ECONOMIC GROWTH AND DEVELOPMENT

MASTER OF BUSINESS ADMINISTRATION (MBA)

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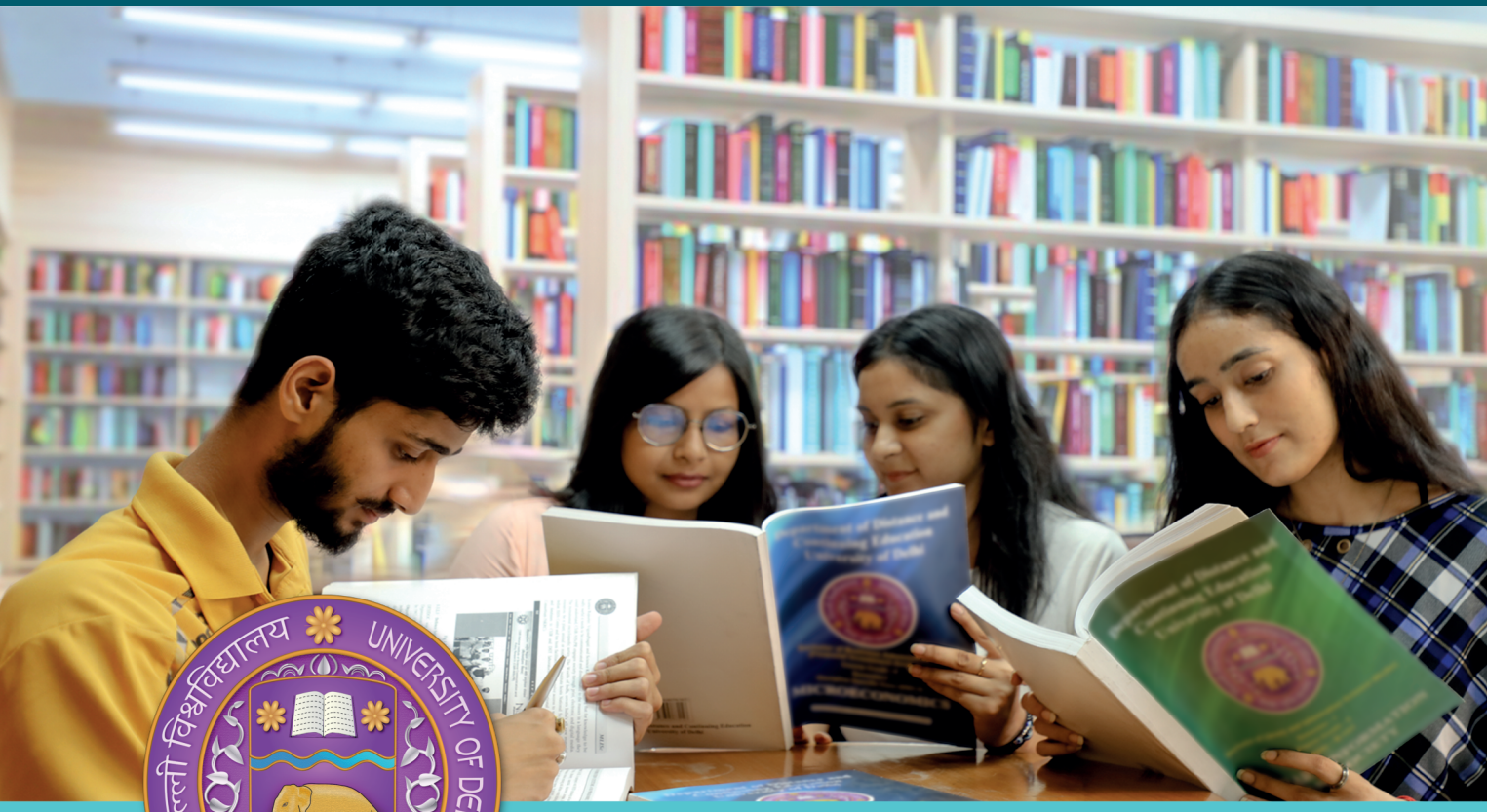

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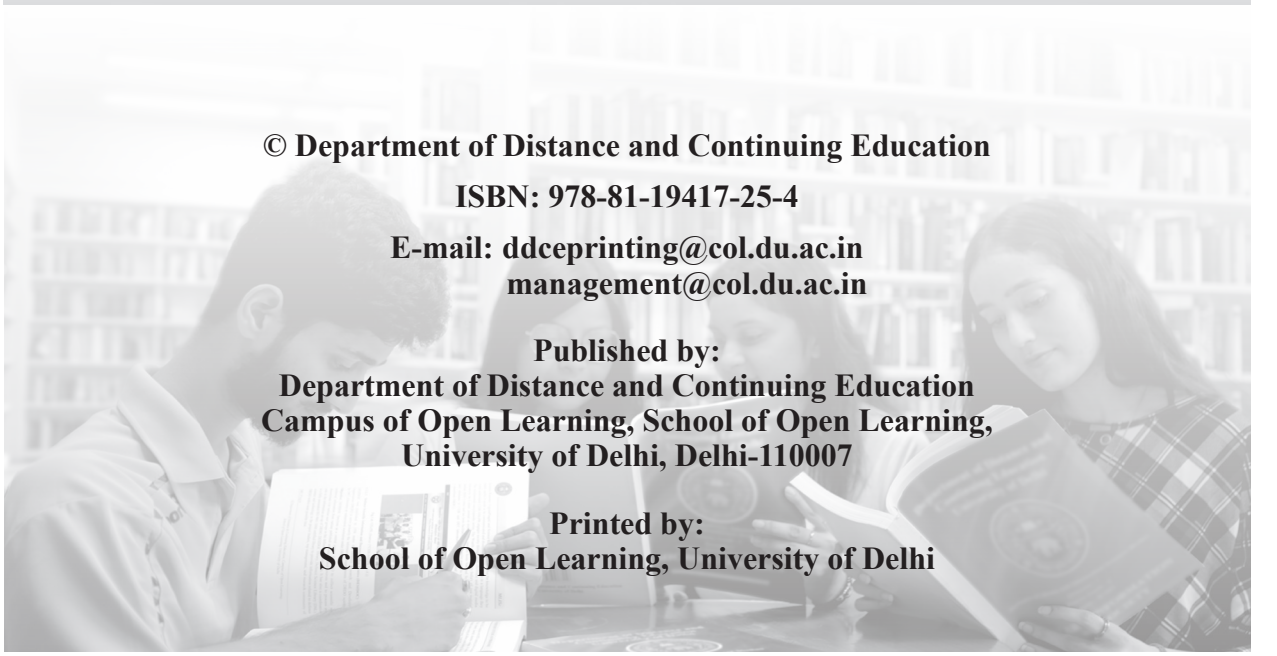

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Contents

PAGE

PAGE

LESSON

1

Introduction: A Global Perspective

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STRUCTURE

1.1 Learning Objectives

- To explore the benefits and challenges of economic growth and it's key indicators.
- To differentiate between economic growth and development.
- To analyse and compare the economic growth trends of different countries, highlighting the latest patterns and factors driving growth.
- To examine stylized facts of economic growth.
- To explore the economic growth theories.

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1.2 Introduction

Economic growth is a vital component of any nation's progress and development. Economic growth denotes the continual expansion of a nation's ability to produce goods and services, resulting in increased output, greater job prospects, and enhanced quality of life. Economic growth generates numerous benefits for individuals, communities, and nations as a whole. Firstly, it leads to higher employment rates, reduces poverty, and enhances social well-being. As the economy expands, businesses create more job opportunities, reducing unemployment and providing individuals with stable incomes and improved livelihoods. Economic growth also increases government revenue through taxation, enabling public investment in areas such as healthcare, education, and infrastructure, which further contribute to societal well-being. Additionally, economic growth fosters technological advancements and innovation, leading to higher productivity levels and increased competitiveness in global markets. This, in turn, enhances export potential, foreign exchange earnings, and economic resilience.

While economic growth brings numerous benefits, it is not without challenges and risks. One of the primary concerns is income inequality, as growth does not always translate into equitable distribution of wealth. If left unaddressed, this disparity can lead to social unrest and hinder long-term sustainability. Environmental degradation is another pressing issue associated with growth. Rapid industrialization and increased consumption patterns can strain natural resources, exacerbate pollution levels, and contribute to climate change. Consequently, sustainable development practices must be adopted to mitigate these risks and ensure a healthy balance between economic growth and environmental conservation.

Several factors contribute to economic growth, including technological advancements, infrastructure development, human capital formation, and effective institutions. Technological innovations have been instrumental in driving growth by increasing productivity, fostering efficiency, and enabling the creation of new industries. The allocation of resources towards developing infrastructure, such as transportation networks, energy systems, and digital connectivity, enables the efficient flow of goods, services, and information, thus nurturing economic engagement. Human capital, encompassing a skilled and educated workforce, is essential for innovation,

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entrepreneurship, and overall economic productivity. Lastly, effective institutions, including sound governance, rule of law, and protection of property rights, create an enabling environment for businesses to flourish and attract investments.

Governments play a crucial role in fostering sustainable economic growth. They can implement policies that promote investment, innovation, and entrepreneurship. This includes creating a conducive business environment through regulatory reforms, reducing bureaucratic hurdles, and ensuring fair competition. Governments can also invest in human capital development by prioritizing education and vocational training programs to equip individuals with the necessary skills for a dynamic labour market. Furthermore, governments must prioritize infrastructure development, including transportation, energy, and digital connectivity, as they are essential drivers of economic growth. Policymakers also have a responsibility to address income inequality through progressive taxation, social safety nets, and inclusive policies that promote equal opportunities for all segments of society. Finally, environmental sustainability should be a priority, with governments encouraging green technologies, implementing regulations to curb pollution, and promoting renewable energy sources.

By fostering an environment conducive to innovation, investment, and human capital development, governments can play a pivotal role in driving sustainable economic growth. However, policymakers must also address the challenges associated with growth, including income inequality and environmental degradation, through inclusive and environmentally conscious policies. By doing so, nations can harness the transformative power of economic growth while ensuring long-term prosperity for their citizens and the planet as a whole.

Indicators of Economic Growth:

(*i*) Gross Domestic Product (GDP): Gross Domestic Product (GDP) is a widely utilized metric for gauging economic expansion. It measures the total value of all goods and services produced nation's boundaries during a given timeframe. It encompasses consumer spending, government expenditure, investment, and net exports (exports minus imports) and is often expressed in monetary terms, such as the country's national currency. A higher GDP signifies heightened economic engagement and is frequently employed for

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cross-country growth comparisons or to monitor an economy's progress over a duration.

(*ii*) **Gross National Product (GNP):** Gross National Product (GNP) is the total market value of all final goods and services produced by a country's residents, regardless of their location, during a specific period. GNP includes both domestic productions (as captured by GDP) and net income from abroad, such as wages, profits, and dividends earned by the country's citizens abroad minus similar payments made to foreign residents within the country. GNP considers the ownership of production, focusing on the earnings of a country's citizens regardless of their location.

(*iii*) **GDP per Capita:** GDP per capita divides the total GDP of a country by its population, providing a measure of average income or output per person. It is an important indicator of the standard of living and can reflect changes in productivity, wages, and overall economic well-being. Comparing GDP per capita across countries allows for international comparisons of living standards.

(*iv*) **Inflation and Price Stability:** Inflation measures the rate of price escalation for goods and services over time. Low and stable inflation is generally associated with a healthy and stable economy, promoting consumer purchasing power and business planning. Monitoring inflation rates helps assess the impact of monetary and fiscal policies on the overall economic environment.

(*v*) **Productivity:** Productivity measures the efficiency of resource utilization in producing goods and services. Higher productivity is associated with increased output and economic growth. Indicators such as labour productivity (output per worker) and total factor productivity (output per unit of combined inputs, including labour and capital) are used to assess the efficiency of production processes and technological advancements.

(*vi*) **Investment Levels:** Investment, both domestic and foreign, is a key driver of economic growth. Monitoring investment levels, predominantly in areas such as infrastructure, machinery, and research and development, indicates the level of business confidence and potential for future growth.

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(*vii*) **Employment and Unemployment:** Employment and unemployment rates provide insights into the labour market dynamics and the utilization of a country's workforce. A declining unemployment rate and increasing employment levels suggest a growing economy and improved job opportunities, indicating positive economic growth.

(*viii*) **Consumer and Business Confidence:** Consumer and business confidence surveys provide insights into the sentiments and expectations of households and firms regarding the economy's prospects. High levels of consumer confidence indicate positive sentiment, leading to increased consumption and economic growth. Similarly, strong business confidence encourages investment and expansion, contributing to overall economic growth.

(*ix*) **Trade and Export Levels:** International trade and export performance are essential indicators of economic growth, particularly for countries heavily reliant on trade. Monitoring changes in trade volumes, export values, and trade balances can provide insights into a country's competitiveness, global market integration, and export-led growth.

(*x*) **Income Distribution:** While not directly measuring economic growth, income distribution provides insights into the inclusiveness and equity of economic development. Monitoring indicators such as the Gini coefficient or income shares of different income groups can reveal how the benefits of economic growth are distributed among the population.

(*xi*) **Social Indicators:** Social indicators, such as poverty rates, access to education and healthcare, and quality of life measures, provide a broader perspective on the impact of economic growth on societal well-being. While economic growth is crucial, these indicators help assess the extent to which growth translates into improved living standards for all segments of society.

It is to be noted that these indicators must be analysed collectively and in conjunction with other economic, social, and environmental factors to gain a comprehensive understanding of economic growth and its implications.

1.3 Economic Growth v. Economic Development

Economic growth and economic development are related concepts but have distinct meanings and implications. Understanding the differences

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between the two is crucial for comprehending the multifaceted nature of economic progress.

Definition: Economic growth refers to the increase in an economy's production of goods and services over time. It is typically measured by indicators such as Gross Domestic Product (GDP) or GDP per capita. Economic growth focuses on the quantitative expansion of economic activities and the rise in output levels. On the other hand, economic development encompasses a broader set of factors and objectives. It pertains to the endeavour of enhancing the welfare and standard of living for individuals within a society. Economic development encompasses not only economic growth but also social, political, and environmental dimensions. It aims to achieve sustainable improvements in living standards, eradicate poverty, reduce inequality, and enhance human capabilities.

Scope: Economic growth primarily focuses on the expansion of the economy's productive capacity and the increase in output levels. It emphasizes the quantitative aspect of economic progress, such as higher GDP, increased investments, and improved productivity. Economic development, however, takes into account a broader range of factors beyond mere economic indicators. It encompasses social factors like education, healthcare, access to basic services, and social welfare. It also considers political factors such as governance, institutions, and stability. Furthermore, environmental sustainability and the preservation of natural resources are integral components of economic development.

Measures: Economic growth is typically measured using indicators such as GDP, GDP per capita, employment rates, and productivity levels. These measures provide insights into the expansion of economic activities and output levels. While economic growth is important for generating resources and improving material well-being, it does not necessarily capture the overall progress and well-being of society. In contrast, economic development is assessed through a broader set of measures that include social and environmental indicators. These measures may encompass factors such as literacy rates, life expectancy, poverty levels, income distribution, access to healthcare and education, environmental sustainability, and quality of life. Economic development takes into account the multidimensional nature of progress and the quality of life for individuals within a society.

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Time Horizon: Economic growth typically focuses on short to medium-term changes in output levels and economic performance. It assesses the expansion of economic activities and the increase in production over relatively shorter time frames. In contrast, economic development takes a long-term perspective, emphasizing sustained improvements in living standards and well-being. It recognizes that progress encompasses not only immediate economic gains but also the equitable and sustainable development of society over the long run.

Policy Implications: Economic growth-oriented policies typically aim to stimulate investment, boost productivity, and foster innovation. Governments often implement measures such as deregulation, infrastructural development, and pro-business policies to encourage economic growth. Economic development policies, on the other hand, focus on achieving broader societal goals and addressing inequalities. They encompass a range of interventions that target social welfare, human capital development, poverty alleviation, healthcare, education, environmental conservation, and sustainable resource management.

1.4 Comparing Economies

In today's interconnected world, comparing economies and their economic growth is crucial for understanding the dynamics of global development. By examining various indicators such as GDP growth rates, technological advancements, trade dynamics, and policy frameworks, we can gain insights into the diverse paths taken by economies and their implications for global economic development.

Comparative Analysis of Economies:

United States: For a considerable time, the United States has stood as one of the global frontrunners in terms of its economy, distinguished by its technological advancements, innovative capacity, and robust institutions. In recent years, the US has experienced steady economic growth, driven by factors such as consumer spending, business investment, and a resilient labour market. The country's focus on research and development, particularly in the fields of technology, healthcare, and renewable energy, has contributed to its economic success. The economy of the United States holds the top position globally with a nominal GDP of $23.00 trillion in

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current U.S. dollars. The service sector, comprising finance, real estate, insurance, professional and business services, and healthcare, contributes significantly to the country's GDP. The United States maintains an open economy, encouraging flexible business investment and foreign direct investment. As the world's dominant geopolitical power and the issuer of the primary reserve currency, the country is able to sustain a substantial external national debt. The U.S. economy stands at the forefront of technological advancements across various industries. However, it faces challenges such as economic inequality, escalating costs in healthcare and social safety nets, and a deteriorating infrastructure.

China: China's rapid economic growth over the past few decades has been unprecedented. Its transformation from a predominantly agrarian society to a global economic powerhouse has been driven by export-oriented manufacturing, infrastructure investments, and a burgeoning middle class. However, China's growth trajectory has faced challenges, including debt accumulation, environmental concerns, and trade tensions with other nations. China possesses the second-largest nominal GDP worldwide, surpassing all countries except the United States. Furthermore, it holds the highest GDP in terms of purchasing power parity (PPP). China's economy has consistently exhibited annual growth rate of 5.2% and GDP of USD 19,373.59 billion in 2023 outpacing that of the United States. As a result, it is projected that China may eventually surpass the United States as the world's largest economy based on nominal GDP. Over the past forty years, China has embarked on a gradual process of liberalizing its economy, resulting in noteworthy strides in economic progress and living standards. Through the government's phased dismantling of collectivized agriculture and industry, coupled with greater market price flexibility and increased business autonomy, substantial growth has been stimulated in domestic and foreign trade as well as investment. China's emphasis on domestic manufacturing, supported by an industrial policy that encourages it, has propelled the nation to become the leading global exporter. Despite these notable advantages, China confronts several noteworthy challenges, including a rapidly aging population and severe environmental degradation.

India: India is another emerging economy with significant growth potential. With a large population and a growing middle class, India has been focusing on economic reforms, infrastructure development, and

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attracting foreign investments. It has also witnessed advancements in information technology, digitalization, and renewable energy. According to IMF's report World Economic Outlook (2023), India holds the position of being the world's fifth-largest economy with GDP of USD 3736.882 billion, GDP per capita of $2600 and annual GDP growth rate of 5.9%. However, due to its vast population, India has the lowest per capita GDP among the countries listed. India's economy showcases a unique blend of traditional village farming and handicrafts, coexisting with a thriving modern industry and mechanized agriculture. The nation stands as a significant exporter of technology services and business outsourcing, with the service sector contributing substantially to its economic output. The liberalization efforts undertaken in India's economy since the 1990s have had a positive impact on economic growth. Nevertheless, the country faces challenges in the form of rigid business regulations, prevalent corruption, and persistent poverty, which pose obstacles to continued expansion. India faces challenges such as income inequality, bureaucratic hurdles, and limited access to quality education and healthcare.

European Union: The European Union (EU) represents a diverse group of economies with varying growth patterns. Countries like Germany and France have traditionally been economic powerhouses, characterized by robust manufacturing sectors and high levels of innovation. However, the EU has faced challenges in recent years, including slow economic growth, political uncertainties, and the impact of Brexit. Efforts are underway to stimulate growth through investment in digitalization, green technologies, and a focus on sustainable development.

Germany is the largest economy in Europe, has a GDP of USD 4309 billion according to World Economic Outlook (2023). The country experienced annual GDP growth rate of -0.1% in the same year, with a nominal GDP per capita of $51,380. Germany is renowned for its expertise in exporting vehicles, machinery, chemicals, and other manufactured goods, thanks to its highly skilled workforce. However, Germany faces demographic challenges that pose risks to its economic growth. The nation's low fertility rate makes it difficult to replace its aging workforce, and the high levels of net immigration put a strain on its social welfare system.

Regarding France, it has the seventh-largest GDP in the world, amounting to $2.94 trillion in nominal terms and $3.42 trillion in PPP-adjusted

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figures. In 2021, France experienced a GDP growth rate of 7.0%, and its nominal GDP per capita stood at $43,518 and in 2023 the GDP was USD 2924 billion with annual GDP growth rate at 0.7%. The country's tourism industry is of significant importance, attracting the highest number of visitors globally. France operates as a mixed economy, with a diverse range of industries that include private and semi-private businesses. However, the government maintains a notable presence in key sectors such as defence and electrical power generation. The French government's commitment to economic intervention for the sake of social equality presents challenges such as a rigid labour market with high unemployment and a substantial public debt compared to other advanced economies.

As for Italy, it possesses the eighth-largest GDP in the world, totalling $2.10 trillion in nominal terms and $2.71 trillion in PPP-adjusted values. Italy experienced a GDP growth rate of 6.6% in 2021, with a nominal GDP per capita of $35,551. The country's economic development varies significantly across regions, with the northern regions exhibiting a more developed and industrialized economy compared to the underdeveloped southern regions. Italy faces persistent challenges of sluggish economic growth due to factors such as high public debt, an inefficient court system, a weak banking sector, an inefficient labour market with high youth unemployment, and a substantial underground economy.

Sub-Saharan Africa: Several countries in Sub-Saharan Africa have experienced significant economic growth, albeit from a relatively low base. Factors such as urbanization, natural resource exploitation, and improvements in governance have contributed to growth in countries like Ghana, Rwanda, and Kenya. However, challenges such as political instability, inadequate infrastructure, and limited access to finance and technology hinder sustainable growth across the region.

