoveries reduce cost of production thereby leading to increase in profit
- Discoveries also result in better products sold at higher prices; again generating more profits
- As knowledge capital and discoveries are public good; more firms will enter the market
- It increases the competition which reduces profit per firm
- Reduced profits incentivize firms to look for new technology and discoveries
  - Discoveries $\rightarrow$ Increased profits $\rightarrow$ increase in competition $\rightarrow$ lower profits $\rightarrow$ More Discoveries
- Unlike New Growth theory, there is no link between lower profits and incentives for discoveries in Neo Classical Growth theory
- See figure on next slide
New Growth theory

- Labor Productivity
- Capital per Labor Hour
- Highest Technology
- Higher Technology
- Initial Technology
- Target Rate of Return
• An analyst suggests that no matter what happens, there will be no growth in real GDP. Another suggests to invest in technology to achieve growth in real GDP. From which growth theories are both analysts borrowing their arguments.