Poverty Perpetuation: Origins, Dynamics, and Mechanisms

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Abstract

This chapter on poverty perpetuation focuses on identifying and analyzing the multiple determinants of poverty, the reasons for its perpetuation, and its impact on economic growth. Sir Henry George, a century and a half ago, in his book "Progress and Poverty," provided an insight into the mechanism of poverty perpetuation. George explained why the progress of modern technology, social services, and education failed to alleviate poverty, and why the growing wealth of industrialized economies tended to stay concentrated in the hands of the few. He believed that poverty originated from the inherent trends of injustice and inequality in any market economy. The problems of poverty amidst plenty, the corrupt relationship between wealth and political power, and the suffocated social order that the world today faces align with the problems George sought to address.

Drawing on contemporary economic theories and models, this chapter revitalizes George's doctrine and addresses determinants of poverty that go beyond the traditional assumption of poverty being driven by overpopulation, lack of investment, and capital accumulation. It is an inquiry into the circular relationship between the causes and consequences of poverty that trigger a trap for sustained economic stagnation and deprivation. Reviewing poverty thresholds and take-offs (Semmler and Ofori 2007), it examines various growth models to understand the steady state of rich and poor economies. The chapter also investigates the correlation between poverty, ecological imbalance, and climate change to highlight the threat of poverty to sustainable development.

Keywords: Poverty Traps, Inequality, Economic Growth, Endogenous Growth, Human Capital, Infrastructure, Poverty Perpetuation, History of Economic Thought, Economic Development

JEL Codes: I32, D63, O40, O41, J24, H54, I30, B14, O10

1. Introduction

"A poverty trap is a set of mechanisms whereby countries start poor and remain poor: poverty begets poverty so that current poverty is itself a direct cause of poverty in the future." (Kraay and McKenzie 2014)

A complex societal issue, poverty is the most prevalent and pervasive problem in the world today. Affecting 9.2% of the global population (United Nations 2022), it is an urgent concern facing both developed and developing countries. Across the globe, economies are struggling with rapid population growth, migration, and massive environmental impacts, which are the causes as well as the effects of the menace of poverty. Breeding from several situations, which may be social, political, economic, or even spatial, a persistent poverty situation drags individuals and economies into a perpetual state of stratification. This stratification may result from a lack of opportunity, discrimination, and general prejudice against the poor in a society. Such a persistent situation creates a spiraling mechanism that does not let people or countries escape this vulnerable situation, and they are caught in a never-ending loop of the poverty trap, making poverty a self-perpetuating vicious cycle.

"Poverty research has shown that while many poor people experience poverty temporarily and some can climb out of long-term poverty, others are stuck in poverty traps. These chronically poor people are structurally positioned so that escape is difficult or impossible without significant changes to the contexts in which they live and work." (World Development Report 2000)

Different schools of economic thought have perceived poverty from different dimensions and have assigned different theories to this multidimensional and complex issue. This chapter examines the underlying reasons for poverty perpetuation and focuses on the dynamic mechanisms of poverty traps that emerge from this circular relationship between the causes and consequences of poverty.

Poverty perpetuation worldwide results from a series of events and mechanisms that may be specific and varied in different regions and economies, as economies across the globe have different macroeconomic performances. There has been a marked transition in the viewpoints of scholars and economists about the causation of poverty over the centuries.

Section 2, "The Outset of Poverty Traps," explores the various contributing factors for the existence of poverty and its persistence, with a special reference to the views of Sir Henry George. It also reviews poverty thresholds and take-offs (Semmler and Ofori 2007) and addresses multiple determinants beyond the traditional assumption of poverty being driven by a lack of capital and capital accumulation.

Section 3, "Poverty Traps Mechanism: Through the Lens of Growth Models," runs from the classical perspective to the modern viewpoint of economic growth, exploring the conditions under which economies remain caught in poverty traps.

Section 4 is the concluding section that gives an assessment of how poverty appears in multiple dimensions. It reviews various growth models and theories and offers suggestions for sustainable poverty reduction, reflecting the view shared across much of the literature that economic growth, while necessary, is not sufficient on its own.

2. The Outset of Poverty Traps

Poverty traps emerge from a complex web of causes and consequences that reinforce each other over time. This section examines how economists and thinkers across different traditions have understood the origins and persistence of poverty, reviews the key thresholds and mechanisms through which poverty perpetuates itself, and identifies the structural factors that prevent individuals and economies from escaping deprivation.

2.1. Thinking Poverty

The absence of minimum sustenance is what poverty is generally attributed to. From a wider perspective, poverty is a global, socio-economic phenomenon that portrays a state of impoverished living conditions. Inaccessibility to housing, education, health services, clean water, and basic sanitation is not the only basis for being poor. Poverty also encompasses unsafe work conditions, the inability to participate in political life or assert rights in court, and suffering unequal treatment or discrimination due to the status of being poor. There has been a marked transition in the thinking on poverty over the past two centuries. Economists and social thinkers have perceived poverty as originating from varied determinants. Predominantly, it is believed that inequality in its many forms has been the most significant poverty-increasing factor.

Poverty, according to Adam Smith, "did not subject the individual to hunger, malnutrition, disease, lack of clothing or shelter; rather, it shamed him through a pained awareness of his inferior position in the social scale" (Gilbert 1997).