Key Factors Driving Economic Growth:

(*i*) Technological Advancements: Technological innovations, particularly in the fields of digitalization, artificial intelligence, and renewable energy, have been pivotal in driving economic growth. Countries that prioritize research and development, invest in innovation, and foster entrepreneurship are more likely to experience sustained growth.

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(*ii*) **Trade and Globalization:** Openness to international trade and participation in global supply chains have provided countries with opportunities for economic growth. Access to global markets, export diversification, and favourable trade policies play a crucial role in driving growth and attracting foreign direct investment.

(*iii*) **Human Capital Development:** The development of a skilled and educated workforce is vital for economic growth. Countries that invest in quality education, vocational training, and healthcare systems are better positioned to foster innovation, entrepreneurship, and overall productivity.

(*iv*) **Infrastructure Development:** Adequate infrastructure, including transportation networks, energy systems, and digital connectivity, is essential for facilitating economic activity, attracting investments, and connecting regions.

Comparing economies and their economic growth allows us to identify trends, challenges, and success factors that shape global development. While some countries have established themselves as economic power houses, others are experiencing rapid growth and emergence.

IN-TEXT QUESTIONS

1. Indicator of Economic Growth is _____.

(*a*) Access to Healthcare

(*b*) GNP

(*c*) Literacy rates

(*d*) All of these

2. GDP per capita provides a measure of average income or output per _____.

(*a*) Area

(*b*) Household

(*c*) Person

(*d*) Business

3. Why is low and stable inflation important for an economy?

(*a*) It signifies heightened economic engagement

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(*b*) It promotes consumer purchasing power and business planning

(*c*) It measures the total value of all goods and services produced

4. What is the difference between GDP and GNP?

(*a*) GDP considers domestic productions, while GNP includes net income from abroad

(*b*) GDP focuses on earnings of a country's citizens, while GNP measures the total value of goods and services produced

(*c*) GDP reflects the rate of price escalation, while GNP assesses economic expansion

1.5 Stylized Facts in Economic Growth: Understanding Key Patterns

Stylized facts are general empirical regularities or patterns that emerge from the analysis of economic data. They provide valuable insights into the dynamics of economic growth, allowing economists to identify common trends and understand the driving forces behind long-term economic development. This essay aims to explore some of the prominent stylized facts in economic growth, shedding light on key patterns observed across different economies and time periods.

Kaldor's six statements about economic growth were proposed by Nicholas Kaldor in his 1961 article. He referred to them as a "stylized view of the facts," a term that subsequently coined the concept of stylized facts. Kaldor did not assert that these quantities remain constant at all times. Growth rates and income shares display significant fluctuations over the business cycle. Rather, he argued that these quantities tend to exhibit stability when the data is averaged over long periods. Initially based on data from the United States and the United Kingdom, these broad generalizations, known as stylized facts, have been found to hold for many other countries as well. Here are the six key stylized facts proposed by Kaldor:

(*i*) Long Term Growth of Total Output at a Constant Rate: One of the central stylized facts in economic growth is the existence of

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long-term upward trends in output and living standards. Despite short-term fluctuations, economies tend to experience sustained growth over extended periods. This phenomenon can be attributed to various factors, including technological progress, capital accumulation, human capital development, and institutional improvements. Economies tend to experience a consistent and positive growth rate of total output over extended periods. This implies that the overall value of goods and services produced in an economy steadily increases over time.

(*ii*) **Stability of the Capital-to-Output Ratio:** The ratio of capital stock (e.g., machinery, buildings) to output remains relatively constant in the long term. This suggests that as the economy expands, the amount of capital per unit of output remains stable. Diminishing returns is a stylized fact that highlights the relationship between inputs and outputs in the production process. As an economy grows, the marginal productivity of additional inputs (such as labour or capital) tends to decrease. This implies that sustaining high rates of economic growth becomes more challenging over time, requiring continuous innovation, efficiency improvements, and structural transformations.

(*iii*) **The Constancy of the Labour Income Share:** The portion of national income allocated to labour remains relatively steady over time, irrespective of changes in the distribution of income between labour and capital. As the economy grows, the proportion of total income going to workers remains relatively stable.

(*iv*) **Growth Rate of Labour Productivity:** Productivity growth is a crucial driver of long-term economic growth. Stylized facts reveal that improvements in productivity, measured as output per unit of input, play a significant role in boosting economic performance. Labour productivity, which measures the output produced per unit of labour input, tends to exhibit long-term growth. This means that workers become increasingly productive over time, resulting in higher output per worker. Technological advancements, innovation, research and development, and investments in human capital are key factors that contribute to productivity growth.

(*v*) **Variability of the Profit Share:** The share of national income going to profits (returns to capital) varies over the business cycle.

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During economic expansions, the profit share tends to rise, while it declines during downturns. However, in the long run, the profit share reverts to its average level. Financial development is closely linked to economic growth. It revealed a positive correlation between financial sector development (including access to credit, efficient capital markets, and robust banking systems) and economic growth. Well-functioning financial systems facilitate capital allocation, promote investments, and support entrepreneurial activities, thereby stimulating economic expansion.

(*vi*) **Significance of Manufacturing in Economic Growth:** Kaldor emphasized the pivotal role of the manufacturing sector in driving economic growth. He argued that manufacturing industries, characterized by economies of scale and technological progress, play a crucial role in generating productivity gains and fostering overall economic development. Such a factor suggests that economic growth requires structural transformation. Structural transformation refers to the shift of resources from low-productivity sectors (such as agriculture) to high-productivity sectors (such as manufacturing and services). Stylized facts demonstrate that successful economies experience structural transformation as they progress, with the share of agriculture in GDP declining and the share of manufacturing and services increasing. This transformation is often associated with increased productivity, technological advancements, and higher living standards.

These stylized facts provide a broad framework for comprehending the dynamics of economic growth. While they do not encompass all aspects of growth, they have influenced economic theories and policies aimed at promoting sustainable and balanced economic development.

Another important stylized fact is the concept of catch-up growth, which refers to the tendency of poorer countries to grow at faster rates compared to richer countries. This phenomenon suggests that countries with lower initial levels of income have the potential to experience higher growth rates as they adopt and adapt existing technologies, implement reforms, and benefit from knowledge spill overs. Stylized facts indicate a complex relationship between economic growth and income inequality. While economic growth can lead to reduced poverty and increased living standards, it does not guarantee equal distribution of wealth. Evidence

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suggests that initially, income inequality may rise during the early stages of growth, but it tends to decline as economies mature and reach higher levels of development. However, the specific relationship between growth and inequality varies across countries and depends on a range of factors, including policy interventions, institutional quality, and social dynamics.

Stylized facts in economic growth provide valuable insights into the patterns, trends, and dynamics of long-term development. These empirical regularities help economists and policymakers understand the factors that drive economic growth, such as technological progress, human capital development, institutional quality, and structural transformations. By studying these stylized facts, policymakers can design strategies and policies that foster sustained and inclusive economic growth, ultimately improving living standards and well-being for individuals and societies.

1.6 Impact of Economic Growth on Businesses

Economic growth is a fundamental goal for nations worldwide, as it signifies an expanding economy, increased productivity, and improved living standards. The growth of an economy has a profound impact on businesses operating within it. This section explores the various ways in which economic growth influences businesses, highlighting both the opportunities and challenges it presents:

(*a*) Generation of Market Opportunities: Economic growth frequently gives rise to the proliferation of markets and the emergence of fresh business prospects. With the expansion of the overall economy, there is often an increase in the demand for goods and services, leading to a larger customer base for businesses. This enlarged market size can be advantageous for existing businesses as it enables them to reach a broader clientele and generate higher revenues. A thriving economy raises the standard of living, empowering consumers to make more purchases and access more services. Consequently, businesses can cater to the demand for sought-after products and services at more profitable rates, capitalizing on economic growth. Moreover, economic growth can also give rise to new industries, technologies, and consumer trends, providing entrepreneurial ventures with opportunities to innovate and meet evolving market demands.

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(*b*) **Increased Investment and Business Expansion:** A growing economy tends to attract higher levels of investment from both domestic and foreign sources. This influx of capital can enable businesses to expand their operations, invest in new technologies, and enhance their production capabilities. Economic growth often translates into improved business confidence, leading to increased investment in research and development, infrastructure, and human capital. As a result, businesses can experience enhanced productivity, efficiency gains, and increased competitiveness. A thriving economy encourages businesses to invest more in their advancement, leading to an improved economic condition and a healthy cycle of investment and growth for both the nation and businesses. Investors find such environments reassuring, which is why sudden changes in the GDP have a significant impact on stock markets. Investors may also choose to invest in a sluggish economy that is expected to grow shortly, presenting a promising investment opportunity.

(*c*) **Job Creation and Employment Opportunities:** Economic growth is closely linked to job creation and the expansion of employment opportunities. As businesses grow and demand for goods and services rises, companies often require a larger workforce to meet customer needs. New job opportunities not only reduce unemployment rates but also contribute to higher disposable incomes and increased consumer spending, fuelling further economic growth in a positive feedback loop. Moreover, businesses benefit from a larger pool of skilled workers, which can enhance their productivity and innovation capabilities.

(*d*) **Access to Financial Resources:** Economic growth generally improves access to financial resources for businesses. As the economy expands, financial institutions tend to have more capital available for lending. This increased availability of credit enable businesses to secure funding for expansion, invest in capital equipment, research, and development, and explore new markets. Furthermore, a robust and growing economy tends to attract greater investment in capital markets, providing businesses with opportunities to raise funds through initial public offerings (IPOs) or debt financing.

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(*e*) **Estimating Business Growth:** Economic growth allows companies to forecast how their industry will fare soon, enabling them to make informed decisions to capitalize on the booming economy. Businesses, regardless of size, can choose to expand their operations, increase their workforce, and invest in research and development to enhance their processes. Conversely, during a slow economy, companies may opt for prudent spending to navigate through challenging times.

(*f*) **Interest Rates:** The central bank closely monitors the nation's GDP and economy and adjusts interest rates on loans and lending accordingly. In a flourishing economy, the central bank may raise interest rates to control inflation. Conversely, in an economy experiencing stagnation, interest rates may be reduced as a means to stimulate business expansion. Companies can monitor such conditions and make informed choices to foster the growth of their enterprises.

(*g*) **Enhanced Infrastructure and Technology:** An economy experiencing robust growth allows for the allocation of resources toward enhancing infrastructure, including roads, electricity, transportation, and communication systems. Research indicates a favourable correlation between economic growth and the development of infrastructure. Consequently, businesses no longer face challenges in accessing fundamental amenities such as electricity, water, and advanced technology, enabling them to concentrate on their core operations.

(*h*) **Challenges of Rapid Growth:** While economic growth offers numerous advantages, it also presents challenges for businesses. Rapid growth periods can strain a company's resources, such as its managerial capacity, supply chains, and operational infrastructure. Businesses must effectively manage their growth to avoid issues such as overextension, quality control problems, or insufficient human resources. Additionally, in highly competitive environments, businesses may face challenges such as increased competition, price pressures, and the need to adapt to changing market dynamics.

Economic growth plays a vital role in improving the quality of life in a country and creating a favourable fiscal environment. Gross Domestic Product (GDP) is an indicator closely linked to economic growth. It serves as a measure of the overall economic activity within a country. From a business perspective, a stable financial environment and a thriving economy

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are essential factors for the establishment, growth, and expansion of businesses. The impact of economic growth on businesses is profound and multifaceted. By embracing innovation, strategic planning, and adaptability, businesses can leverage the benefits of economic growth and position themselves for long-term success. Governments, on their part, should create a supportive business environment that fosters entrepreneurship, provides access to affordable financing, and promotes a skilled workforce to maximize the positive effects of economic growth on businesses.

1.7 Economic Growth Theories

Understanding the history of economic growth theories is essential in comprehending the evolution of economic thought and the factors that contribute to the expansion of economies over time.

Classical Theories: The foundations of economic growth theories can be traced back to classical economists such as Adam Smith and David Ricardo. Smith's "Wealth of Nations" emphasized the significance of specialization, division of labour, and capital accumulation as drivers of economic growth. Ricardo's theory of comparative advantage highlighted the benefits of international trade in enhancing economic expansion.

Neoclassical Theories: The neoclassical era, which emerged in the late 19th century, focused on the role of market forces, supply and demand, and resource allocation in fostering economic growth. Prominent economists like Alfred Marshall and Leon Walras contributed to this school of thought. They emphasized the efficiency of markets, technological progress, and the importance of savings and investment in driving economic growth.

Keynesian Theories: In response to the Great Depression of the 1930s, John Maynard Keynes introduced Keynesian economics, which emphasized the role of aggregate demand in shaping economic growth. Keynes argued that government intervention, through fiscal and monetary policies, could stimulate demand and overcome periods of economic stagnation. His theories laid the groundwork for post-war economic policies and the creation of welfare states.

Endogenous Growth Theories: In the 1980s and 1990s, endogenous growth theories emerged as a new paradigm in economic thought. Pioneered by economists such as Paul Romer and Robert Lucas, these theories

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focused on internal factors that generate long-term economic growth. They emphasized the importance of technological progress, human capital accumulation, research and development, and innovation as key drivers of sustained economic expansion.

New Growth Theories: New Growth Theory, popularized by economists like Paul Romer and Robert Solow, integrated elements of both neoclassical and endogenous growth theories. It emphasized the role of knowledge, innovation, and technological advancements as critical determinants of economic growth. This theory recognized that knowledge and innovation could lead to increasing returns to scale, creating a positive feedback loop for sustained economic expansion.

Contemporary Perspectives: Modern economic growth theories incorporate a multidimensional approach, acknowledging the interplay of various factors in driving economic growth. These include institutional quality, governance, human capital development, entrepreneurship, access to finance, and technological progress. Scholars continue to refine these theories and explore new dimensions, such as sustainable growth and the role of intangible assets in the knowledge economy.

IN-TEXT QUESTIONS

5. What is meant by structural transformation in the context of economic growth?

(*a*) Shift of resources from high-productivity sectors to low-productivity sectors

(*b*) Shift of resources from manufacturing to agriculture

(*c*) Shift of resources from low-productivity sectors to high-productivity sectors

6. Which stylized fact emphasizes the importance of productivity growth in driving economic performance?

(*a*) Growth rate of labour productivity

(*b*) Variability of the profit share

(*c*) Significance of manufacturing in economic growth

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1.8 Summary

Economic growth is a fundamental aspect of national development, leading to improved living standards, job creation, and technological progress. While economic growth and economic development are related concepts, they have distinct meanings and objectives. Economic growth primarily focuses on the expansion of economic activities and output levels, whereas economic development encompasses a broader set of factors and aims to improve the overall well-being and quality of life of individuals within a society. Achieving sustainable economic development requires considering social, political, and environmental dimensions alongside economic progress. Kaldor's stylized facts of economic growth, identified by economist Nicholas Kaldor in the mid-20th century, are empirical observations that shed light on the patterns and characteristics of long-term economic development. These facts have significantly influenced our understanding of economic growth. Economic growth is essential for the business environment as it creates new market opportunities, stimulates investment and expansion, leads to job creation, and improves access to financial resources. Economic growth has a significant impact on businesses. It facilitates business growth estimation, influences interest rates, attracts investment, increases incomes, and supports infrastructure development. Businesses thrive in an environment of economic growth, benefiting both the national economy and individual enterprises. However, businesses must also navigate the challenges that come with rapid growth. The history of economic growth theories demonstrates the evolution of economic thought and the complexities involved in understanding the dynamics of economic growth. The journey through these theories highlights the importance of technological progress, human capital, innovation, market forces, and institutional factors in fostering sustained economic growth.

1.9 Answers to In-Text Questions

1. (*b*) GNP
2. (*c*) Person
3. (*b*) It promotes consumer purchasing power and business planning

4. (*a*) GDP considers domestic productions, while GNP includes net income from abroad
5. (*c*) Shift of resources from low-productivity sectors to high-productivity sectors
6. (*a*) Growth rate of labour productivity

1.10 Self-Assessment Questions

1. Economic Growth and economic development are different concepts. Explain.
2. Describe the impact of economic growth on businesses.
3. Discuss the key indicators of economic growth in brief.
4. Stylized facts analyse key patterns from economic data. State Kaldor's stylized facts.
5. Elaborate the major economic growth theories.

1.11 References

- Kaldor, Nicholas (1961). "Chapter 10: Capital Accumulation and Economic Growth". In Lutz, Friedrich; Hague, Douglas (eds.). Capital Accumulation and Economic Growth. MacMillan and Co. Ltd. pp. 177–222.
- Klenow, P. J., & Rodríguez-Clare, A. (1997). Economic growth: A review essay. Journal of Monetary Economics, 40(3), 597–617.
- Martha de Melo & Alan Gelb (1996). A Comparative Analysis of Twenty-Eight Transition Economies in Europe and Asia, Post-Soviet Geography and Economics, 37:5, 265-285.
- IMF Dataset. World Economic Outlook (April 2023). https://www.imf.org/external/datamapper/datasets/WEO

1.12 Suggested Readings

- Barro, R.J. and Sala-i-Martin, X. (2004) Economic Growth. 2nd Edition, MIT, Cambridge.

LESSON

2

Neo-Classical Model: Solow's Model

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STRUCTURE

2.1 Learning Objectives

After studying this module, you shall be able to undestand:

- The Solow growth model concept.
- The importance of the Solow's growth model.
- Identify the effects of the various factors.
- Evaluate the important features according to Solow growth model.
- Analyse the Solow growth model.

Notes

2.2 Introduction

In 1957, Robert M. Solow made a seminal contribution to the economic growth by developing the neo-classical growth model. This work, for which he was awarded the Nobel Prize in Economic Sciences in 1987, delved into the factors that affect the growth rate of economy across different nations.

Solow's model expanded upon the Harrod-Domar model by incorporating labour as a factor of production and by introducing the concept of a non-constant capital-output ratio. This refined approach provided a framework for analyzing how saving, population growth, and technological advancements impact an economy's output levels and its overall growth trajectory.

The Solow growth model not only sheds light on the mechanisms driving national income growth but also explains why certain economies exhibit faster growth rates than others. Its insights have profoundly shaped our understanding of economic development and continue to guide policy decisions aimed at fostering sustainable economic growth.

2.2.1 *Factors Contributing to Economic Growth*

Economic growth depicts to an increase in the level of aggregate output or income in an economy which is able to produce in a unit of time. A commonly used measure to compare the growth across countries during any time period or to compare the growth within a country across different time periods is the proportional growth rate of output.

2.2.1.1 *Solow's Model Assumptions*

1. The simplifying assumption of the model is that the entire output of the economy consists of a single good that can be used directly or saved as capital. No denial to the fact that many goods are produced in the economy but only for simplicity's sake, it has been assumed that one composite or aggregate good is produced.
2. All labour is assumed to be homogeneous.
3. Stock which is accumulated in the past (referred to as capital) and labour are the factors of production in the production function.

Notes

4. Constant returns to scale are assumed to prevail, *i.e.* any given percentage change in inputs brings forth equal increase in output.
5. MPS is constant; and Savings = sY, where s is MPC.
6. Labour force is increasing at a growth rate which is exogenously determined.
7. It is a closed economy.
8. Economy is a laissez faire economy *i.e.,* there is no interference of the government.

Solow's aggregate production function represents the technical connection between output (Y) and its two inputs: capital (K) and labour (L). This relationship is expressed mathematically as:

$Y(t) = F(K(t), L(t), A(t))$

Or in simple notation, rewritten as:

$$Y = F(K,L,A)....1$$

Where Y denotes the total output of goods and services within a specific timeframe and K and L denote the units of physical capital and labour utilized during that period. The parameter A, represented as the technological parameter, signifies the efficiency or productivity level of labour and capital inputs, or essentially the prevailing technology level within a specific timeframe. The production function indicates that the quantity of aggregate output attainable from a given amount of resources affected by the quantity of resources employed and also on their productivity. For instance, the productivity of a particular machine rely on the skills of the worker operating it, while the productivity of a skilled worker relies on the type of machine they operate. The functional relation 'F' can take various forms, such as the Leontief Production is represented as $F = A \min \{K,L\}$ used by Harrod and Domar or the Cobb-Douglas production function $F = AK^{\alpha}L^{1-\alpha}$, where the value of constant'α'lies between 0 and 1. The Cobb-Douglas production function, which Solow found useful in his analysis, has favourable properties. The main distinction between the Leontief and Cobb-Douglas functions lies in the potential for substitution between labour and capital. The Leontief function disallows any substitution, while the Cobb-Douglas function permits different substitution possibilities in-between the two factors. The absence of substitution in the Leontief function implies a fixed proportion of both factors 'K/L', also known as

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the capital-labour ratio. On the contrary, the potential for substitution in the Cobb-Douglas function results in variable capital-labour ratio.

In microeconomic theory, we have encountered a law known as the "law of variable proportions," means that if we increase the usage of any factor in comparison to the others, the marginal productivity of the more heavily used factor eventually diminishes and may even become negative after a certain level of relative utilization. Therefore, a production function that allows for factor substitution must exhibit diminishing marginal productivity for both labour and capital, considering the constant technology level.

The growth in aggregate output can arise from increment in either the resources employed or their productivities. In other words, growth can occur if K, L, or A experiences long-term increases, as no factor would be underutilized in such a scenario.

IN-TEXT QUESTIONS

1. Which of the following is not a main assumption of the Solow growth model?

(*a*) Output is produced using capital and labour

(*b*) The saving rate is constant

(*c*) The constant population growth rate

(*d*) Technology is constant

(*e*) The marginal product of capital declines as the capital stock increases

2. The main assumption of the Solow growth model is that the production function exhibits:

(*a*) Constant returns to scale

(*b*) Increasing returns to scale

(*c*) Decreasing returns to scale

(*d*) None of the above

2.3 Working of the Solow's Model

The economy is based on a neo-classical production function, which shows how output is produced from labour and capital. This function has the

Notes

property of constant returns to scale, meaning that doubling all inputs will also double output. For instance, if both capital and labour in an economy are doubled, its output will also double. Symbolically,

$\lambda Y = (\lambda K, \lambda L)$ ..2

where λ is any positive number.

Capital and labour are the two fundamental pillars of production. Capital refers to the physical assets that are used to produce goods and services, such as factories, machines, and equipment. Labour refers to the human effort that is used to produce goods and services, such as the work of farmers, factory workers, and salespeople.

The neo-classical production function provides a framework for understanding how changes in the units of labour affect the output of an economy. For intense, if we set the scale factor, λ, to 1/L in equation 2, we get

$$\frac{Y}{L} = F\left(\frac{K}{L}, 1\right) \quad ...3$$

In the equation number 3, the output per labour *i.e.*, Y/L is depends upon the capital per labour *i.e.*, K/L.

Let's redefine the equation 3 :

y = F(k,1)

or y = F(*k*) ...4

where,

y= Y/L

k= K/L

IN-TEXT QUESTIONS

3. The main focus of the Solow Model of economic growth is on the relationship between:

(*a*) Consumption and investment

(*b*) Capital and labour

(*c*) Technology and productivity

(*d*) Investment and saving

Notes

4. The Solow Model steady state occurs when:

(*a*) The economy experiences zero population growth

(*b*) The per worker's capital stock is constant

(*c*) Technological progress is at its maximum level

(*d*) The rate of savings equals the depreciation rate

2.3.1 *Properties*

The production functiony = F(k) have three main properties:

1. If capital per labour is zero the output is also be zero. This means that if zero unit of capital employed is employed, then there will be no unit of output. *i.e.*, f(0)=0
2. There is positive marginal product of capital per worker. This means that each additional quantity of capital adds to output *i.e.*, f' (k)>0
3. The increment in output generated by each additional unit of capital diminishes as the capital-to-labour ratio rises *i.e.*, f'(k)<0

The production function of the form y = F(k) given in the equation 4 also depicts in the Figure 2.1 graphically. As more capital is added per worker, the output raises at a decreasing rate. This is known as diminishing or decreasing returns to capital.

Diminishing returns to capital occurs because as the units of capital per unit of worker increases, labour have more capital to work with. This means that they can produce more output with each unit of labour. However, the additional output from each additional unit of capital declines because workers have less and less to do with the additional capital.

For instance, if a worker has no capital, then a single amount of capital will be very useful and produce a lot of additional output. However, if a worker has a lot of capital already, then an incremental unit of capital will not be as useful and will only produce a small amount of incremental output.

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Fig. 2.1: Neoclassical Production Function

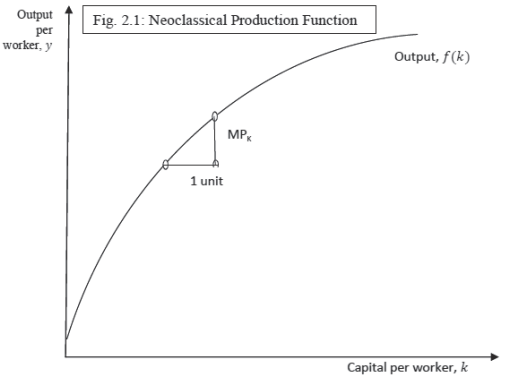

Figure 2.1

Figure 2.1 explains that the output per labour is directly related to the amount of capital per labour. This explains as the amount of capital per labour increases, the output per labour also increases. The slope of production function curve, is the marginal product of capital, is positive but becomes flatter as the value of 'k' increases. This indicates that the production function shows diminishing or decreasing rate of returns to capital.

In other words, f'(k)>0 but f''(k)<0. The particular shape of this one variable production function owes itself to positive but diminishing marginal productivity of capital in the aggregate production function. We can show this by using some basic calculus.

$$MP_K = \frac{\partial Y}{\partial K} = \frac{d(yL)}{dK} = L\frac{dk}{dK} \times \frac{dy}{dk} = f'(k)$$

&

$$\frac{\partial MP_K}{\partial K} = \frac{df'(k)}{dK} = \frac{dk}{dK} \times \frac{df'(k)}{dk} = \frac{1}{L} f''(k) \quad ..5$$

As Solow assumes that $MP_k > 0$ and $\frac{\partial MPk}{\partial k} < 0$; therefore $f'(k) > 0$ and $f''(k) < 0$.

Solow made certain assumptions about the production function to guarantee the presence of a single stable equilibrium in his model. The conditions that are commonly referred to as Inada conditions are as follows:

1. $f'(k) > 0$ for all the values of k

Notes

2. $f''(k) < 0$ for all the values of k
3. $\lim_{k \to 0} f'(k) \infty$

The Cobb-Douglas production function satisfies all of these properties.

Furthermore, the savings per capita in a given time period can be expressed as $sf(k)$. Since investment per capita is assumed to always be equal to savings per capita, the flow of gross investment per capita during any time period is $sf(k)$. Investment leads to an increase in the stock of capital per capita. As a result of investment, the capital per capita grows at a rate of $sf(k)$ in each period. However, within a given time period, the capital per capita also decreases due to the growth of the labour force, which expands at a constant rate, and the depreciation of capital equipment. We denote the rate of depreciation as δ. Consequently, the capital per capita decreases at a rate of $(n + \delta)k$.

The rate of change of capital stock per capita is therefore given by

$$\frac{dk}{dt} = \dot{k} = sf(k) - (n + \delta)k$$

This is the basic differential equation of the Solow's model. According to this equation,

1. $\frac{dk}{dt} > 0$ *if* $sf(k) > (n + \delta)k$
2. $\frac{dk}{dt} = 0$ *if* $sf(k) > (n + \delta)k$
3. $\frac{dk}{dt} < 0$ *if* $sf(k) > (n + \delta)k$

In simpler terms, the growth of the capital-labour ratio, or capital per capita, occurs as long as the gross investment per capita exceeds the reduction in capital per capita. It reaches a point where the net investment per capita is zero, and at this stage, the capital per capita remains constant. This constant level of capital per capita in the long run is referred to as the steady-state capital stock per capita, denoted as k*. The steady state represents an economic state that, once reached, continues indefinitely. It is also known as the balanced growth path, where the ratio of capital to output remains constant. This can be observed from the production function, where the constant capital per capita leads to a constant per capita output. Thus, the ratio of output to capital remains constant as

Notes

well. More precisely, the steady state is defined as an economic state in which there is constant output-capital ratio over time.

The steady-state capital per capita level can be determined graphically, as shown in Figure 2.2 below. The investment per capita function is depicted as a concave curve (marked in red) called sf(k). The position of the gross investment curve depends on the exogenously given savings ratio, denoted as s. A higher savings ratio raises the curve, and as the savings ratio approaches 1, the investment per capita curve approaches the output per capita curve (shown in blue). The green line represents the reduction in capital curve caused by population growth and depreciation.

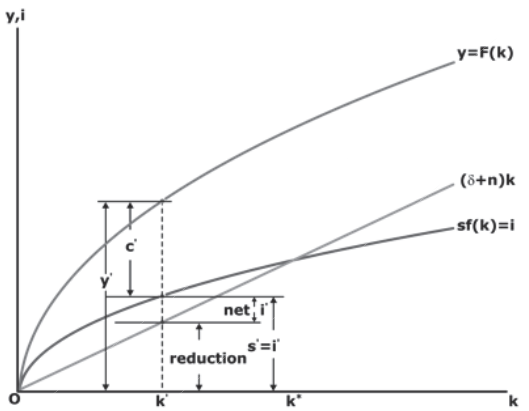

Figure 2.2

For a given capital-output ratio, represented as 'k', we can determine various quantities from the height differences between different curves. The difference between the output per capita curve and the investment per capita curve indicates the consumption per capita. On the other hand, the difference between the investment per capita curve and the reduction in capital per capita line represents the net investment per capita in the economy.

If the net investment per capita is positive, which is the case for all positive capital-labour ratios less than k*, the capital stock per capita in the economy grows. Conversely, if the net investment per capita is negative, the capital stock per capita in the economy decreases. This occurs when the capital-labour ratio exceeds k*. Only at the steady-state capital stock per capita, denoted as k*, do the additions and reductions to the capital per capita balance each other out, resulting in a stable capital stock per capita over time.

IN-TEXT QUESTIONS

5. In the Solow model, diminishing returns to capital means that:

(*a*) Each additional unit of capital contributes less to output growth

(*b*) The marginal product of capital is constant over time

(*c*) Capital accumulation has no effect on output growth

(*d*) Technological progress is inversely related to capital accumulation

6. The growth model of Solow model is based on the assumption that all economies have the same:

(*a*) Technological progress rate

(*b*) Investment and saving rates

(*c*) Labour force participation rate

(*d*) Steady-state capital stock per worker

2.4 Determinants of the Steady State

In the Solow model, the steady state refers to the long-term equilibrium of the economy where the capital per capita and output per capita remain constant. The determinants of the steady state in the Solow model are as follows:

1. **Savings Rate (s):** The rate of saving represents the portion of income that is saved and invested rather than consumed. A higher savings rate gives higher level of investment, which increases the capital stock and raises the steady-state level of capital per capita.
2. **Technological Progress (A):** Technological advancement drives economic growth by enhancing productivity and efficiency. As technology improves, both labour and capital become more productive, resulting in increased output per person over time.
3. **Population Growth (n):** Population growth affects the steady state by influencing the growth rate of the labour force. A higher population growth rate results in a larger labour force, which increases the depreciation of the capital stock. This, in turn, lowers the steady-state level of capital per capita.

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4. **Depreciation Rate (δ):** The depreciation rate represents the rate at which capital stock loses value over time due to wear and tear or obsolescence. As the rate of depreciation increases, the amount of capital that can be accumulated in the long run decreases.
5. **Capital's Share of Income (α):** A higher share of income accruing to capital owners encourages saving, which in turn boosts the steady-state capital stock per worker.

By varying these determinants economists can analyse how changes in savings, technological progress, population growth, depreciation, and capital's share of income impact the long-term equilibrium and potential for economic growth in the Solow model.

We determine the steady state capital stock per capita by solving the following equation:

$$\frac{f(k)}{k} = \frac{(n+\delta)}{s}$$

The left hand side of this equation is the slope of the line joining the origin to point on the output per capita curve. Since the function is concave, the left side of the equation decreases as the capital per capita (k) increases and increases as k decreases.

Consequently, the steady state (k*) that satisfies the equation will decrease (increase) as the right-hand side of the equation decreases (increases).

Based on the production technology, the steady-state capital stock per capita (k*) can be determined as follows:

1. k* increases as s increases. This implies that economies with higher savings rates will have a higher capital stock per capita and, consequently, higher output per capita in the steady state.
2. k* decreases as n increases. This indicates that economies with faster population growth will have a lower capital stock per capita and, thus, lower output per capita in the steady state.
3. k* decreases as δ increases. This means that economies with higher rates of capital depreciation will have a lower capital stock per capita and, consequently, lower output per capita in the steady state.

We can express k* as a function of *s*, *n* & δ, as follows: k* (*s*, *n* & δ).

IN-TEXT QUESTIONS

7. In the Solow model, how is the savings rate determined?

(*a*) Fixed and regulated by the government

(*b*) Variable and effected by the level of income

(*c*) Constant and depends by the rate of population growth

(*d*) Exogenous and effected by external factors

8. The Solow model of growth, the steady state output per worker level is determined by:

(*a*) The rate of saving

(*b*) The technological progress rate

(*c*) The rate of depreciation

(*d*) All of the above

2.5 Golden-rule Steady State

The Solow model is based on the golden-rule steady state which refers to the capital per capita level that maximizes long-term consumption per capita. At the steady state level society can achieve the highest possible level of consumption over time.

To understand the golden-rule steady state, we need to consider the relationship between savings, investment, and consumption in the Solow model. The model is based on the assumption that a certain portion of output is saved and invested, while the rest is consumed. Higher savings rates lead to more investment, which increases the capital stock and, in turn, boosts output. However, higher savings rates also mean sacrificing current consumption.

The golden-rule steady state occurs when the savings rate is set at a level that maximizes long-term consumption per capita. In this state, society strikes a balance between present and future consumption, optimizing their overall well-being. It represents an intertemporal allocation of resources that maximizes utility or welfare.

In a centrally planned economy, where the government has the ability to regulate the savings rate, it will strive to select the savings rate that

Notes

maximizes consumption per capita in the steady state. This particular savings rate is referred to as the golden rule level of savings, denoted as s_g. The corresponding capital stock per capita that maximizes consumption per capita in the steady state is known as the golden rule steady state capital stock per capita, denoted as k_g. To determine the value of k_g, we can maximize steady state consumption per capita by adjusting the savings rate (s).

$$\max_s c^* = \max_s (y^* - (n + \delta)k^*) = \max_s (f(k^*) - (n+\delta)k^*)$$

Note that in steady-state, net investment per capita is zero and thus savings per capita must be $(n + \delta)k^*$. The necessary first order condition for maximization is that

$$f'(k^*) = (n + \delta)$$

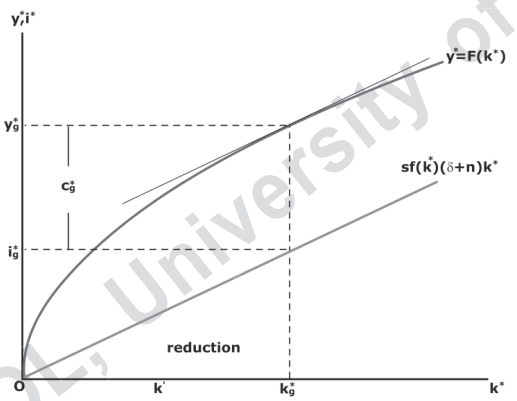

Figure 2.3

The golden rule steady state is illustrated in Figure 2.3. It is important to observe that in this figure, we have depicted the investment per capita and output per capita for different steady states. The difference or gap between these two curves represents the consumption per capita in the steady state. To maximize this gap, it is necessary for the slopes of the two curves to be equal, as indicated by the condition derived earlier. A planner who aims to maximize welfare would select the savings rate (s_g) that maximizes the consumption per capita for future generations.

2.5.1 *Dynamic adjustment in Solow's model*

Dynamic adjustment in Solow's model refers to the process through which an economy moves towards its steady state over time. The model

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assumes that economies do not instantaneously reach their steady states but instead go through a dynamic adjustment process.

In the Solow model, the dynamic adjustment is driven by the difference between the actual capital stock per capita and the steady-state capital stock per capita (k - k*). This difference, also known as the capital gap, determines the direction and speed of adjustment:

1. When the actual capital stock per capita is below the steady-state level ($k_0 < k^*$), the economy experiences positive net investment. This means that investment exceeds depreciation, leading to an increase in the capital stock per capita. As the capital stock per capita grows, so does output per capita, and the economy moves closer to the steady state k* as shown in Figure 2.4.

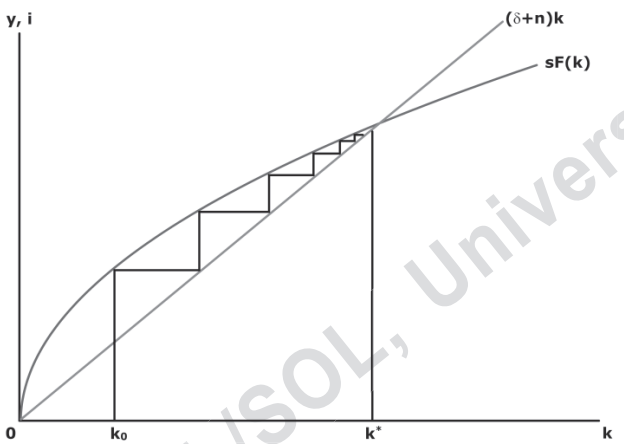

Figure 2.4

We may also show the dynamic path of k as a time path as shown in Figure 2.5 below.

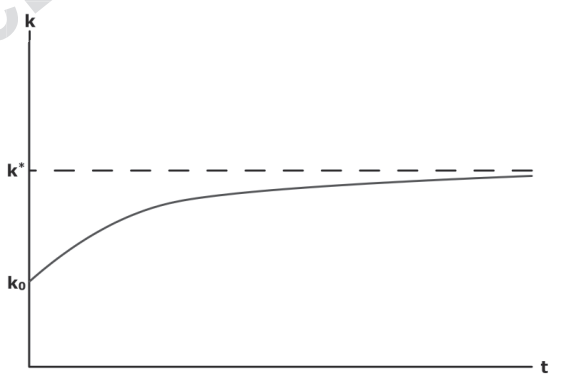

Figure 2.5

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2. Conversely, when the actual capital stock per capita exceeds the steady-state level ($k_0 > k^*$), the economy faces negative net investment. This implies that depreciation is higher than investment, resulting in a decrease in the capital stock per capita. As the capital stock per capita declines, output per capita also decreases, bringing the economy closer to the steady state as shown in Figure 2.6.

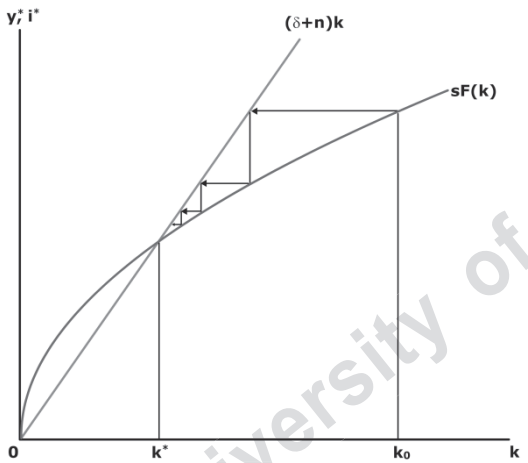

Figure 2.6

3. The adjustment process continues until the capital stock per capita reaches the steady-state level ($k = k^*$), at which point net investment becomes zero, and the economy remains in a state of long-term equilibrium.

   It's important to note that the dynamic adjustment process in the Solow model assumes a constant savings rate, population growth rate, and technological progress. Any changes in these parameters would impact the speed and path of adjustment towards the steady state.

2.5.2 *Stability of the Equilibrium in the Solow's Model*

The stability of the equilibrium in Solow's model refers to the tendency of the economy to return to its steady state after experiencing a disturbance or shock. A stable equilibrium implies that the economy will naturally adjust back to its long-term equilibrium position.

Notes

In the Solow model, the stability of the equilibrium can be analyzed by examining the behaviour of the capital stock per capita (k) over time. The model assumes that the economy converges towards its steady state through a dynamic adjustment process. The stability of the equilibrium depends on the characteristics of this adjustment process.

The stability of the equilibrium in Solow's model can be classified into two types: stable and unstable.

2.5.3 *Stable Equilibrium*

A stable equilibrium occurs when the economy naturally returns to its steady state after experiencing a shock. In the Solow model, a stable equilibrium is characterized by the capital stock per capita (k_0) converging towards the steady-state level (k*) over time. If the economy deviates from the steady state, it will adjust through the dynamic adjustment process, leading to a return to the long-term equilibrium.

2.5.4 *Unstable Equilibrium*

An unstable equilibrium occurs when the economy does not naturally return to its steady state after a shock. In the Solow model, an unstable equilibrium is characterized by the capital stock per capita (k) diverging away from the steady-state level (k*) over time. If the economy deviates from the steady state, the dynamic adjustment process will cause further divergence, leading the economy away from the long-term equilibrium.

The stability of the equilibrium in the Solow model is influenced by several factors, including the savings rate, population growth rate, technological progress, and parameters such as the depreciation rate. Changes in these factors can affect the stability properties of the model and determine whether the equilibrium is stable or unstable.

Overall, the stability of the equilibrium in the Solow model is essential for understanding the long-term behaviour of an economy. A stable equilibrium implies that the economy has a self-correcting mechanism that allows it to return to its steady state, providing a foundation for sustainable economic growth.

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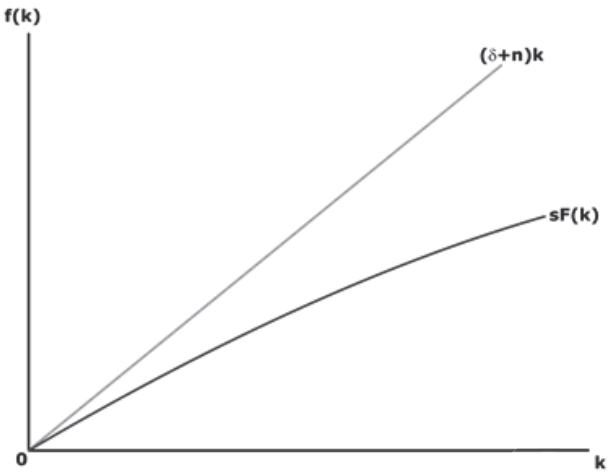

Figure 2.7

The existence of such a stable equilibrium in the Solow's model is guaranteed by the Inada conditions assumed about the production function. Without such assumptions, there may be no stable equilibrium with positive capital labour ratio in the Solow's model as shown in the Figure 2.7. In the above figure, at all positive levels of k , net investment is negative and thus the economy will converge to zero capital.

IN-TEXT QUESTIONS

9. In Solow's model, the economy will eventually reach a steady state, where economy will have constant output per worker and capital per worker. (True/False)

10. The economy will always be growing in Solow's model, as long as the rate of saving is positive. (True/False)

11. With the change in the saving rate, there will be a temporary change in the growth rate of the economy. (True/False)

12. With the change in the rate of technological progress results in a permanent change in the economy's growth rate. (True/False)

13. The economy will never reach to the point of steady state if the rate of saving is zero. (True/False)

2.6 Solow's Model Technological Progress

In the Solow model, technological advancement is considered an exogenous factor, implying that it is presumed to occur independently of the model and remains unaffected by other variables within it. This is in contrast to factors like capital accumulation and population growth, which are deemed endogenous, indicating their susceptibility to the influence of other variables.

The Solow model posits that technological progress is Hicks-neutral, signifying that it does not alter the relative efficiency of capital and labour. Rather than causing capital to become more or less productive in comparison to labour, technological progress enhances the overall productivity of the economy. This results in the ability to produce more output with the same amount of capital and labour.

Within the Solow model, the rate of technological progress is assumed to be constant, indicating a consistent increase in the economy's productivity over time. This rate is not contingent on any other variables in the model, establishing it as an exogenous assumption.

Technological progress is an important factor in the Solow model because it is the only factor that can lead to sustained economic growth in the long run. Capital accumulation and population growth can lead to growth in the short run, but they will eventually reach a point where they cannot continue to grow. Technological progress, on the other hand, can continue to grow indefinitely, which means that it can lead to sustained economic growth in the long run.

To explain, why economic growth can persist over time, we need to add a factor for technological progress 'A' to the model. Technological progress can be thought of as an increase in the efficiency of labour, which means that each worker can produce more output. This increase in efficiency can lead to a higher level of output even if the amount of capital and labour remains the same.

The production function can be modified to include technological progress by adding a new variable called A, which represents the efficiency of labour. The new production function can be written as:

$Y = F(K, AL)$

Notes

This equation states that total output Y depends on the inputs of capital K and effective workers, which is represented by A * L. Such a technical progress is known as Harrod-neutral technical progress. We assume that the efficiency of labour A increases at a consistent rate ***g*** due to technological progress, with this growth being externally determined.

$$\frac{1}{A} * \frac{dA}{dt} = g$$

The above equation of technological progress is known as labour augmenting, whereas '*g*'is the rate of labour-augmenting technological progress.

Now, the output can be considered as a function of two factors: capital (K) and effective labour (AL). We can express the output and capital per effective labour as y = Y/AL and k = K/AL, respectively. The growth rate of effective labour is determined by the combined effects of technological progress (n) and population growth (g), denoted as (n + g). The remaining analysis for determining the steady state remains the same as before, except that now the reduction in capital is influenced by the growth of labourand the growth of effective labour. The analysis presented in Figure 2.8 below illustrates a similar approach to what we have previously discussed.

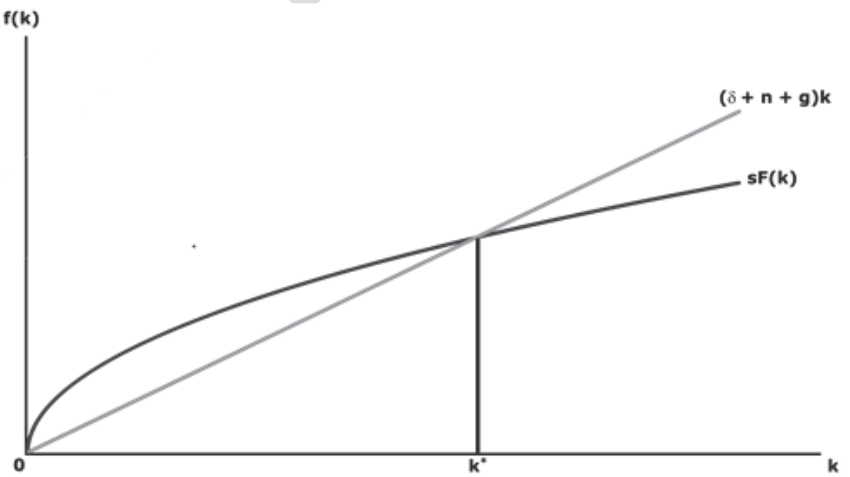

Figure 2.8

1. With a constant technological progress, the capital per effective labour remains stable in the steady state.
2. The output per unit of labour, on the other hand, increases at the pace of external technological progress. According to Solow, this

Notes

suggests that the sole sustainable source of growth in per capita output or income is technological progress.

3. The variation in rates of technological progress is the key factor in elucidating the enduring differences in the per capita output growth rates among economies.

The current break-even investment is equivalent to $(\delta + n + g)$. In a stable state, the investment (k) precisely counterbalances the declines in k resulting from depreciation, population growth, and technological progress.

2.7 Solow Model with Human Capital

The Solow model with human capital is an extension of the standard Solow growth model that incorporates the role of human capital in the economic growth process. Human capital refers to the knowledge, skills, education, and health of individuals that contribute to their productivity and overall economic output.

In the Solow model with human capital, the production function is modified to include both physical capital (K) and human capital (H) as inputs:

Y = F(K, H, AL)

Here, AL represents the level of technology or total factor productivity, and F denotes the production function that describes how inputs of capital, human capital, and technology combine to produce output (Y).

The accumulation of human capital is influenced by factors such as education, training, healthcare, and technological advancements that improve the skills and knowledge of individuals in the workforce. The level of human capital in the economy affects labour productivity and subsequently, economic growth.

In this model, the role of human capital is captured through the growth rate of human capital (nH). The growth rate of human capital can be influenced by various factors, such as investments in education and training programs, improvements in healthcare systems and technological advancements that enhance the quality of human capital.

The Solow model with human capital emphasizes that investment in human capital can lead to sustained economic growth and higher living standards. Increases in human capital can result in higher labour productivity which contributes to greater output per capita and long-term economic development.

Notes

Policy implications of the Solow model with human capital include the importance of investing in education and healthcare systems to enhance the level of human capital in an economy. By promoting education and providing access to healthcare, countries can improve the skills and productivity of their workforce, leading to higher economic growth rates and improved living standards.

Overall, the Solow model with human capital provides a framework for understanding the role of education, skills, and knowledge in driving economic growth, highlighting the significance of human capital accumulation in the development process.

Limitations

While it has been influential and insightful, it also has several limitations and simplifications, some of which are as follows:

1. **No technological progress:** One of the most significant limitations of the Solow model is its assumption of a constant level of technology. In reality, technological progress and innovation play a crucial role in long-term economic growth, but this aspect is not explicitly captured in the model.
2. **Homogeneous labour and capital:** The model assumes that labor and capital are homogeneous, meaning it treats all workers and all types of capital as the same. This assumption overlooks the heterogeneity and differences in skills, education, and productivity among workers and capital goods in the real world.
3. **Lack of human capital:** The Solow model does not account for human capital, such as education, skills, and knowledge, which are essential drivers of economic growth.
4. **No institutional factors:** The model does not consider the role of institutions, governance, or political factors, which can significantly impact economic growth.
5. **Fixed savings rate:** Solow's model assumes a constant savings rate in the economy. In reality, savings rates can vary significantly due to changes in consumer behaviour, government policies, and other factors.
6. **No consideration of population dynamics:** The model does not include explicit population dynamics, such as population growth or

Notes

changes in demographics, which can influence the rate of economic growth.

7. **Convergence hypothesis:** The Solow model suggests that poorer countries will catch up with richer countries over time, leading to convergence in income levels. However, in practice, not all countries experience such convergence due to various structural, institutional, and geographical differences.
8. **Lack of financial sector:** The model does not incorporate a financial sector, which can affect investment and savings decisions and, consequently, economic growth.
9. **Short-run focus:** The Solow model is more focused on long-run economic growth and does not address short-term fluctuations or business cycles.
10. **Ignores external factors:** The model assumes a closed economy without considering the impact of international trade and globalization, which can significantly influence economic growth.

IN-TEXT QUESTIONS

14. Technological change is an exogenous factor in Solow's model. This means that it is assumed to happen outside of the model, and it is not affected by any of the model's variables.
(True/False)

15. Technological change leads to an increase in output per worker in Solow's model. This is because technological change makes it possible for workers to produce more output with the same amount of capital. (True/False)

16. Technological change leads to a decrease in the capital-output ratio in Solow's model. This is because technological change makes it possible to produce more output with the same amount of capital, so less capital is needed per unit of output.
(True/False)

17. Technological change leads to an increase in the saving rate in Solow's model. This is because technological change does not affect the amount of income that households have available to save. (True/False)

Notes

2.8 Endogenous Growth Model

The endogenous growth model is an economic framework that seeks to explain the long-term growth of economies by emphasizing the role of internal factors and endogenous variables, rather than relying solely on exogenous factors such as technology or population growth. Unlike the Solow growth model, which assumes exogenous technological progress, the endogenous growth model focuses on the endogenous determination of technological change and innovation.

In the endogenous growth model, technological progress is not assumed to occur independently of economic factors but is considered a result of investment in research and development (R&D), human capital, knowledge spillovers, and other factors within the economy. This model suggests that investment in these endogenous factors can generate sustained and self-reinforcing economic growth.

2.8.1 *Key Features of the Endogenous Growth Model*

1. **Human Capital:** The model recognizes the importance of human capital accumulation through education, training, and skill development. A more educated and skilled workforce contributes to higher productivity and innovation, leading to economic growth.
2. **Research and Development (R&D):** Investment in R&D activities leads to technological advancements, which in turn drive productivity gains and economic growth. Increased spending on R&D can foster innovation, improve efficiency, and create new industries and products.
3. **Knowledge Spillovers:** The endogenous growth model highlights the positive externalities associated with knowledge spillovers. When one firm or individual generates new knowledge or innovation, it can diffuse and benefit other firms or individuals in the economy. This spillover effect contributes to overall economic growth.
4. **Increasing Returns to Scale:** Unlike the diminishing returns to scale assumption in the Solow model, the endogenous growth model allows for increasing returns to scale. This means that as output increases, the cost per unit decreases, results in sustained economic growth.

Notes

5. **Government Policies:** The endogenous growth model emphasizes the role of government policies in fostering innovation and human capital development. Policies that promote investments in education, R&D, intellectual property rights protection, and infrastructure can enhance long-term growth prospects.

The endogenous growth model suggests that economies can actively promote and sustain higher growth rates through targeted policies that foster human capital development, technological innovation, and knowledge creation. By internalizing the determinants of growth, this model provides insights into how economies can generate long-term prosperity and improve living standards through endogenous factors and policies.

Endogenous growth theory has been influential in economic policy circles, and has led to a number of changes in government policy. For example, many governments have increased spending on education and research and development, in an effort to boost economic growth.

However, endogenous growth theory has also been criticized. Some economists argue that the theory is too complex, and that it is difficult to measure the impact of the factors that contribute to endogenous growth. Others argue that the theory is not supported by the evidence, and that economic growth is primarily the result of external factors such as technological progress.

IN-TEXT QUESTIONS

18. Growth rate of almost all economies of the world has been faster than _____.

19. The model maintain solow's assumption of _____ to the capital as a factor of production.

20. Knowledge capital is the means to attain human capital which in turn is the means to increase the _____.

21. Ak model of endogenous growth was presented by _____.

22. Most of the economic goods are _____ in nature.

Notes

2.9 Summary

The Solow's growth model serves as a simple yet effective tool for understanding the mechanisms behind economic expansion. According to this model, three key factors—namely, savings, population growth, and technological advancement—play pivotal roles in determining the trajectory of economic growth.

Saving refers to the money that households and businesses do not consume but instead invest in new capital goods. Higher saving rates lead to faster economic growth because they increase the amount of capital available to produce goods and services.

Population growth is the rate at which the population is increasing. Higher population growth rates lead to slower economic growth because they spread the same amount of capital over more people.

Technological progress is the rate at which new technologies are developed and adopted. Technological progress is the only factor that can lead to sustained economic growth, because it allows economies to produce more output with the same amount of capital and labour.

The Solow model also shows that economies tend to converge to a steady state, where the rate of economic growth is equal to the rate of technological progress. This means that countries with different saving rates, population growth rates, and levels of technological progress will eventually reach the same level of economic development.

The Solow model is a valuable tool for understanding economic growth, but it is important to note that it is a simplified model. The real world is more complex than the Solow model, and there are other factors that can affect economic growth, such as government policies, education, and infrastructure.

2.10 Answers to In-Text Questions

1. (*d*) Technology is constant
2. (*a*) Constant returns to scale
3. (*b*) Capital and labour

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4. (*b*) The per worker's capital stock is constant
5. (*a*) Each additional unit of capital contributes less to output growth
6. (*a*) Technological progress rate
7. (*d*) Exogenous and effected by external factors
8. (*d*) All of the above
9. True
10. False
11. True
12. True
13. False
14. True
15. True
16. True
17. False
18. population growth
19. diminishing returns
20. rate of growth
21. sergio rebelo
22. non-rivalrovs

2.11 Self-Assessment Questions

1. In what way are the models incorporate human capital different from the standard neo-classical models?
2. Describe the structure of solow model.
3. State and discuss the assumptions of the solow model.
4. Discuss the effect of a change in the savings rate using the solow model.

Notes

2.12 References

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LESSON

3

Technology, Intellectual Property and Economics of Ideas

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STRUCTURE

3.1 Learning Objectives

- Student will be able to understand the meaning of technical change.
- Student will be able to understand the impact of technical change on the production process.

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- Student will be able to understand the economics of intellectual property rights and public goods.
- Student will be able to understand the economics of different intellectual property rights such as copyrights, trademarks, patents.

3.2 Introduction

The role of technology is crucial in the process of economic growth. In economics, change in economics is majorly reflected through the changes in the production techniques because of innovation and researches. Mostly, technological change leads to change in the labour's productivity, capital requirements and efficiency of other factors of production. Innovation is often regarded as the most important technological factor in the process of economic growth. Theories of modern economics assume that without having technical progress, it is difficult for a country to survive and even sustain growth in per capital income for a longer perspective. Due to the presence of low technological progress in several under-developed countries, there is a vicious circle of under-development which is difficult to break. On the other hand, developed countries are able to perform well because they are spending higher amounts in research and development which leads to less adoption of new and innovative technology.

Economic growth acknowledges the crucial role of technical changes in influencing the productivity of factors of production. It is a two-step process which includes 1. Creating new knowledge and technology. 2. Adoption of new technology. This two-step process is achieved with the help of huge spending on the research and development.

3.3 Nature of Technological Change

In economic world, technology is regarded as a process through which inputs are transformed into output. To exemplify, in the production function Q= Y (K,L), the function explains how the inputs used in the production process are transferred into output. Any innovation or idea leads to change in the output. Either more output is produced with the

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same amount of input or same output but with better quality is produced with the same amount of input.

Paul Romer explains the relationship between economics of ideas and process of economic growth. He said, one of the crucial characteristics of ideas is there non-rivalrous nature while on the other side it is the degree of their excludability. Degree of excludability depends on the amount of fees which an owner can charge by allowing someone to use his/her idea. For instance, copyrights and patents are the tools for which an owner can charge fees.

The following query in this regard is "what enticement one takes in developing novel thoughts/ideas." The response lies in the fact that thoughts/ideas are closely connected with enticements of increasing return to scale and imperfect competition. Increasing returns to a scale is achieved as in the process of generating ideas, investment is required till the time idea is not fully developed. Once the idea is developed, subsequent production is done at cheaper prices.

The added feature related with economics of ideas is the presence of imperfect competition. Since existence of increasing return to scale makes it essential to charge a price higher than marginal cost otherwise the firm would experience negative profits or losses. With increasing return to scale, average cost is always higher than marginal cost and consequently marginal cost pricing leads to negative profits. It states that none of the firms from the industry would enter the marketplace and employ "F" as fixed cost for developing the product if they are not able to fix the price above the marginal cost of making additional units. The production of new things, or new ideas, necessitates the prospect of making profits and that why compels the movement away from perfect completion market.

As discussed, economics of idea requires high investment and spending in research and development activities except when originators have certain hope or expectation about receiving certain gains after the creation of innovative ideas which they would refrain from venturing out to create new ideas. At this point, patents and copyrights are the selected legitimate instrument through which inventor can be guaranteed to earn some paybacks after creation of new invention. This legal mechanism provided monopoly power over the invention to usage for a stipulated period so that the inventor can recover the associated cost along with a minimum

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desired amount of profit. Usage of Patents or copyrights influenced the degree of excludability of idea; otherwise, there would be the chances of imitation which in return led to reduction in the motivation and incentive for innovators in creating new and innovative ideas

3.4 Technical Change and the Production Process

In this section, we will depict the change in the technological level with the help of production functions. For simplicity, we are assuming only two factors of production *i.e.* labour and capital. Any technical advancement would result in either more output with same amount of input or same output with less of either one or both of the inputs or may also result in same level of output with better quality with same amount of inputs. Change in technology leads to shift in the production function upwards. This shift in the production function can be represented with the help of following production function:

Let us assume, Production function = Y = f (K, L, t).....(*i*)

Where;

Y denotes Output

K denotes Capital

L denotes Labour

t denotes production frontier shifter.

Using (*i*) , per worker production function will be equal to:

Y = f (K/L, L/L, t)

Y = f (k, t) where k = K/L

There is one more way for representing technical change wherein technical progress occurs with shifts in the production function wherein units of input used may not have increased by only augmented over time and thus able to produce more than the previous outcome.

This is represented by the following production function

Y = f (J(*t*)k, Z(*t*)L).....(*ii*)

wherein, Y is not only a function of capital and labour inputs. The stock of capital and labour are multiplied with a factor named J and Z which are considered as the functions of time. The terminologies J(*t*) and Z(*t*) are denoted to as effective capital and effective labour respectively.

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These can be explained as follows: If dZ/dt, the rate of change of Z is greater than zero, then over time, the effective labour force is increasing even though the actual labour force stays constant. Similarly, if dJ/dt is greater than zero then the effective capital stock goes up even though actual capital stock does not increase.

If the expression dJ/dt comes out to be positive while Z(*t*) is equal to 1, then the technical progress is considered as purely capital augmenting, while, on the other hand, if the expression dZ/dt comes out to be positive while J(*t*) is equal to 1, then the technical progress is considered as purely labour augmenting. However, If both the expressions dJ/dt and dZ/dl turn out to be positive, then the resultant technical progress is regarded to be equally capital and labour augmenting. However, it must be remembered that this type of formulation says nothing about cause or source of technical change.

3.5 Technology and Economic Growth

Economic growth has been dreary for more than a era now. This has happened at a time when economies have faced much unfolding change. The three elementary constituents which drive economic growth are productivity, capital and labour. All these factors often face new challenges in a varying context. Primary driver amongst all these drivers of change is the technology, led by digital transformation.

Technology Driven Slowdown in Productivity and Investment

Productivity is considered as the key longstanding paddle of economic growth. Technology-driven innovation is the foremost spur to productivity progress. Yet, unexpectedly, productivity growth has slackened as digital technologies have boomed. Amid advanced economies over the tenure of 20 years or so, it has actually averaged less than half of the pace of the previous 12 years. Organizations at the technological edge have gained major productivity advances, but the influence on productivity more widely across firms has been feeble. The new technologies have inclined to harvest winners-take-most results. Leading organizations have attained added market power, market structures have actually weaken leading to less competition, and business dynamism has declined.

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Technology Driven Shifts in Labour Markets

Technology is having deep impact on labour markets also. Mechanization and digital advancement cause a shift in the demand of labour away from routine low-to middle-level skills to higher-level skill set along with further sophisticated logical, practical, mechanical and managerial skills. However, On the supply front, preparing and training workers with skills, knowledge that will complement the latest technologies, suits the need of the technological era is lagging, impeding the wider diffusion of innovation within economies. Education and training have been losing the race with technology.

Due to this, many economies including Indian economy face the challenge of aging populations. Many of these economies are also seeing a levelling off of gains in labour force participation rates and basic education attainments of the population. These drifts put an even bigger focus on productivity—and technological innovations that drive it—to deliver economic growth.

Technological Driven Inequality

Growth has also become less inclusive. Income disparity has been increasing in many major economies, including India. The new advancement in technologies favours capital and higher-level skills have led to a deterioration in labour's segment of income and have contributed in increasing wage inequality. This have also been associated with more intense manufacturing structures and high economic rents relished by only leading organizations. Income has make a shift from labour to capital and the because of the distribution of both labour and capital, income has become more unequal.

Mounting inequality and escalating anxiety about occupations have contributed to amplified social stiffnesses, tensions and political disagreement. The technological change have also increased inequality with more job losses and stagnation of wages of low-skilled workers.

Technological Driven Changing Growth Pathways

Although income inequality has been increasing inside many countries, inequality amid countries has been dropping as faster-growing developing economies narrow the income gap with progressive economies. Technology

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poses novel challenges for this economic convergence. Manufacturing-led growth in developing economies has been the leading driver of convergence, exaggerated by their comparative advantage in labour-intensive production based on their large pools of low-skill, low-wage workers. Such comparative advantage is eroding with automation of low-skill work, creating the need to develop alternative pathways to growth aligned with technological change.

IN-TEXT QUESTIONS

1. Which one of the following scenarios explain economic development?

(*a*) Improvement in distribution system

(*b*) Improvement in technology

(*c*) Improvement in production

(*d*) All of these

2. Which of the following is a non-economic factor of growth?

(*a*) Ideal legislative resources

(*b*) Collection of Economic Resources

(*c*) Growth of overall population in course of time

(*d*) Capital Accumulation

3.6 Economics of IPR : An Introduction

Intellectual property rights are not only considered as a legal issue, but often it is regarded as an economic, social, philosophical and political issue. Therefore, it is studied from different perspectives, out of which one perspective is economic perspective. Several economists have viewed intellectual property rights as one of the applied economic perspectives to the realm of intellectual property. They tried to understand the relationship between IP protection and incentive for innovation on one hand whereas they have interlinked intellectual property rights with numerous economic issues like economic growth, economics of innovation, monopoly, etc.

Notes

3.7 IPR and Economics of Public Goods

In economics, public goods have two merits, one is non-excludability and another one is non-rivalry. Non-excludability means the degree to which your consumption depends on the consumption by others. For example, if there are two persons A and B, and Person A wants to consume one mango. The moment person A consumes the mango, another person B loses the opportunity of consuming mango. Thus, mango is regarded as excludable in nature. On the other hand, the street lights available in the city are used by all persons in the city irrespective of the fact, whether it is being used by Person A or by person B or by any other person in the city. Thus, the nature of the product is non-excludable. All private products are excludable in nature whereas public products are non -excludable in nature like the defence system of a country. Defence is provided to all citizens at the same pace irrespective of the fact whether you are paying for it or not.

In addition to this, public products are non-rivalrous in nature as compared to private products.

Due to these features, there is an undersupply of creative and innovative work. No one wants to invest in intellectual property as there is no way of preventing the free-riders from joining the marketplace. In addition to this, the investment done in the intellectual property also suffers from the risk of infringement, chances of piracy etc. Because of these reasons, inventors are not very keen to invest in intellectual property.

Intellectual Property Rights and Economics of Innovation

It is often said that IPRS stimulates innovation and inventions as they provide a fair chance to the innovators to earn a good amount of return on their initial investment. Also, they are useful in ensuring a smooth innovation system by disclosing all the relevant information. However, there is another side of the same coin. Use of IPRs also restricts innovation by preserving knowledge with the creators only. Under the umbrella of IPRs, innovators are supposed to preserve the innovative knowledge with themselves only. The knowledge preservation leads to the generation of monopoly powers in the long run. Thus, the trade-off between the social benefit of improved innovations and the social cost of restricted use of innovation determines the actual or optimum level of intellectual property.

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3.8 Economics of Copyright

Copyright is a group of selected and assignable lawful rights granted to a inventor for a pre-determined number of years to design, print, publish, and perform or to a film, or to recorded literary, artistic or musical material.

Supply of copyright resources is positively associated with the copyright protection available in the market implying more supply of artistic work when good amount of protection is available in the economy. The demand for copyright resources is negatively associated with the copyright protection available in the market. Thus, if in any marketplace, there is abundant protection available to copyright materials, there would be excess supply of copyright materials as compared to its demand. But if there would to too little protection available to artistic work, then, there would be a situation of excess demand for copyright work as the suppliers do not have any incentive to supply artistic work or copyright material as they are aware that there is no protection available for their copyright materials.

Major factors affecting the supply of the copyright material are the earnings from the copyright work royalties, copyright law, breadth, and duration of copyrights wherein breadth of copyright refers to the different uses to which the copyright material must be used without authorization and duration refers to the number of years against which author's right is protected. Higher the earnings from the copyright work royalties, higher would be the incentive to supply copyright materials. Having a strong law for protecting copyright material in the economy motivates the suppliers of copyright materials where as a poor law or a weak law to protect the copyrights, high chances of infringement lessen the motivation of suppliers of copyright materials.

Within the breadth of copyrights, we have broad copyrights implying permission to use copyrights for authorized purpose only, narrow copyrights implying permission to use copyrights for authorized purpose and for some unauthorized purpose also, fair use of doctrine implying use of books or literary work for educational purpose only. The duration of copyright in India is life + 60 years. However, protecting copyright material in a digital world is posing a new challenge. Now days, it is very easy to copy the material which is accessible in the electronic form. Moreover, it is also easy to circulate, distribute it to the whole – wide consumer.

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The major factors affecting the demand for the copyright material includes the willingness of the consumers to pay for the copyright material, extent of copyright infringement. More the chances for infringing the copyright materials more would be the demand for copyright products in the economy. Similarly, if customers are ready to pay for the copyright materials, more would be the demand for those materials.

Following are the demand and supply curve for copyright materials:

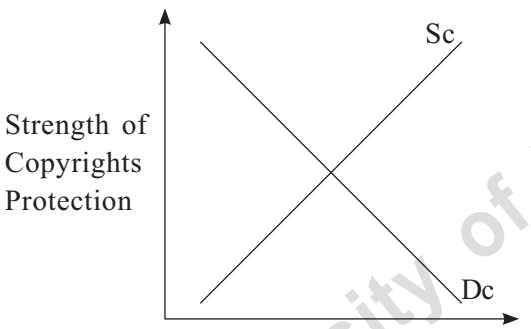

Figure 3.1: Demand and Supply of Copyrights

As seen in the diagram, both demand and supply curves of copyrights are related with the strength of copyright protection available in the market. As the strength of copyright protection increases, supply of copyright material increases whereas lower the strength of copyright protection, higher the demand for copyright materials. Therefore, the demand for copyrighted material is an inverse function of copyright protection, whereas the supply of copyright material is a positive function of copyright protection. To achieve the equilibrium, strength of copyright protection must match with the demand and supply of copyright materials.

IN-TEXT QUESTIONS

3. A demand curve of the copyright material is:

(*a*) Inversely related with the strength of copyright protection and downward sloping in nature

(*b*) Positively related with the strength of copyright protection and downward sloping in nature

(*c*) Inversely related with the strength of copyright protection and upward sloping in nature

(*d*) Positively related with the strength of copyright protection and upward sloping in nature

4. Supply curve of the copyright material is _____.

(*a*) Upward sloping

(*b*) Parallel to X- Axis

(*c*) Downward sloping

(*d*) All of these

Copyright as a Source of Monopoly

Economist has debated whether "Copyright is Source of Monopoly" or not. It was argued that yes, it is a source of monopoly as it gives the owner the monopoly over the creation of its work, the moment you are owner of your material you are really one of the monopolists in the sense that you have the entire command over the protection of those items entire command over its production, distribution, price and everything. The optimal level of copyright protection is achieved by the trade-off amid the cost of limiting access to a work and the advantage of providing incentives to create the works. Thus, copyright is considered as a source of monopoly power because with greater level of copyright protection, the owner/copyright holder would certainly achieve a higher level of monopoly control in the marketplace in the sense that owner has access to the copyright material which will be traded not only within the country, but a will also be traded outside the country. At this moment, the owner of the copyright material whether the owner would be a writer, an artist, a musician holds a power to extract willingness/high prices from the customers to pay for copyright material if they really want to use or consume the copyright material.

To examine the extent of monopoly power available with the copyright holder, we need to measure the extent of difference between the marginal cost and the price. The marginal cost is the cost of producing one extra unit of the product. Here, since the work is already published for example, book is already written or any other artist work is already out, there will not be much change in the cost with the production of one additional unit and with the further increase in the level of production, it will fall. But the copyright holder knows that the price is not going to fall as he/she have the monopoly situation in the marketplace. This situation in the economy will surely give undue profits to the owners and that is the economics working behind the copyrights. But if copyright protection

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is not given, then making copies will not be difficult and thus profits available to the owners would be reduced to a great extent.

So, the success of copyrights would depend on what type of protection copyright owners would be possessing, what type of narrow copyright are permitted, what type of punishment is given in case of infringement, type of tracing instrument one is using for copying the product etc.

IN-TEXT QUESTIONS

5. Broad Copyright means:

(*a*) Permission to use copyrights for authorized uses

(*b*) Permission to use copyrights for authorized and unauthorized uses

(*c*) Permission to use copyrights for authorized uses but for few unauthorized uses

(*d*) None of these

6. Duration of copyrights in India is:

(*a*) Life +70 years

(*b*) Life +60 years

(c) Life +45 years

(*d*) Life +26 years

3.9 Economics of Trademarks

Trademarks are used to identify the goods and services to consumers and to differentiate between the brands. A large number of products are offered today and if one have to really find out that which product is the genuine product or real product, then with the help of trademark you will be able to recognise the correct product. Companies are also informing the customers to check for the trademark before making a purchase decision. Trademark can be a word, it can be a symbol, it can be a device, it can be a name and combination used in the business to recognize and differentiate the goods. For example, we have seen two elephants on the fevistick which is a registered trademark.

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Trademark protection ensures the company from the dis-honesty of other firms as there are several firms in the marketplace which tries to forge the customers with the fake products by using similar names. Trademark is used basically for safeguarding the rights of the trademark holders and of the consumer as trademarks helps in easy identification of the products. Registration of trademark is compulsory for ensuring a level of protection. It is the sheer responsibility of the registration holder to make all the efforts to protect the trademark and to create awareness about it. So, making appropriate use of trade mark and its legitimate enforcement are really in the hand of trademark holder, this will also ensure prevention of the infringement and if it is not really well taken then entire effort of registering those trademarks is over.

The economic justification of the trademarks lies in the fact that they restrict the entry of free riders, destruction of information, capital embodied in the trademark etc. But if a trademark is not registered, there would be multiple free riders available in the market place to capture your market share. Also, free riders enjoy the benefits of infringing the rights of those who are registered with their marks. In most of the cases, big and reputed companies have the threat of trademark infringement.

In cases, when a trademark is not available, the customer has to incur a huge amount of searching for good quality products, and also a huge amount of transaction cost in bargaining for the product. But if information about the brand trademark is available, then, there would be less search costs.

Trademark: Economics of Language and Communication

Use of trademarks encourages the invention of new words. With the invention of new words, it economizes on the communication and information cost of searching. It leads to the creation of new generic words which denotes the entire product instead of promoting a single brand. Moreover, the newly created/invented words help in developing a new language of communication which the customers value because of its natural attractiveness and informational worth. These new words are used by the firms in creating their identity along with motivating customers to consume more and more, thus establishing their brand names. Since a single firm faces stiff competition in the marketplace due to the presence of a large number of suppliers, trademarks are used to grab the market quickly.

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Trademark protection is not year specific instead it is unlimited. It is given to exploit the market for an indefinite period of time, till the time your product has value, till the time your product stands out against competitor's products.

Trademark as a Source of Monopoly Rent

Sometimes, owners enjoy monopoly rent with the usage of a trademark by producing fake copies of the product promised at the time of registering trademark or by averting the customers from purchasing substitute products of either same or high quality. Through this act, firms are cheating on consumer's trust. Firms are themselves not fulfilling the promise of maintaining the same quality standards, which they have offered in the past.

Trademark and Incentive to Free Ride

With the trademark comes the threat of free riders also, specially in case of reputed and popular trademarks. Stronger the trademark, higher would be chances of free-riders as they have huge incentive in the form of earning huge amounts of profits. Free-riders often use pirated copies of big, popular and famous firm's trademarks. Motivation of free-riders depends on the revenue generated by the use of a trademark and the cost of intimation which includes the cost of imprisonment if caught. Higher the expected revenue, higher would be the incentive to indulge in such acts.

Intimation Cost > Revenue Generation -> Less Incentive to Free Ride.

Intimation Cost < Revenue Generation -> More Incentive to Free Ride.

3.10 Economics of Patents

Patent is a special right permitted to an inventor to have power over the use of an invention for a precise period. Such rights are principally authorizing a temporary monopoly to the inventor which is one of the ways to gratifying inventive action. Through patents, firm is having the capacity to command the supply the product, to own the product, to control the whole power of distribution of their product and price determination, for several years. Patents provides the firm the monopoly powers to determine the price over the cost of the production. Higher

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the difference between the monopoly price and the cost of production, higher would be the profit margins. Also, whether any other firm can produce the product or not through licensing will be at the discretion of the patent owner.

The price determined by the owner is higher than the price available in the perfect competition market wherein larger number of firms are competing with each other but the quantity supplied under monopoly market is less than quantity supplied in the perfect competition market.

Inventions and Natural Monopoly

Many inventions create natural monopoly implying reduction in the cost of production with increase in the scale of production over a period. Cost of production reduces over a period as the firm is only incurring variable cost as no research cost is incurred again. For example: Microsoft Corporation.

Microsoft Corporation enjoy huge amounts of profits because once a software is patented, the firm will have the complete world to sell out the product.

3.11 Summary

- The role of technology is crucial in the process of economic growth.
- In economic world, technology is regarded as a process through which inputs are transformed into output.
- Technical advancement would result in either more output with same amount of input or same output with less of either one or both of the inputs or may also result in same level of output with better quality with same amount of inputs.
- Change in technology leads to shift in the production function upwards.
- In economics, public goods have two merits, one is non-excludability and another one is non-rivalry. Non-excludability means the degree to which your consumption depends on the consumption by others.
- Supply of copyright resources is positively associated with the copyright protection available in the market. The demand for

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copyright resources is negatively associated with the copyright protection available in the market.

- To examine the extent of monopoly power available with the copyright holder, we need to measure the extent of difference between the marginal cost and the price.
- When Intimation Cost > Revenue Generation there is little Incentive to Free Ride for the firms.
- When Intimation Cost < Revenue Generation, there are more Incentive to Free Ride for the firms.

3.12 Answers to In-Text Questions

1. (*d*) All of these
2. (*a*) Ideal legislative resources
3. (*a*) Inversely related with the strength of copyright protection and downward sloping in nature
4. (*a*) Upward sloping
5. (*a*) Permission to use copyright for authorized uses
6. (*b*) Life + 60 years

3.13 Self-Assessment Questions

1. Name different economic issues related with different forms of intellectual property rights.
2. Why there is a need to protect the interests of copyright owner or trademark owners.
3. What are the different factors affecting demand of the copyright material?
4. Why Intellectual property rights are considered as public goods?

3.14 Suggested Readings

- Barro, R. J., & Sala-i-Martin, X. (2004). Economic Growth (2nd ed.). Prentice Hall.

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- Banerjee, A. & Duflo, E. (2012). Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty. Public Affairs.
- Banerjee, A., Benabou, R. & Mookherjee, D. (2006) Understanding Poverty (6th ed.). Oxford University Press.
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LESSON

4

Poverty and Inequality

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STRUCTURE

4.1 Learning Objectives

- Comprehend the meaning and different dimensions of poverty and inequality.
- Understand how the human population affects economic development.
- Understand the role of education and health in economic growth of a country.
- Examine rural poverty and suggest policies to ameliorate it.

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4.2 Introduction

How do we ensure that the 1000-1200 million people of the 8 billion people on the planet who are poor or subsisting on less than $1 a day have a good quality of life and employment? The most significant factor lowering poverty is economic growth. In this chapter we will study about global income distribution, overall national poverty, and income inequality. We start by pointing out the complexity of poverty. The $1/day and $2/day poverty, global and regional poverty, the impact of poverty on access to healthcare and education, Amartya Sen's three measures of poverty and deprivation, his capabilities approach to poverty, the Lorenz curve and Gini index for calculating global and national income distribution, and Kuznets' inverted-U theory for changes in income distribution with growth. We examine the measures of absolute poverty, highlight population sub-groups that are most affected by poverty, and give many case studies of strategies developed in developing nations to ensure equitable income distribution and reduce poverty. Finally, we make recommendations for measures to lessen poverty and enhance income distribution.

This chapter will look at how the human population affects economic development. How fertility and population increase impact the expansion of the work force and the economy, respectively. How population growth affects employment and the labour force, and what factors have an impact on labour skills. As capital and trained labour have increasingly replaced unskilled labour, development has lessened the need for unskilled labour. In addition, this chapter emphasises human capital, skilled workforce, education and health. According to a study by the World Bank, higher wealth per capita is closely linked to lower mortality and higher education. In his essay Simon S. Kuznets commented that an economically developed nation's most valuable resource is not its physical assets but rather "*the body of knowledge amassed from tested findings and discoveries of empirical science, and the capacity and training of its population to use this knowledge effectively*."

This chapter also looks at rural poverty and suggests some solutions. We examine how agriculture has changed the economies of low-income countries, discuss the differences between rural and agricultural development, demonstrate that the current rural-urban divide. Then, in order to better understand farming in LDCs, we examine the shift from subsistence to

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specialised farming and the growing influence of multinational corporations and contract farming in LDCs.

4.3 Poverty and Inequality

4.3.1 *Poverty as Multidimensional*

The definition of poverty often includes six dimensions. First, there are several interconnected causes of poverty. Despite the fact that poverty rarely stems from a lack of just one thing, the main issue is always hunger, or a lack of food. Second, there are significant psychological aspects of poverty, including helplessness, voicelessness, dependency, guilt and humiliation. Even in the face of brutal circumstances, poor people can maintain their sense of humanity by upholding their cultural identity and social solidarity values. Third, poor people lack access to the necessities of life, such as clean water, roads (especially in rural regions), and transportation. Fourth, despite the overwhelming thirst for literacy, nothing is said about or reviewed about education. Poor people understand that education offers a way out of poverty, but only if the economic situation in society at large and educational standards both rise. Fifth, illness and poor health are feared practically everywhere as sources of poverty. This relates to both the price of medical care and the income that is lost as a result of illness. Finally, the poor rarely discuss their income, preferring to manage their assets—physical, human, social and environmental—in order to deal with their vulnerability. This vulnerability has a gender component in many contexts that we will discuss later in this chapter. We can define and measure poverty in terms of monetary, capacity, social exclusion and participatory aspects.

The United Nations Development Program (UNDP) published a report called Human Development Report (HDR), assuming that poverty is multidimensional. It calculates Human Poverty Index (HPI), based on three measures of deprivation: (1) likelihood at birth of not surviving to age 40; (2) adult illiteracy rate; and (3) lack of a decent standard of living, as measured by the average of the percentage of the population without sustainable access to potable water source and the percentage of children under the age of five.

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According to the World Bank, poor people do not have the basic freedoms of choice and action that those who are more fortunate take for granted. They have hardships that prevent them from living the kind of life that is valued by everyone. Additionally, they are extremely vulnerable to poor health, unstable economies, and natural disasters. Poor people have less access to health care, education and food, which raises the child mortality rate (the number of deaths per 1,000 live births in the first five years).

According to the HDR report, developing countries have seen significant progress over the last 30 years. For instance, life expectancy increased by eight years. Illiteracy was cut nearly in half, to 25%. And in East Asia the number of people surviving on less than $1 a day was almost halved just in the 1990s.

Inequality in HDI experienced a significant drop globally in the second half of the 20th century. There is no doubt that two of HDI's three components have converged: Since 1920, (1) life expectancy inequality worldwide has decreased significantly, and (2) educational inequality worldwide has likewise steadily decreased. However, the global income distribution has decreased since the 1970s even though it rose during the first half of the 20th century (if weighted by population). In the 1980s and 1990s, as populous Asian nations like China, India, and Indonesia accelerated their economic development, a sizable portion of their incomes shifted to the global middle class, increasing its proportion in the global income distribution and thereby lowering overall inequality. On the other hand, a large number of sub-Saharan African nations saw an increase in their rates of poverty but due to their relatively small populations, they had little effect on worldwide income distribution.

4.3.2 *Absolute and Relative Poverty*

Absolute poverty, which is distinct from income inequality, is living without the bare necessities of food, clothes and housing. As a result, determining this level requires judgment, making it challenging to draw comparisons across different nations. Furthermore, what qualifies as poverty changes depending on the time and place as well as the standard of living. The World Bank claims that although national poverty lines are always below the mean, they rise with mean consumption.

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As a result, many Americans who are labelled poor by their government are materially better off than many Americans from the 1950s or modern-day Africans. The poverty line shifts as the economy grows, and the concept of poverty has changed significantly among civilizations. The poverty rate for developed countries incorporates functional literacy, a higher poverty threshold than for least developed countries, and a higher survival rate. Still, the World Bank established poverty levels in 1985 at $ 1 (Purchasing Power Parity) per day and $2 per day, which translated to $ 1.08 per day and $ 2.15 per day in 1993 and annual incomes of $ 532 and $ 1,064 in 1998. The lower limit, $ 1 per day, is regarded as the absolute minimum by standards used around the world.

4.3.3 *Measurement*

To choose where to concentrate anti-poverty programmes, reliable data are needed. Economists require the bare minimum in terms of data acceptability. For instance, (1) the database must be an actual household survey or census; (2) they should include all income, including non-wage income; (3) data should include local price information, including differences in the cost of living between rural and urban areas; (4) the data must be national in coverage; (5) they should be disaggregated at the canton, district, or county level to pinpoint programmes of poverty reduction; (6) they should avoid lags between collection and publication, and long gaps in data collection should be avoided.

Amartya Sen's Approach

The economist-philosopher Amartya K. Sen of Cambridge University argues that classical welfare economics, which emphasises the revealed preferences or desire-based utilities of individuals in their acts of choice, is insufficient to judge the social good because it lacks sufficient information about people's preferences. Sen's welfare theory, as an alternative, emphasises on people's capacities rather than their attainments (such as meeting their basic wants), as he feels this method can draw from a more comprehensive body of knowledge. Sen concentrates on a small number of fundamental functionings that are essential to wellbeing from a collection of realistic capabilities.

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According to Sen, living is the ability to achieve states of being and doing or a vector of functionings. Since well-being is an inherently ambiguous "broad and partly opaque concept," he does not give these functionings any particular weight. Sen focuses on a select group of fundamental processes that are essential to well-being, such as being well-fed, avoiding premature mortality, appearing in public without embarrassment, being joyful, and being free. The fundamental goal is the freedom to achieve, not the functionings themselves, therefore ability and attainment are not tightly correlated in the same way that income is.

Sen views poverty as the inability to pursue well-being as opposed to a state of poor well-being. This lack may not necessarily be the result of a lack of skills. For instance, it would be strange to refer to Mr. XYZ as "poor" if he earns a good income yet wastes it by living poorly. When fundamental capacities fall short of minimally acceptable levels, poverty results. Sen questions the World Bank economists Ahluwalia, Carter, and Chenery's use of the headcount technique or poverty percentage alone to quantify deprivation and poverty. Sen argues that in addition to the head-count method, we also need the income-gap method, which calculates the additional income necessary to raise the poor to the level of the poverty line. This difference can be stated in terms of per-capita income, or the average amount of income that is below the poverty line. The World Bank defines the income or poverty gap as "the mean shortfall from the poverty line, expressed as a percentage of the poverty line (counting the non-poor as having zero shortfall)". This metric captures both the prevalence and the depth of poverty.

Sen also suggests the Gini coefficient, which calculates the distribution of income among the poor. Sen's three axioms for a poverty index are satisfied by combining the Gini coefficient, head-count approach, and income-gap approach which together represent the Sen measure for evaluating the severity of absolute poverty: (1) the focus axiom, which mandates that the measure depend only on the poor's incomes; (2) the monotonicity axiom, which mandates that the poverty index rise when the poor's incomes decrease; and (3) the weak transfer axiom, which mandates that the poverty measure be sensitive to changes.

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IN-TEXT QUESTIONS

1. Churning poor are the people who move in and out of poverty on a regular basis. (True/False)
2. Which of the following is a characteristic of people below the poverty line?
   (*a*) Debt trap
   (*b*) Gender inequality
   (*c*) Poor health
   (*d*) All of the above
3. Which of the following is a part of transient poor?
   (*a*) Churning poor
   (*b*) Occasionally poor
   (*c*) Both (*a*) and (*b*) are correct
   (*d*) Both (*a*) and (*b*) are incorrect
4. Which of the following programs was initiated by the Government of India to improve the food and nutritional levels of the poor in the country?
   (*a*) Midday meal scheme
   (*b*) Integrated child development scheme
   (*c*) Public distribution scheme
   (*d*) All of the above

4.4 Measures of Income Distribution

The Lorenz Curve and Gini Index

The Gini index is a metric used to assess how concentrated overall income is among both non-poor and poor people. Instead of measuring absolute poverty, income distribution indices measure relative poverty. The value of Gini coefficient lies between 0 and 1. The coefficient value of zero means entire population is having a same level of income whereas, coefficient value of 1 means a single person is receiving all the income. Lorenz curve is often used to depict income disparities (Figure 4.1). The 45-degree line would depict an income distribution that is perfectly equal.

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The further the Lorenz curve from the line of equality the more income inequality persists in the economy and *vice versa*.

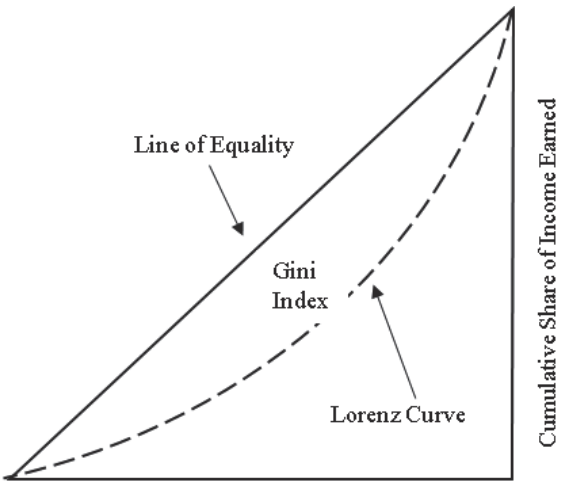

Figure 4.1: Gini Index and the Lorenz Curve

Kuznet's Curve

It shows that while economic development first causes increase in inequality, but as the economy develops, market forces first increase and then decrease inequality levels. As economic growth comes from the creation of better products, it usually boosts the income of workers and investors who participate in the first wave of innovation. One typical example is the industrialization of an agricultural economy. However, this disparity typically only lasts a short while because workers and investors who were initially left behind quickly catch up by contributing to the availability of same or superior products. Their incomes rise as a result.

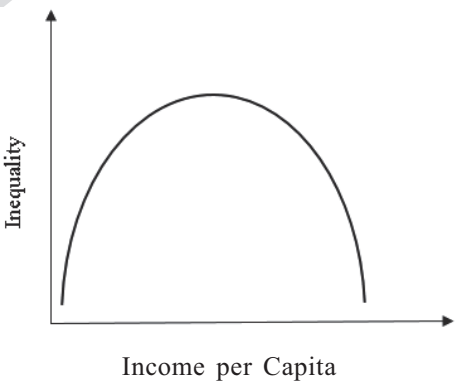

Figure 4.2: Kuznet's Curve

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4.5 Population and Development

Throughout most of our existence, population growth averaged 20 per million people per year, or 0.002 per cent. There were major fluctuations in this expansion as a result of wars, plagues, famines and natural disasters. However, the rate of population growth has accelerated since around 8000 B.C. In the early 19th century, there were one billion people on the planet. The second billion was added in 1930, which was roughly a century later. The third billion emerged in just 30 years, in 1960; the fourth in 15 years, in 1975; the fifth, in 11 years, in 1986; the sixth, in 12 years, in 1998; and the seventh, in 2013, as population growth slowed. Least developed countries are home to 81 per cent of the world's population.

Population growth in developed and developing countries indicates there is a significant difference between different countries in terms of birth rates, mortality rates and population growth. In general, nations can be categorised into three groups: (1) the developed countries and transitional economies, which include nations in Europe, North America, Australia, New Zealand, and Japan, with population growth rates under 0.8 per cent annually; (2) a number of nations in East and Southeast Asia and Latin America, including Argentina, Chile, Cuba, China, Taiwan, South Korea, Thailand, Vietnam, Indonesia, and Sri Lanka, with crude death rates under 9 per 1,000 and annual growth rates below 0.8 per cent annually comes closer to developed countries than to least developed countries; and (3) least developed countries including most of Africa, Asia, and Latin America, with population growth rates of at least 1.9 per cent per year. The birth rate is one of the main differences between the three groups.

World Population: Decelerating yet Rapid Growth

Geographically, the population of the world is not evenly distributed. Asia, Africa, and Latin America are the continents that are expanding the fastest. From 70.0 per cent in 1950 to 81.5 per cent in 2000, their proportion of the world's population increased, and by 2025, it is projected to be 85.1 per cent. Asia, Africa, and Latin America experienced annual population growth rates of 2.1 per cent from 1950 to 2000, doubling the region's population every 33 years. Such expansion is unheard of in human history. Africa is predicted to experience the fastest growth, averaging 2.4 per cent yearly, from 2000 to 2025.

The death rate decreased between 1930 and 1990 as a result of advancements in sanitation, medicine, nutrition and health. Although growth in Latin America and the Caribbean is anticipated to average 1.3 per cent per year through 2025, its current annual rate of 1.7 per cent is based on 23 births and 6 deaths per 1,000 people. With more than 60% of the world's population, Asia is by far the most populous region, despite the fact that its current annual growth rate of 1.3 per cent (with a birth rate of 20 and a death rate of 7) will drop to 1.1 per cent in the following 25 years, from 2000 to 2025. The proportion of the world's population residing in North America and Europe (except from the former Soviet Union) has decreased from 18.0 per cent in 2000 to 12.3 per cent in 2025, from 23.0 per cent in 1900 and 29.5 per cent in 1950. The Russian Federation and six Asian nations are included in the top ten largest nations in the globe list. China and India together made up 41.3% of the global population in 2020. In 2023, India's population surpassed China.

Despite the world experiencing unprecedented population growth over the past 50 to 60 years, faster growth than any other 50 to 60 years period. The rate of growth has been slowing down since its peak rate of 2.3 per cent annually in 1960.

4.5.1 *The Demographic Transition*

In the ancient and medieval periods, Famine, sickness, and warfare were powerful restraints on population expansion throughout the world. For example, Europe lost about one-fourth of its population during the Black Death (1348-50). The population of Western nations grew more quickly and steadily after 1650. First, the rate of population growth rose in England (particularly between 1760 and roughly 1840), then in other parts of Western Europe, and finally in a number of places where Europeans had already established themselves, including the United States, Canada, Australia and New Zealand. The population growth rates in these Western nations did, however, fall about in the same proportion that they had climbed between 1930 and the present. Contrarily, non-Western nations, with the exception of China and Japan, did not initially see high population expansion until around 1930.

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Between a preindustrial, stable population with high birth and death rates and a later, modern, stable population with low fertility and mortality, there is a demographic transition, which is characterised by fast population growth. The four-stage of demographic transition is shown in figure 4.3.

Stage 1: High Fertility and Mortality

We spent the most of our history in this stage. Between 1 and 1650 c.e., annual population growth was only 5 per 10,000; however, in the 18th and 19th centuries, growth in Western Europe was approximately 5 per 1,000, and birth and death rates were high.

In the absence of modern sanitation, medicine, industry, agriculture, trade, transportation, and communication, high mortality rates were unavoidable. In the premodern society, food shortages brought on by floods, droughts, bug plagues, and war were quite serious. Such communities need fertility that is at least equal to mortality in order to survive. Therefore, it is not surprising that high birth rates were supported by the dominant ideology, values, religion, and social structure in the ancient, mediaeval, and early modern worlds.

Stage 2: Declining Mortality

In Europe, this phase started in the 19th century, as modernization gradually decreased mortality rates. With the advancement of agricultural practises, food production increased. At this time, it was particularly crucial to introduce crops like maize and potatoes, both of which could support large families on small plots of land. People were less susceptible to food shortages as a result of advancements in trade, transportation and communication. As nutrition and medical knowledge increased and after the invention and widespread use of soap, inexpensive kitchen utensils, and cotton clothes led to greater personal hygiene, the death rate from infectious diseases like tuberculosis and smallpox decreased. The prevalence of malaria and respiratory disorders decreased as a result of drainage and land reclamation.

Mortality rates began to decline in developed countries about a century earlier in than in developing countries. These rapid falls are a result of methods that industrialised nations have been using for years to improve things like sanitation, medicine, transportation and agriculture. Mortality rates have dropped significantly in developing countries after the Second World War.

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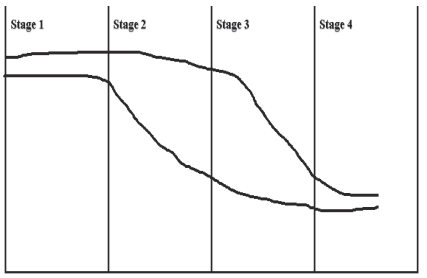

Figure 4.3: Demographic Transition

Stage 3: Declining Fertility

Organized family-planning programs, which provide propaganda and contraceptives to reduce the number of births. Fertility rates decreased as a result of encouraging birth control through education, urbanisation, industrialization and economic development. The motto of the World Population Conference held in Bucharest in 1974, "Development is the best contraceptive," embodies this viewpoint. The number of children born to the average woman during her reproductive years decreased significantly worldwide from the 1960s to the 1990s, especially in the poorest developing nations.

Stage 4: A Stationary Population

According to World Bank predictions, the majority of developing nations won't achieve an exact replacement rate until between 2020 and 2040. The average woman of childbearing age gives birth to just one daughter at this pace, serving as the population's replacement. But despite the fact that replacement-level fertility has been reached, population momentum or growth persists due to earlier fertility rates that led to an age structure with a disproportionately high proportion of women in or below reproductive age. Thus, it will take until 2075 to 2175, or 5 to 14 decades after reaching the precise replacement level, for the majority of developing nations to reach a stationary population (where growth is zero).

4.5.2 *The Malthusian Theory of Population*

Malthus' Essay on the Principle of Population (1798, 1803) is the most well-known book on the balance of food and population. According to Malthus's hypothesis, population growth increased geometrically (1, 2, 4, 8, 16, 32, etc.) whereas food supply increased arithmetically (1, 2,

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3, 4, 5, 6). According to Malthus, moral restraint, exemplified by later marriages and abstinence, would be the only way to stop population growth. Otherwise, there would be wars, plagues, infanticide, abortion and sexual perversion. Even at that time, Thomas Robert Malthus thought that long-term living standards would remain at a subsistence level.

Malthus, however, did not foresee how technological advancement and capital growth would outweigh declining returns on land. According to rough estimates, while the world's population expanded by nine times between 1650 and 2005, food production increased by 14 to 16 times. The expansion in cultivation in the United States, Canada, Australia, and New Zealand was substantially responsible for the world's cultivated land more than doubling or tripling during this time. Through irrigation, multiple cropping, improved seeds, increased use of commercial fertiliser, better farm implements, and other agricultural innovations, output per hectare is likely to have increased by at least fourfold over the course of these 355 years. Malthus also miscalculated how much modernization of the economy, urbanisation, industrialisation, and effective contraception would lower fertility rates.

4.6 Education and Health in Economic Development

According to Theodore W. Schultz, capital goods should always be regarded as produced means of production. However, the idea of capital goods is typically limited to tangible assets, leaving out the skills and other human capabilities that can be improved by investing in human capital. A stream of revenue is produced over time through investing in human capital such as education and training. A significant method of distributing human capital to the relative advantage of the poor is through universal, free elementary education. High primary enrolment rates are linked to comparatively high income shares for the bottom 40 per cent of the population.

Economic Returns to Education

Education enables people to develop and use their talents and abilities. It boosts output, enhances nutrition and health, and reduces the number of children per household. Specific knowledge is imparted through education, which also improves general reasoning abilities, shifts values, makes

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people more open to new ideas, and modifies attitudes towards society and the workplace. Our main concern, though, is how it affects income and poverty levels. According to the World Bank, the average return on education (and human capital) is higher than the average return on physical capital in least developed countries.

The best human investment for alleviating extreme poverty and lowering economic disparity is basic education. Nevertheless, rather than making literacy and general education the objectives for the labour force as a whole in the 1960s, planners in developing countries favoured secondary and higher education that met the high-level labour requirements of the modern sector.

In a 1994 study on the social rates of return to educational investment, George Psacharopoulos found that primary education had the highest average returns. Similar trends are seen in a later study with returns to primary education increasing by 19% annually, secondary education by 13%, and higher education by 11%. For upper and secondary education, the public spends more money per student than for basic education. For higher education, Sub-Saharan Africa spends 100 times as much per student as it does for basic education.

Education as Screening

The wage may not be a suitable indicator of the social rates of return to education. Access to well-paying occupations in LDCs is sometimes constrained by educational requirements. In contrast, utilising educational credentials to filter job applicants is not entirely wasteful and certainly preferable to using criteria like caste, class or family ties.

Additionally, as the supply of educated labour has increased, the wages of skilled labour have steadily fallen in comparison to unskilled labour. According to the World Bank, investing in basic education yielded similar returns to investing in machinery, equipment, and structures, all other things being equal. Theoretically, according to the studies, primary education aids in long-term goal-setting, record-keeping, estimating the benefits of past actions and the risks of future ones, as well as gathering and assessing information about evolving technological trends.

Greater literacy and numeracy increases earning potential significantly in both manual and non-manual jobs. These abilities help accountants,

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clerks, and secretaries perform their duties more effectively, as well as mechanics, machinists and forklift operators. However, employers who are willing to pay for them by providing a wage premium over time will discover cognitive skills, particularly literacy and numeracy, on the job rather than certifying them through formal education.

IN-TEXT QUESTIONS

5. The main characteristic of an underdeveloped economy is that it has a _____.

(*a*) State of deprivation among large proportions of the population

(*b*) High per capita income

(*c*) A large proportion of the about force is in the tertiary sector

(*d*) None of the above

6. Which of the following is not an indicator of an economically developed nation?

(*a*) High levels of literacy

(*b*) Low death rate

(*c*) High per capita income

(*d*) A high proportion of labour in the primary sector

Secondary and Higher Education

While primary education in LDCs is important, secondary and higher education should not be neglected. Despite the high numbers of educated unemployed there are serious skills shortages in some developing countries. Even though these shortages differ from nation to nation, they frequently occur in the professional, technical and scientific fields. More career in-service or on-the-job training is one method that could be used to lower the unit cost of training skilled workers. In a World Bank report on education, Jamil Salmi claims that college or "tertiary education drives a country's future. Policymakers should maximise productivity by utilising the advantages of higher education in conjunction with new information networks and technology.

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Health and Economic Development

Health and economic development show a two-way relationship. The health system is generally improved by development, whereas greater health boosts economic well-being, social cohesion and productivity. The best single indication of a country's health is life expectancy. As discussed above, life expectancy climbed continuously in least developed nations between the 1930s and 2003, with the exception of a decline in Africa from 1994 to 2003, primarily due to HIV/AIDS. More than medical care, general improvements in living conditions were the main cause of these increases.

Despite this, there has been a lot of medical advancement, particularly in the area of communicable illness management. Smallpox and the plague had been virtually eradicated by 1975. Using a production function model of growth, Bloom, Canning, and Sevilla (2004) discover that "a one-year improvement in a population's life expectancy contributes to an increase of 4% in output." Nowadays, cholera and malaria kill less people than they did in 1950. Polio occurrences decreased from 350,000 in 1988 to 700 in 2003 as a result of a global vaccination programme, with 99 per cent of infections occurring in a small number of provinces in India, Nigeria and Pakistan. In addition to causing physical misery and mental anguish, poor nutrition and poor health also lower labour productivity. Inadequate nutrition for a mother during pregnancy and for infants and young children can result in illness and inadequacies in a child's physical and mental growth. Thus, future productivity is hampered.

Adults who are malnourished and sick lose their capacity for work as well as their energy, creativity and learning skills. The poor are primarily affected by malnutrition. Millions of people in least developed nations struggle with malnutrition, but not because they lack access to healthy food or don't know what to eat, but rather because they are unable to pay for it. One billion people worldwide are caught in a cycle of deprivation, hunger and low productivity. It is evident that with improved transport and communication and greater awareness of the need for emergency food aid, fewer people starve to death as a result of severe food crises and famines today than in 1960.

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4.7 Rural Development and Agricultural Transformation

According to the World Bank, 3.3 billion (or 63% of the 5.3 billion population) people reside in rural regions in least developed nations. In addition, as the rural poor move to densely populated cities in pursuit of employment, they become urban poor. For the first time in recorded history, the majority of the global labour force was employed in industries other than agriculture in the late 1980s. Despite accounting for only 4% of global output, agriculture employs nearly 50% of all workers worldwide. Agriculture has a significant role in the economies of least developed nations. In low-income nations, 60% of the working force works in agriculture, which accounts for around 25% of GDP.

Even in middle-income nations, where agriculture still accounts for more than 40% of employment despite having a GDP contribution of just about 10%, the industry is a major employer. It goes without saying that any strategy to eradicate poverty and boost economic development must place a focus on rural development and income distribution, particularly raising the income and productivity of the poor in rural areas. For this to happen, the rural poor in least developed nations require more access to capital, land and productive resources. In order to eliminate rural poverty, the focus of this section is on reducing intra-rural inequities as well as increasing rural income relative to urban income.

4.7.1 *Agriculture's Role in Transforming the Economy*

Agriculture contributes to economic growth through domestic and export surpluses that can be used for industrial development. Farm income growth boosts the market for industrial products as agricultural products and factor markets become better integrated through ties with the rest of the economy. Some least developed nations restrict agriculture during the early stages of modernization in an effort to skip a step in economic transformation, a strategy that is essentially doomed to failure. In fact, Lewis's classical model (1954) calls for a rapid expansion of agriculture to precede or follow economic development: If the capitalist sector doesn't create any food, the demand for it will rise along with the price of food

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relative to other capitalist goods, which will lower earnings. This is one way in which agricultural development is necessary for industrialization, as increasing manufacturing output is not profitable without corresponding increases in agricultural output.

This explains why industrial and agrarian revolutions constantly coexist and why static agricultural economies do not experience industrial progress. Between 1868 and 1914, Japan experienced rapid growth thanks to a rice-growing Green Revolution, low food prices, and low real wages. Like in Japan, rapid agricultural development and technological advancement frequently accompanied rapid economic growth, which paradoxically occurred at a time when agricultural output and labour force shares were declining. Gross farm income increases more slowly than average income thanks to Engel's law, which assumes that the income elasticity of demand for manufactured goods is greater than one and that it is less than one for agricultural items.

4.7.2 *Issues in Agricultural Sector*

- **Resources and technology shortages:** Low capital per worker and insufficient technology contribute to the low agricultural revenue and productivity in LDCs. Tenants, sharecroppers, and landless workers receive nearly no credit, while small farm owners receive little of it. The Green Revolution's high-yielding varieties (HYVs) have benefited huge portions of Asia, particularly large farmers, but most of Africa's agriculture has been left out since it lacks basic infrastructure. The absence of effective demand and political power among small farmers in the majority of Africa also contributes to the lack of research and development to enhance technologies suitable for them.
- **Concentration of Land, Capital and Technology:** Land, capital, and agricultural technology are frequently concentrated among large farmers who have more access to markets and inputs, compared to many small cultivators who may be marginalised and occasionally forced to work for a wage. Many of the poor are smallholder farmers who work long hours and are heavily involved in agricultural production, with a large proportion of them being women. However, they lack

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the productive resources (fertiliser, better seeds, equipment, tools, land and skills) and new technology needed to escape their poverty trap.

- **Low Educational and Skill Levels:** Average wages in metropolitan areas are higher than those in rural areas. School years, a key determinant of productivity and skill, are lower in rural than in urban settings. For instance, in India, a child born in a city has an eight times greater probability of having a university degree than a child born in a rural community. They also have a two times greater chance of receiving a primary or secondary education. Children living in cities have access to more schools of higher calibre. A lot of rural education is also not related to the economic requirements of the local community.
- **Rural-Urban Migration:** Rural emigrants typically have higher levels of education, skill, and money than the norm for rural areas due to the possibility of finding better-paying work in urban areas.
- **Policies of Urban Bias:** According to British economist Michael Lipton, rather than between labour and capital, as Karl Marx argued, the most important class disputes and economic disparities are between rural and urban groups. The government directs the majority of its resources to cities, a policy of urban bias, notwithstanding development plans that declare agriculture to be the highest priority sector and political rhetoric that emphasises the needs of the poor rural people. Planners and legislators in LDCs are more inclined to address the issues raised by the more vocal, organised, and influential urban residents. For instance, in order to produce meat and milk for the urban middle and upper classes, or to cultivate cocoa, coffee, and other commodities, farmland is diverted from being used to grow millet and beans for hungry villages.
- **Seasonal Poverty and Hunger:** Contrary to popular belief, mild undernourishment is more prevalent in rural than in urban regions because limited income rather than a lack of food is more likely to be the cause. However, studies by the Food and Agriculture Organisation (FAO) of several least-developed nations show that the percentage of the population suffering from severe malnourishment in rural areas is lower than in urban areas because of greater access

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to subsistence food production. Nevertheless, rural areas experience significant hunger. There is often a "hungry season" before the start of a fresh harvest, particularly in West Africa. Poor rural households are locked in a cycle of poverty where selling labour and taking out loans at high interest rates to get through the lean times results in lower income and higher interest costs in the following years.

- **Vulnerability of the Rural Poor:** Peasants and the rural poor are particularly vulnerable because they deal with poor infrastructure, unfair policies, high disease rates, inadequate support networks and market failure. This makes them "extremely risk averse and reluctant to engage in the high-risk, high-return enterprises that could pull them out of poverty. The World Bank warns that one mistake could push them into even greater poverty. Over a 20-year period, three-fourths of rural Ethiopian households experienced a harvest failure, which caused notable fluctuations in farm income. With a coefficient of variation (deviation of a variable from its mean) ranging from 0.37 to 1.01, farmers in rural south Indian communities likewise experienced significant income swings. In order to reduce risk, LDC farm families may diversify their crops, look for non-farm employment, engage in sharecropping, create social networks, or put money away for "rainy days".

4.7.3 *Policies to Increase Rural Income and Reduce Poverty*

This section focuses on improving income distribution to raise average rural earnings and lower the proportion of the rural population living in poverty.

- **Agrarian Reform and Land Redistribution:** Despite the fact that land is typically the most valuable possession that families possess or desire to possess, in most low-income countries, the amount of arable land per person in the agricultural population decreased between 1965 and 2004. Additionally, land ownership is highly concentrated in many LDCs, with a small number of landholders controlling the majority of the country's land. But the majority of holdings are smaller than two hectares each. If the rural poor have access to productive resources, the most crucial of which is land, they can raise their income.

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- **Secure Property and Usufruct Rights:** least developed nations must choose between the need for secure property rights and an equitable land allocation. Differences between DCs and LDCs are mostly explained by legal and secure property rights. Individuals are incentivized to invest in resources and make efficient use of them through the assignment of rights and benefits resulting from resource utilisation through property rights. A clear allocation of land rights to owner-operators often boosts the efficiency of farm production due to the high expense of supervising agricultural wage workers. The usage and improvement of agricultural land may suffer from a lack of clear property rights. The effective use, trade, investment, conservation, and management of resources [such as land] depend on the existence of property rights.
- **Capital:** Agriculturalists often believe that mechanization's success in increasing production in the US and Canada may be replicated in low-income countries. However, because labour tends to be cheap and capital is expensive in LDCs, technology developed for developed countries is frequently not appropriate there. Planning in these nations must ensure that the increased output from new equipment justifies its high price. If expensive machinery is used, it should be rented out to all farmers in order to spread the cost over a sufficient number of units to be cost-effective. If new equipment is employed to decrease costs during planting and harvesting, it is more likely to pay for itself.
- **Credit:** Weak competitive dynamics, poor legal enforcement, a lack of accountability, corruption, a lack of collateral from poorly defined property rights, and the rationing out of small farmers are all prevalent flaws in the farm credit market. The village money lender-large landowner, who may charge interest rates of 5 to 10 per cent each month, is the primary source of finance for many small farmers. Although the repayment terms are more flexible, some small farmers prefer this credit to bank or government credit. These farmers, however, have a distinct need for financing that would necessitate a different loan provider. Small farmers frequently need to fund expenses incurred between sowing and harvest, and as they have limited fixed capital, they are forced to pledge their land as

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security. It is necessary to use government-managed financing to pay for technological advancements like high-yield grain varieties as well as the extension assistance, storage facilities, irrigation, and fertiliser needed to make use of a new technique.

- **Research and Technology:** The relative supply of land and labour is crucial in determining appropriate agricultural technical change, and agricultural growth alleviates the production constraints imposed by inelastic land and labour supplies. Technical and institutional changes are sparked through the responses of farmers, agribusiness entrepreneurs, scientists, and public administrators to resource endowments and to changes in the supply and demand of factors and products. Research-led technological change in agriculture contributes to high rates of return and has a significant impact on reducing poverty, but we want to emphasise that the technology used should depend on available resources. For example, Japan, with a ratio of farm workers per cultivated hectare that is almost 50 times higher than that of the United States, has prioritised biological and chemical tillage.
- **Extension Services:** The government can facilitate or offer many public goods, including agricultural information, technology, and investments in human capital. Extension agents can provide farmers with knowledge and the findings of agricultural research. The agent has a significant and diversified responsibility and is answerable to the farmer. Agents must make contact with farmers, speak with them, convey basic technical knowledge, be able to personally demonstrate it, spot problems, be aware of resources for technical assistance and training, recognise farmers who pose a good risk for defaulting on loans, arrange for the delivery of fertiliser, seeds, and other inputs from government depots, and clearly communicate farm issues and characteristics to researchers and planners. Additionally, where information and communication technologies are available, all of this can be done more efficiently. The World Bank has emphasised the need to create institutionally pluralistic networks of institutions that offer a range of information and innovation services to rural populations as agricultural extension systems. Such extension systems must be driven by demand, have better ties to

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their customers, improve their efficiency, and find more reliable sources of funding.

- **Water and other Input Availability:** Irrigation boosts agricultural output. It increases the amount of land that can be farmed, allows for the growing of multiple crops each year, and controls the water flow. Water availability and access can still be a challenge for small farmers, especially in Asia. For instance, in Pakistan's century-old irrigation system in the Indus River valley, powerful, large farmers receive first dibs on the water that is available, wasting it because price is unrelated to usage. In fact, the effectiveness of land reform frequently depends on the reform of water rights.
- **Transport:** Because of high transport costs, LDC crops that would otherwise be competitive with those in other nations frequently are unable to join international markets. The cost of producing farm products and getting them to markets can be reduced by investments in roads, railroads, port dredging, canals, and other forms of transportation.
- **Marketing and Storage:** Inadequate marketing channels and storage capacity frequently impede grain sales outside the region of production and reduce the productivity advantages of the Green Revolution. For instance, many farmers in the Philippines were unable to raise two crops of rice each year in the 1960s due to a lack of storage and drying facilities. Additionally, the wheat produced in 1968 had to be stored outside or in schools in northern India. Up to one-third of this crop was lost by rats and rain. Government must make plans for how new agricultural methods and seeds will affect marketing and storage. Government may provide the necessary infrastructure, such as roads and grain bins, establish consistent grades and standards that heighten the incentive to enhance product quality, and by providing farmers with information on national prices, assist them in making decisions regarding the crops to plant, the timing of sales, and the construction of storage facilities. Official marketing boards have been established in many least developed nations to purchase commodities from farmers for export on the global market. However, these boards frequently amass money to transfer from agriculture to industry and have a tendency to demand a monopsony position in

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order to ensure financial success. However, the boards can control crop prices and offer other services such as promotion, extension help, and research into production and the market.

- **Price and Exchange Rate Policies:** In the short term, rising agricultural production and inflexible demand are likely to result in decreased agricultural terms of trade, decreased rural real income, and a rise in urban-rural disparities. Production-oriented programmes must therefore be linked with pricing and exchange rate regulations, enhanced rural services, land reform, farmer collaboration, and more rural industry in order to eliminate rural poverty. According to empirical research, LDC agriculture has a high long-run elasticity of supply, or a high percentage change in quantity supplied in response to a 1-per cent change in price. Long-term means the farmer can change the number of hectares allocated to a certain crop. When agricultural input and product prices are low, technological advancement is more effective. When agricultural prices are allowed to fluctuate freely rather than being tightly controlled, researchers and extension specialists are more likely to innovate.
- **Improving Rural Services:** Compared to rural areas, urban areas have significantly more schools, medical facilities, piped water, etc. It is crucial to narrow the educational gap between children in rural and urban areas. Increased public education spending in rural areas, redistributes money to the poor. Additionally, the rural areas will be able to retain and draw in more educated residents if rural schools start to place more emphasis on curricula that prepare students for rural employment.
- **Rural Industry:** Prior to liberalisation in 1991, India restricted industrial growth and the establishment of new businesses in metropolitan areas, while giving preferential treatment to businesses located in industrially "backward" non-metropolitan areas.
- **Agricultural Biotechnology:** Biotechnology is the application of biology to human use. Enzymes in cheese manufacturing and other food processing are examples of older use, along with fermentation for drink and food, plant and animal breeding. Tissue culture, which bypasses slower cross-fertilization and seed production, is one of the new biotechnological applications. Marker-assisted selection,

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which shortens plant breeding by directly identifying desired DNA segments or genes, reduces the number of generations necessary to develop a new variety; and genomics, which describes and deciphers the sequence, location, function, and interaction of genes, are other applications. Agricultural biotechnology has advantages like as quality improvements and possibly significant productivity gains (lower labour, capital, fertiliser, or harmful herbicide inputs), which are essential to eradicating rural poverty.

4.8 Summary

Poverty is multidimensional, including lack of authority and voice, starvation, illiteracy, bad health, inadequate infrastructure and low income. Inequality has significantly decreased over the past fifty years, in large part due to improvements in both global health and educational disparities. Absolute poverty is defined as living without enough money to afford the bare necessities of food, clothes and shelter. The $ 1/day poverty line was initially based on income necessary to prevent undernourishment, but after 1985, international poverty has been linked to a PPP exchange rate income. The vast majority of the world's poor live in sub-Saharan Africa, South Asia and East Asia.

By redirecting funding from cutting-edge curative treatment in urban hospitals to primary healthcare services including preventative care, easy-to-understand health information, a better physical environment for health, and non-traditional or middle-level medical professionals in a variety of rural clinics, least developed nations can improve efficiency and equity. The poor's access to job opportunities and earning potential is restricted by illness and inadequate nutrition. Food rationing or subsidies boost the income of the poor, improve nutrition and health, let individuals work more days per year, and raise productivity at work. The cost of feeding programmes, however, makes it unlikely that they will continue unless food production per capita is increased or maintained. Poverty is a very circular problem.

Low incomes in rural areas are caused by a lack of capital (including that required for health and social services), a lack of technology, low educational and skill levels, the brain drain to urban areas, regulations governing food prices, below-market foreign currency rates, and governmental

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bias in favour of urban areas. Rural poverty rates are further influenced by land concentration, the technological bias in favour of large farmers, and significant seasonal revenue fluctuations. There are numerous policies that could raise income in rural areas and lower rural poverty.

Land reform and redistribution, the creation of rural credit organisations, the development of labour-intensive capital equipment, agricultural research facilities that carry out on-farm tests, research facilities to develop and adapt the technology for small farmers, an extension service integrated with development organisations, an irrigation authority that carefully considers the viability of proposed projects, and government ministries that provide suitable and timely inputs to farmers are all commendable. Additionally, increasing spending on social and educational services in rural areas, redistributing land to the rural poor, establishing agro-industries, industries producing basic consumer goods, and other small industries in rural areas, as well as investments in marketing, transport, and storage facilities for agricultural commodities, would all help the rural poor. If credit, extension, and inputs are easily accessible, the small family farm is well positioned to have high productivity per hectare in the least developed nations.

Agricultural innovations and new technology, increased extension services, and other production-oriented rural development initiatives are likely to lower agricultural terms of trade and, as a result, short-term rural incomes. Production-oriented programmes must be linked with policies to raise relative farm prices and the income distribution in rural areas if we are to boost the incomes of the rural poor. In underdeveloped nations, agricultural biotechnology offers a significant potential to raise yields per hectare and per person. Due to significantly lower average incomes, rural inhabitants are more likely to be poor than urban populations. Agricultural labourers, the landless, and those who are nearly landless are the groups most affected by rural poverty. Rural poor households make up a disproportionately large fraction of the population.

In the second half of the 20th century, population growth—especially in LDCs—surpassed all previous records. However, population growth has slowed down since 1960. The population of the developing world is currently growing by 1.6 per cent annually. Asia is home to more than half of the world's population. The demographic transition is a period

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of significant population increase that occurs between a preindustrial, stable population with high fertility and mortality rates and a late modern age with approximately equal birth and death rates. Economic growth, urbanisation, industrialization, mobility, literacy, female labour force involvement, reduced income disparity, and increased family-planning initiatives all lead to a decline in fertility. However, these initiatives are unlikely to be successful unless birth control becomes advantageous due to socioeconomic development and improved income distribution. Since the 1960s, low-income countries fertility rates have been declining due to family planning and development initiatives.

Because Malthus failed to anticipate that technological advancement, capital accumulation, and voluntary birth control would maintain a secure food and population balance, his predictions that the population would outgrow the food supply in the past were incorrect. The amount of food produced by agriculture now is adequate to feed everyone on the planet. The agricultural output per worker in industrialised countries is roughly 25 times higher than in developing countries due to high levels of capital accumulation, technical expertise and worker productivity. Agriculture in least developed nations was formerly dominated by subsistence farming. High birth rates and rapid population growth have significant consequences, including increased urbanisation and congestion, a rapidly expanding labour force, rising unemployment, and heavy dependency burdens.

4.9 Answers to In-Text Questions

1. True
2. (*d*) All of the above
3. (*c*) Both (*a*) and (*b*) are correct
4. (*d*) All of the above
5. (*a*) State of deprivation among large proportions of the population
6. (*d*) A high proportion of labour in the primary sector

4.10 Self-Assessment Questions

1. Define absolute poverty? Explain how absolute poverty is different from relative poverty.

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2. What does Sen meant by the Gini approach, headcount approach, and income-gap approach to poverty?
3. Write a short note on Gini Index and Lorenz curve.
4. Explain Kuznet's curve. Does the rising segment of the inverted U-shaped curve imply that the poor suffer from economic growth?
5. List down the policies do you think are most effective in reducing poverty and income inequality in developing countries.
6. Discuss why LDC women have higher poverty rates than men. What LDC policies would reduce female poverty rates?
7. Is there a trade-off between LDC policies seeking to reduce income inequality and those trying to stimulate growth?
8. Discuss the role of agricultural sector in the economic growth of an economy?
9. Why is agricultural productivity in DCs so much higher than in LDCs? How does a peasant economy differ from that of a commercial farm economy?
10. What factors contribute to the high incidence of rural poverty in LDCs?
11. What policies are most effective in increasing rural income and reducing rural poverty?
12. How does LDC government investment in educational expansion affect income distribution?
13. What are some of the ways that an LDC can increase its rate of returns to investment in secondary and higher education?
14. What are the reasons for differences in the cross-national labour productivity?
15. Why has the LDC population growth rate decelerated in recent decades?
16. Explain the demographic transition theory with respect to India.
17. Which policies are more important for reducing fertility: Family-planning programs or socioeconomic development?

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4.12 Suggested Readings

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LESSON

5

Empirical Explorations of Economic Progress & Development

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STRUCTURE

5.1 Learning Objectives

- Describe the concept of micro perspective.
- Understand the need of studying randomized control trials.
- Explain the importance of studying new empirical research directions.
- Familiarizing with the new empirical techniques.

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5.2 Introduction

Understanding the intricate dynamics of economic growth and development requires a deep dive into the micro-level factors that shape individual and firm behaviours. In recent years, researchers have increasingly adopted a micro perspective in empirical research, delving into the granular details of economic phenomena to uncover new insights. This Chapter explores the emerging empirical research directions within the micro perspective that contribute to our understanding of economic growth and development. By analysing individual decisions, firm-level dynamics, and local contexts, these research directions shed light on the mechanisms driving economic progress.

In the realm of economics, empirical research plays an indispensable role in unravelling the intricate relationships and multifaceted factors that propel economic growth and development. Throughout the years, scholars have tirelessly pursued innovative methodologies to improve the accuracy and reliability of their studies. One such method that has become popular is the use of randomized control trials (RCTs). This chapter embarks on an exploration of novel empirical research avenues, within the context of economic growth, development and data analysis.

Randomized control trials are special experiments where participants are randomly assigned to either a group that receives a specific treatment or a group that does not receive any treatment. By randomly assigning participants, Randomized Control Trials (RCTs) help researchers establish cause-and-effect relationships and confidently attribute the observed outcomes to the treatment being studied. Randomized Control Trials (RCTs) have traditionally been used in medical research, but they are now being widely used in economics as well.

This chapter devoted to new empirical research directions in economics. It specifically delves into their application in comprehending economic growth, development and data analysis. By harnessing the power of Randomized Control Trials (RCTs), researchers and policymakers can gain valuable insights into the effects of interventions, create evidence-based policies, and promote sustainable economic progress. The integration of advanced data analysis techniques further bolsters the authenticity and richness of findings, paving the path for informed and impactful decision-making within the realm of economics.

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5.3 Micro Perspective for Economic Growth and Development

In the realm of economic development and growth, the micro-perspective focuses on understanding the importance of individual agents like households, firms, and entrepreneurs in shaping overall economic outcomes. It recognizes that the collective decisions and actions of these individuals play a significant role in determining how the economy performs as a whole. The micro-perspective highlights key factors such as human capital, entrepreneurship, technological innovation, and institutional frameworks that influence individual behaviour and impact economic development. It explores how individuals make choices regarding investments, education, savings, work, and entrepreneurial endeavours, and how these choices collectively contribute to economic growth. By studying the micro perspective for economic development, researchers and policymakers gain valuable insights into the mechanisms through which economic policies and interventions can promote inclusive growth, reduce poverty, and improve overall well-being. It helps identify the obstacles and limitations faced by individuals, allowing for targeted interventions to address these challenges and ultimately foster sustainable and fair economic development. In the pursuit of understanding economic growth and development, adopting a micro perspective is crucial. A micro perspective focuses on the individual-level dynamics, firm-level behaviours, and localized contexts that collectively shape economic outcomes. The importance of adopting a micro perspective when examining economic growth and development, emphasising how it can reveal complex ideas and guide policy responses.

***Understanding Individual Decision-Making*:**

Individual decision-making forms the core of economic growth and development. A micro perspective allows researchers to delve into the factors influencing individual decision-making, such as human capital investment, labour market participation, and entrepreneurial activities. By examining individual behaviours, preferences, and constraints, researchers gain insights into the microeconomic foundations of economic growth. Understanding how individuals respond to incentives, navigate market opportunities, and interact with institutions is vital for formulating policies that promote inclusive and sustainable development.

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- Analysing the factors influencing individuals' decisions to invest in education and skills training, and how these decisions impact their employability and income levels.
- Studying the determinants of individuals' entrepreneurial choices, such as access to financing, social networks, and local market conditions, to identify strategies for promoting entrepreneurship and fostering economic growth.

***Firm-Level Dynamics and Innovation*:**

The growth and development of the economy are mostly driven by firms. Analysing firm-level dynamics within a micro perspective provides valuable insights into productivity, innovation and competitiveness. Researchers explore factors such as managerial practices, technology adoption, access to finance, and market competition to understand the mechanisms that drive firm-level performance. Micro-level analysis also uncovers the role of entrepreneurship, firm entry and exit, and knowledge spillovers in fostering economic growth. By understanding the dynamics of firms, policymakers can design targeted interventions that support business development and stimulate innovation:

- Examining the impact of managerial practices, technology adoption, and research and development investments on firm-level productivity and competitiveness.
- Investigating the role of innovation ecosystems, industry clusters, and knowledge spillovers in fostering innovation and promoting economic growth in specific regions.

***Local Context and Institutions*:**

A micro perspective emphasizes the importance of local contexts and institutions in economic growth and development. Local factors such as geographic location, infrastructure, cultural norms, and institutional frameworks influence economic outcomes. Researchers examine how these factors interact with individual and firm behaviours, shaping local economies and regional disparities. By considering the heterogeneity across regions and understanding the unique challenges and opportunities they face, policymakers can tailor interventions to address specific needs, foster regional development, and promote equitable growth.

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- Exploring the influence of local infrastructure, transportation networks, and access to markets on firms' location choices and their subsequent impact on regional economic development.
- Analysing the role of institutional factors, such as property rights protection, contract enforcement, and regulatory frameworks, in shaping investment decisions and attracting foreign direct investment (FDI) to specific locations.

***Social Networks and Social Capital*:**

Social networks and social capital play a significant role in economic growth and development. A micro perspective enables researchers to explore the influence of social networks on information flows, resource allocation, and economic opportunities. Understanding the structure and dynamics of social networks provides insights into how social capital fosters trust, co-operation, and knowledge diffusion, which are essential for economic progress. Policymakers can leverage social networks to facilitate entrepreneurship, promote inclusive growth, and strengthen community-based initiatives:

- Studying the role of social networks in facilitating access to information, resources, and market opportunities for entrepreneurs, particularly in underserved communities.
- Examining the impact of social capital and community-based organizations on poverty reduction, social inclusion, and economic empowerment, especially among marginalized groups.

***Gender and Inclusive Development*:**

Promoting gender equality and inclusivity is a crucial aspect of economic growth and development. Micro-level analysis sheds light on the unique challenges faced by women and marginalized groups and examines the impact of gender disparities on economic outcomes. Understanding the gender dimensions of economic decision-making, labour market participation, and access to resources helps policymakers design interventions that empower women, reduce gender gaps, and foster inclusive development. A micro perspective ensures that development strategies are sensitive to the diverse needs and potentials of all individuals and groups.

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- Investigating the barriers faced by women entrepreneurs in accessing credit, networks, and business opportunities, and identifying strategies to promote gender equality and women's economic empowerment.
- Assessing the impact of gender-responsive policies, such as childcare support and parental leave, on women's labour force participation, productivity, and economic outcomes.

Conclusion

Adopting a micro perspective is essential for comprehending the intricacies of economic growth and development. By understanding individual decision-making, firm-level dynamics, local contexts, social networks, and gender dimensions, researchers and policymakers can gain nuanced insights that inform targeted interventions. A micro perspective emphasizes the importance of inclusive and sustainable development, tailoring policies to specific contexts, and fostering entrepreneurship and innovation. By leveraging the power of micro-level analysis, we can drive economic growth and development that benefits individuals, firms, and communities, leading to prosperous and equitable societies.

5.4 Randomized Control Trials

In recent times, the application of Randomized Control Trials (RCTs) in economic studies has broadened its purview, encompassing diverse inquiries pertaining to economic growth and development. These trials yield valuable insights into the efficacy of policies, interventions, and programs designed to foster economic progress. They enable researchers to evaluate the impact of specific measures on crucial variables such as productivity, employment, investment, education, health and poverty reduction. Randomized Control Trials (RCTs) furnish policymakers with a potent instrument to devise interventions grounded in empirical evidence, optimize the allocation of resources, and maximize the efficacy of their initiatives.

One salient advantage of Randomized Control Trials (RCTs) lies in their capacity to encapsulate the heterogeneity of responses within a population. By randomly assigning participants, researchers can meticulously analyse the differential effects of interventions across various subgroups, taking into account factors such as age, gender, socio-economic status,

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and geographic location. This micro-perspective facilitates a nuanced comprehension of the underlying mechanisms at play, enabling policies to be tailored to specific groups, thus ensuring more comprehensive and precisely targeted development strategies.

Additionally, Randomized Control Trials (RCTs) have benefited from advancements in data analysis techniques, making them even more reliable and informative. With the availability of large datasets and sophisticated analysis methods, researchers can gain deeper insights from Randomized Control Trials (RCTs). Techniques like machine learning, natural language processing, and predictive analytics have improved the interpretation of results, helping researchers find hidden patterns, make predictions, and understand complex relationships in economic growth and development.

Randomized Control Trials (RCTs) have become an important tool in economic research, allowing us to evaluate policies and programs carefully. By randomly assigning people to different groups, Randomized Control Trials (RCTs) help us understand how certain factors affect economic growth and development. Lately, researchers have been using a micro-perspective in Randomized Control Trials (RCTs), which gives us more detailed insights into specific contexts and groups of people. This new direction emphasizes the importance of data analysis in drawing meaningful conclusions.

***Exploring Heterogeneity*:**

Instead of looking at the big picture, micro-perspective Randomized Control Trials (RCTs) help us understand how different groups of people respond to interventions. By analysing data from various demographics, socioeconomic backgrounds, and locations, we can identify factors that affect the impact of interventions. Policymakers can use this information to create policies that work better for specific groups and have a targeted impact.

***Contextual Factors and Externalities*:**

Randomized Control Trials (RCTs) are great for understanding how contextual factors and externalities influence shape economic outcomes. By looking at broader social, institutional, and environmental aspects, researchers can see how interventions interact with these factors. This helps us understand the unintended consequences and overall effects of

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policies. It also allows policymakers to design comprehensive policies that take into account the specific context and have a lasting impact.

***Long-term Effects and Intergenerational Impacts*:**

While short-term outcomes are important, understanding the long-term effects of policies and interventions is crucial for sustainable development. Micro-perspective Randomized Control Trials (RCTs) offer an opportunity to study the intergenerational impacts of interventions, capturing effects that manifest over extended periods. By tracking participants over time and collecting data on education, health, and income, we can see the long-lasting effects on individuals, families, and communities. This knowledge helps us understand the link between economic growth, human development, and social well-being.

***Mechanism Analysis and Mediation Pathways*:**

Micro-perspective Randomized Control Trials (RCTs) allow us to dive deeper into the mechanisms through which interventions influence economic outcomes. By collecting data on intermediate factors and analysing mediation pathways, we can identify the specific channels through which interventions have an impact. This helps us refine policies, allocate resources more effectively, and improve the efficiency of interventions.

***Leveraging Advanced Data Analysis Techniques*:**

With the availability of big data and advancements in data analysis, micro-perspective Randomized Control Trials (RCTs) can benefit from sophisticated methods. Techniques like machine learning, natural language processing, and predictive analytics help researchers extract valuable insights from large datasets. Combining Randomized Control Trials (RCTs) data with administrative records, geospatial information, or satellite imagery adds depth to the analysis and broadens the scope of investigation.

***Conclusion*:**

Micro-perspective Randomized Control Trials (RCTs) give us a better understanding of how policies and interventions affect economic growth and development. By looking at differences, considering the bigger picture, studying long-term effects, understanding mechanisms, and using advanced data analysis, we can make more informed policy decisions. Micro-perspective Randomized Control Trials (RCTs) will continue to be

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a powerful tool for shaping economic policies and driving sustainable development.

IN-TEXT QUESTIONS

1. What role does empirical research play in understanding economic growth and development?

(*a*) It has no impact on economic growth and development

(*b*) It provides valuable insights into the factors that drive economic growth and development

(*c*) It focuses on macro-level analysis only

(*d*) It relies solely on theoretical models

2. What is the purpose of Randomized Control Trials (RCTs) in economic research?

(*a*) To establish causal relationships and provide insights into the impact of interventions

(*b*) To analyse historical data only

(*c*) To determine macroeconomic indicators only

(*d*) None of the above

5.5 New Empirical Research Directions for Economic Growth and Development

Empirical research plays a vital role in understanding the factors behind economic growth and development. As our understanding grows, new research directions emerge, bringing fresh perspectives and insights to the field. These directions encompass diverse approaches, data sources, and methodologies that enhance our understanding of complex economic phenomena.

***Leveraging Big Data and Unconventional Sources*:**

The advent of big data has transformed empirical research in economics. Researchers now have access to vast and varied datasets that capture different aspects of economic activity. By using administrative records, transaction data, social media feeds, and even satellite imagery, economists can analyse economic dynamics with greater detail and accuracy. These

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unconventional data sources provide insights into consumer behaviour, market trends, and policy impacts, enabling more precise policy recommendations and targeted interventions.

***Spatial and Regional Analysis*:**

Understanding the spatial aspects of economic growth and development is crucial for effective policies. Researchers are increasingly using spatial analysis techniques to study regional disparities, agglomeration effects, and the role of infrastructure. By mapping economic activities, analysing spillover effects, and considering the unique characteristics of different regions, empirical research can guide targeted regional development strategies and promote inclusive growth.

***Behavioural Economics and Psychology*:**

Empirical research now recognizes the importance of behavioural economics and psychology in shaping economic outcomes. New research directions explore biases, heuristics, and social influences that affect decision-making and market behaviour. By incorporating insights from behavioural economics, empirical research provides a deeper understanding of economic phenomena and offers practical solutions to improve decision-making and market outcomes.

***Environmental Sustainability and Climate Change*:**

Empirical research is expanding its focus to include environmental sustainability and climate change. New directions examine the interactions between economic growth, environmental policies, and sustainable development. This includes assessing renewable energy subsidies, analysing the economic impact of climate mitigation strategies, and quantifying the costs and benefits of environmental regulations. By integrating environmental considerations, economists contribute to a more sustainable future.

***Technology, Innovation, and the Digital Economy*:**

Technological advancements and the digital economy have transformed economic landscapes. Empirical research explores the impact of technology and innovation on growth, productivity, and income distribution. Researchers analyse automation, artificial intelligence, and digital platforms to understand their effects on labour markets, firms, and entrepreneurship. By studying the digital economy, empirical research provides insights into sustainable economic growth in the digital age.

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***Conclusion*:**

New empirical research directions for economic growth and development expand our understanding of complex economic phenomena. Leveraging big data, spatial analysis, behavioural economics, environmental sustainability, and technology research, economists gain fresh insights to inform evidence-based policies. These approaches enhance our knowledge of economic systems and contribute to inclusive and sustainable development strategies.

***Here are some examples of new empirical research directions for economic growth and development*:**

- **The Influence of Digital Platforms:** Researchers are exploring how digital platforms, such as online marketplaces and sharing economy platforms, shape economic growth. They examine the effects of these platforms on market dynamics, employment patterns, and innovation across various industries.
- **Behavioural Insights and Decision-Making:** Empirical research is tapping into the field of behavioural economics to design interventions that encourage individuals and businesses to make better economic choices. These interventions, known as nudges, aim to promote sustainable consumption, investment, and savings behaviours.
- **Social Connections and Economic Outcomes:** Investigating the role of social networks in economic progress, researchers analyze how personal connections and social capital impact entrepreneurship, resource access, and innovation within communities.
- **Climate Change and its Economic Implications:** With a focus on environmental concerns, empirical research explores the economic consequences of climate change. Scholars examine the effects of climate-related factors on agricultural productivity, natural resource management, and the resilience of economies in the face of environmental shocks.
- **Gender Equality and Economic Development:** Empirical research sheds light on the relationship between gender equality and economic growth. It investigates the influence of gender disparities on employment, education, entrepreneurship, and access to financial services, aiming to foster inclusive economic progress.

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- **Financial Inclusion for Sustainable Development:** Researchers study the impact of financial inclusion initiatives on economic development. By analyzing the effects of expanding access to financial services, such as microfinance, mobile banking, and financial literacy programs, they seek to enhance opportunities for entrepreneurship, poverty reduction, and overall economic well-being.
- **Progress towards Sustainable Development Goals:** Empirical research evaluates advancements made towards achieving the United Nations' Sustainable Development Goals. Scholars assess the effects of policies and interventions aimed at addressing issues like poverty, inequality, education, health, and environmental sustainability.
- **Global Trade and its Effects:** Researchers examine the impact of international trade and globalization on economic growth and development. They analyze the effects of trade agreements, foreign direct investment, and global supply chains on employment, productivity, and technological advancement.
- **Infrastructure Investment and Economic Growth:** Empirical research investigates the consequences of infrastructure investment on economic progress. Scholars analyze the effects of investments in transportation, energy, and digital infrastructure on productivity, connectivity, and regional development.
- **Education and Skills Training for Economic Outcomes:** Researchers study the effects of education and skills training programs on economic outcomes. They analyze the impact of educational attainment, vocational training, and lifelong learning on employment, income distribution, and technological advancement.

These examples represent the diverse array of new empirical research directions that contribute to our understanding of economic growth and development. By exploring these areas, researchers provide valuable insights to inform evidence-based policies and interventions for sustainable and inclusive economic progress.

IN-TEXT QUESTIONS

3. How do RCTs contribute to understanding the effectiveness of policies and programs?

(*a*) By randomly assigning participants to different treatment groups

(*b*) By analysing big data and alternative data sources

(*c*) By considering spatial dimensions and regional analysis

(*d*) By studying the long-term effects and intergenerational impacts

4. What is the significance of a micro-perspective approach in conducting RCTs?

(*a*) It focuses on macroeconomic factors and aggregate analysis

(*b*) It helps uncover nuanced insights specific to different subgroups and contexts

(*c*) It relies on advanced data analysis techniques like machine learning and predictive analytics only

(*d*) None of the above

5. What are some examples of advanced data analysis techniques used in RCTs?

(*a*) Random assignment and control groups only

(*b*) A Machine learning, natural language processing, and predictive analytics

(*c*) Spatial econometrics and network analysis only

(*d*) None of the above

6. How does the micro-perspective approach benefit policymakers in designing interventions?

(*a*) It helps policymakers target policies to specific groups and design more effective interventions

(*b*) It disregards the role of data analysis in policy design

(*c*) It focuses solely on individual decision-making without considering broader contexts

(*d*) None of the above

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5.6 New Empirical Techniques for Data Analysis

In the realm of economic development and growth, data analysis plays a crucial role in extracting valuable insights and guiding evidence-based policies. As data becomes more abundant and complex, new empirical techniques have emerged to enhance economic data analysis. These innovative techniques offer exciting opportunities to uncover patterns, relationships, and causes that deepen our understanding of economic phenomena.

***Machine Learning and Predictive Analytics*:**

Machine learning techniques have gained prominence in economic data analysis, enabling researchers to make accurate predictions and uncover hidden patterns. By using algorithms that learn from past data, machine learning techniques can identify non-linear relationships, detect anomalies, and forecast economic trends. These techniques provide valuable insights into consumer behaviour, market dynamics, and macroeconomic indicators, helping policymakers make informed decisions and anticipate future challenges.

***Natural Language Processing (NLP)*:**

The analysis of written data has become increasingly important in economic research. Natural Language Processing (NLP) techniques allow researchers to extract meaningful information from large amounts of unstructured text data, such as news articles, social media posts, and economic reports. By using sentiment analysis, topic modelling, and text mining techniques, NLP helps researchers gauge public sentiment, identify emerging economic trends, and assess the impact of policy announcements. These insights guide policy design and implementation, leading to more targeted and effective interventions.

***Network Analysis*:**

Network analysis techniques have gained popularity in studying economic development and growth from a relational perspective. By modelling economic systems as networks, researchers can analyse the connections and interdependencies among various economic actors, such as firms, industries, and regions. Network analysis provides insights into the structure of economic networks, identifies influential nodes, and clusters, and examines the spread of knowledge and innovation. This approach helps

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policymakers understand the dynamics of economic relationships, promote collaboration, and stimulate regional development.

***Spatial Econometrics*:**

Spatial econometrics has emerged as a powerful tool for analysing economic data that exhibits spatial dependencies. This technique considers the geographic proximity and interactions between economic units, enabling researchers to capture the effects of location on economic outcomes. Spatial econometrics helps identify regional disparities, study the impact of agglomeration, and evaluate the influence of infrastructure development on economic growth. By incorporating spatial dimensions, policymakers can design targeted interventions to address spatial inequalities and foster balanced regional development.

***Experimental and Quasi-Experimental Methods*:**

Experimental and quasi-experimental methods, such as randomized control trials (RCTs), have revolutionized empirical research in economic development and growth. These methods allow researchers to establish causal relationships between interventions and outcomes, providing robust evidence for policy decision-making. By randomly assigning treatment and control groups, researchers can measure the impact of interventions on economic variables. Experimental and quasi-experimental methods offer valuable insights into the effectiveness of policies and programs, helping policymakers allocate resources efficiently and implement evidence-based interventions.

In conclusion, new empirical techniques for data analysis in economic development and growth open up exciting possibilities for gaining deeper insights into economic phenomena. Machine learning, NLP, network analysis, spatial econometrics, and experimental methods empower researchers to uncover patterns, predict trends, and establish causal relationships. These techniques enhance policymakers' ability to design effective interventions, foster economic growth, and address development challenges. By harnessing these innovative techniques, researchers and policymakers can make informed decisions, drive sustainable economic development, and contribute to inclusive growth.

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IN-TEXT QUESTIONS

7. How can the integration of advanced data analysis techniques enhance the validity of RCT findings?

(*a*) By incorporating big data and unconventional data sources

(*b*) By examining the impact of externalities only

(*c*) None of these

(*d*) By identifying the underlying mechanisms and mediation pathways

8. What is the objective of studying heterogeneity in RCTs?

(*a*) Incorporating big data and unconventional data sources

(*b*) To identify factors that moderate or mediate the impact of interventions

(*c*) To examine the impact of externalities only

(*d*) None of the above

9. How does the micro-perspective approach contribute to understanding the impact of contextual factors?

(*a*) By disregarding the broader socio-cultural, institutional, and environmental aspects

(*b*) By providing a macro-level analysis of economic growth and development

(*c*) By considering the influence of contextual factors on the effectiveness of interventions

(*d*) None of the above

5.7 Summary

The micro-perspective focuses on understanding the importance of individual agents like households, firms, and entrepreneurs in shaping overall economic outcomes. It recognizes that the collective decisions and actions of these individuals play a significant role in determining how the economy performs as a whole. The micro-perspective highlights key

Notes

factors such as human capital, entrepreneurship, technological innovation, and institutional frameworks that influence individual behaviour and impact economic development. It explores how individuals make choices regarding investments, education, savings, work, and entrepreneurial endeavours, and how these choices collectively contribute to economic growth. By studying the micro perspective for economic development, researchers and policymakers gain valuable insights into the mechanisms through which economic policies and interventions can promote inclusive growth, reduce poverty, and improve overall well-being. It helps identify the obstacles and limitations faced by individuals, allowing for targeted interventions to address these challenges and ultimately foster sustainable and fair economic development. Empirical research plays an indispensable role in unravelling the intricate relationships and multifaceted factors that propel economic growth and development. Randomized control trials are special experiments where participants are randomly assigned to either a group that receives a specific treatment or a group that does not receive any treatment. By randomly assigning participants, Randomized Control Trials (RCTs) help researchers establish cause-and-effect relationships and confidently attribute the observed outcomes to the treatment being studied. Randomized control trials (RCTs) have traditionally been used in medical research, but they are now being widely used in economics as well. Additionally, Randomized Control Trials (RCTs) have benefitted from advancements in data analysis techniques, making them even more reliable and informative. With the availability of large datasets and sophisticated analysis methods, researchers can gain deeper insights from Randomized Control Trials (RCTs). Techniques like machine learning, natural language processing, and predictive analytics have improved the interpretation of results, helping researchers find hidden patterns, make predictions, and understand complex relationships in economic growth and development. Randomized Control Trials (RCTs) have become an important tool in economic research, allowing us to evaluate policies and programs carefully. By randomly assigning people to different groups, Randomized Control Trials (RCTs) help us understand how certain factors affect economic growth and development. By looking at differences, considering the bigger picture, studying long-term effects, understanding mechanisms, and using advanced data analysis, we can make more informed policy decisions. Micro-perspective Randomized Control Trials (RCTs)

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will continue to be a powerful tool for shaping economic policies and driving sustainable development. New empirical research directions for economic growth and development expand our understanding of complex economic phenomena. Leveraging big data, spatial analysis, behavioural economics, environmental sustainability, and technology research, economists gain fresh insights to inform evidence-based policies. These approaches enhance our knowledge of economic systems and contribute to inclusive and sustainable development strategies.

IN-TEXT QUESTIONS

10. What is the ultimate goal of new empirical research directions in economic growth and development?

(*a*) None of these

(*b*) To examine the impact of externalities only

(*c*) To promote inclusive and sustainable economic development

(*d*) To disregard the importance of data analysis in drawing conclusions

11. Which empirical technique focuses on examining the interconnections between economic entities, such as firms and industries?

(*a*) Randomized control trials

(*b*) None of these

(c) Network analysis

(*d*) Spatial econometrics

12. What is the role of machine learning techniques in data analysis?

(*a*) Predicting future economic trends

(*b*) Analysing historical data only

(*c*) Examining the impact of externalities only

(*d*) None of the above

13. Which of the following is a key advantage of randomized control trials?

(*a*) They analyse historical trends only

(*b*) They examine the impact of positive externalities only

(*c*) They establish causal relationships

(*d*) None of the above

14. What is the main purpose of Natural Language Processing (NLP) in economic research?

(*a*) Disregard the importance of data analysis in drawing conclusions

(*b*) Extracting information from text data

(*c*) Examine the impact of positive externalities

(*d*) None of the above

15. Micro-level analysis in economic research focuses on:

(*a*) Examine the impact of positive externalities only

(*b*) Macroeconomic policy formulation

(*c*) Individual-level behaviours and decisions

(*d*) None of the above

5.8 Answers to In-Text Questions

1. (*b*) It provides valuable insights into the factors that drive economic growth and development
2. (*a*) To establish causal relationships and provide insights into the impact of interventions
3. (*a*) By randomly assigning participants to different treatment groups
4. (*b*) It helps uncover nuanced insights specific to different subgroups and contexts
5. (*b*) A Machine learning, natural language processing, and predictive analytics
6. (*a*) It helps policymakers target policies to specific groups and design more effective interventions
7. (*d*) By identifying the underlying mechanisms and mediation pathways
8. (*b*) To identify factors that moderate or mediate the impact of interventions

Notes

9. (*c*) By considering the influence of contextual factors on the effectiveness of interventions.
10. (*c*) To promote inclusive and sustainable economic development
11. (*c*) Network analysis
12. (*a*) Predicting future economic trends
13. (*c*) They establish causal relationships
14. (*b*) Extracting information from text data
15. (*c*) Individual-level behaviours and decisions

5.9 Self-Assessment Questions

1. What role does empirical research play in understanding economic growth and development?
2. What is the purpose of Randomized Control Trials (RCTs) in economic research?
3. How does the micro-perspective approach benefit policymakers in designing interventions?
4. What is the ultimate goal of new empirical research directions in economic growth and development?

5.10 Suggested Readings

- Barro, R. J., & Sala-i-Martin, X. (2004). Economic Growth (2nd ed.). Prentice Hall.
- Ray, D. (1998). Development Economics. Princeton University Press.
- Jones, C. (2013). Introduction to Economic Growth (2nd ed.).Viva Books
- Perkins, D.H., Radelet, S. & Lindauer. D. L. (2013). Economics of Development (7th ed.).
- W. W. Norton & Company

Glossary

Absolute Poverty: A situation when a household's income is too low to cover the costs of basic necessities like food, shelter and housing.

Accumulate: To gradually get more and more of something over a period of time.

Broad Copyrights : Permission to use copyrights for authorized purpose only.

Capital: A large amount of money that is invested.

Consumption: The act of buying and using products.

Demographic Transition Theory: It describes the historical shift from high birth and death rates in societies with little technology, education (especially for women), or economic development to low birth and death rates in societies, as well as the stages in between these two scenarios.

Depreciation: The process to become less valuable over a period of time.

Economic Development: It refers to enhancing the welfare and standard of living for individuals within a society.

Economic Growth: Increase in an economy's production of goods and services over time.

Enhance: To increase or further improve the good quality, value or status of something.

Entitlement: Refers to the set of alternative goods that a person can obtain in a society using all of the rights that he or she is endowed with. An entitlement aids in the development of skills (such as good nutrition).

External: Connected with or situated on the outside of something.

Fair use of doctrine: Implying use of books or literary work for educational purpose only.

GDP per Capita: It divides the total GDP of a country by its population, providing a measure of average income or output per person.

Gini Coefficient: It evaluates the disparity of values in a frequency distribution, such income levels.

Golden Rule: The saving rate that maximizes consumption per worker in the long run.

Gross Domestic Product (GDP): It measures the total value of all goods and services produced nation's boundaries during a given timeframe.

Gross National Product (GNP): The total market value of all final goods and services produced by a country's residents, regardless of their location, during a specific period.

Notes

Inequality: It describes the phenomena of an unfair distribution of chances and resources among the people that make up a particular society.

Lorenz Curve: It is a graphical representation of how wealth or income is distributed among a population.

Malthusian Population Theory: Is the hypothesis of exponential population growth and arithmetic increases in food supply. Thomas Robert Malthus made the idea for the theory. According to him, positive and proactive checks can build a balance between population increase and food availability.

Narrow Copyrights: Permission to use copyrights for authorized purpose and for some unauthorized purpose also.

Non-excludability: Degree to which your consumption depends on the consumption by others.

Population Growth Rate: The rate at which the population is increasing.

Poverty: It is the lack of resources to meet necessities like food, clothing and shelter. But poverty goes far beyond simply not having enough money.

Productivity: The rate at which a worker a company or a country produces goods.

Proportion: The relationship of one thing to another in size, amount etc.

Relative Poverty: It refers to a situation in which a person's income is below a specific percentage of the national median income.

Rival: A person, company, or thing that competes with another in sport business etc.

Saving Rate: The proportion of income that is not consumed but instead saved and invested.

Steady State: The point at which the economy is no longer growing or shrinking.

Stylized Facts: General empirical regularities or patterns that emerge from the analysis of economic data.

Technological Progress: The rate at which new technologies are developed and adopted.

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