Thomas Robert Malthus, in his first essay "An Essay on the Principle of Population," projected that populations grow geometrically while the means of subsistence increase arithmetically, and thus poverty is caused by men and women having larger families than they can support. He believed that famine and poverty were natural outcomes of population growth and assigned God's will as the ultimate reason for those outcomes.

Standing in contrast to the Malthusian paradigm, the Marxian political economy rested its belief in poverty as the product of historically specific modes of production. They insisted that each historical

mode of production has its own unique dynamic for creating poverty (Harvey and Reed 1992). Marxists believed that the proletariat[2] was the social class having no significant ownership of the means of production and whose only means of subsistence was to sell their labor power for a wage or salary. Poverty to them was an inevitable consequence of a capitalist society, a direct outcome of the inequality inherent in the class system. It is worth noting that Marx did not address poverty as a standalone concept. Rather, poverty in Marxist thought is an inevitable consequence of capitalist exploitation and the class system, emerging from the structural relationship between capital and labor rather than from individual circumstance.

This construction of poverty as a structural contradiction within capitalism has deeper roots. The concept can be traced to Hegel, who identified the problem of pauperism arising from the British factory system decades before Marx developed the industrial reserve army mechanism. For Hegel, poverty was not merely deprivation but the systemic byproduct of a rapidly industrializing civil society's own logic, an early recognition that the tension between wealth and poverty is internal to capitalism rather than incidental to it (Hegel [1820] 1991; Gevorkyan and Semmler 2019).

Disapproving the Malthusian paradigm, Sir Henry George, in his book "Progress and Poverty," published in 1879, asserted that population growth is fully compatible with material progress. He understood the simultaneous advancement of poverty and wealth and refuted the thought that increases in population tend to reduce wages and produce poverty. George stressed the reason for poverty's existence amidst technological advancements that created more prosperous societies.

Critiquing Malthusian doctrine, George argued that in countries where poverty is deepest, the forces of production are evidently strong enough, if fully employed, to provide for the lowest not merely comfort but luxury (George 1987). He further observed that poverty and all its concomitants show themselves in communities just as they develop into the conditions toward which material progress tends, proving that social difficulties do not arise from local circumstances but are in some way engendered by progress itself (George 1987). George was concerned about the persistence of poverty amidst increasing wealth, arguing that existing theories had failed to adequately explain it (George 1879).

He strongly argued that industrial paralysis and commercial depression spring from no lack of productive power, and that the trouble is clearly not in any want of ability to produce wealth (George 1987). George's answer to why poverty exists lay in land ownership. He argued that all generated wealth is produced by applying labor to land, and that capital multiplies that labor but is essentially an add-on to the labor-land relationship. George asserted that economics focuses on money and employment while disregarding natural resources. Land, with all its resources, was owned disproportionately, allowing landowners to generate wealth using labor and capital, while wealth disparity arising from unequal land ownership created social injustice. In George's view, land should be made common property and should not be monopolized.

George examined the social roots of poverty and held that poverty is not an individual crime but a social crime, one for which all members of society, poor as well as rich, bear responsibility (George n.d.). His

[2] In ancient Rome the proletariat consisted of the poor landless freemen. It included artisans and small tradesmen who had been gradually impoverished by the extension of slavery.

views resonate with the issues of inequality and social injustice in the modern capitalist setup, explaining why the progress of modern technology, social services, and education failed to alleviate poverty, and why the growing wealth of industrialized economies tended to stay concentrated in the hands of the few.

Post Henry George, economists and thinkers have tried to conceptualize poverty from different thresholds and dimensions more contemporary to their times. The world today suffers from concerns similar to what Henry George focused on 150 years ago. A large population suffers from deprivation amidst technological upgrading and scientific development. Even developed countries with strong economies have a significant number of people struggling to survive amidst plenty. The causes of poverty are extremely complicated, emerging from discrimination, poor governance, conflict, political instability, or corrupt leadership, and these inequalities trap people and communities in a vicious cycle.

2.2. Poverty Thresholds and Takeoffs

Poverty research has shown that while many poor people experience poverty temporarily and some can climb out of long-term poverty, others are stuck in poverty traps. These chronically poor people are structurally positioned so that escape is difficult or impossible without significant changes to the contexts in which they live and work. Poverty in such cases becomes a complex phenomenon. Understanding the causes of poverty traps means investigating this complexity and the dynamics that sustain it. Lack of industrial and technological advancement, growing markets, human capital formation, financial development, poor demographic structure and social norms, climate change, and polarization of income all account for multiple causes of poverty (Semmler and Ofori 2007).

It is believed that income inequality has been the most significant poverty-increasing factor. It is paradoxical that even in high-income economies, a substantial part of the population has incomes far below minimum sustenance standards. Polarization and unequal distribution of income and wealth give rise to both wealth accumulation among the few and poverty at large. Poverty is a consequence of how society is organized and resources are allocated. As the World Bank observes, when markets are imperfect in credit, insurance, land, and human capital, inequalities in power and wealth turn into unequal opportunities, leading to wasted productive potential and an inefficient allocation of resources (World Bank 2006).

2.2.1. Wealth Gap

The mechanisms that reinforce poverty may occur at any scale of social and spatial accumulation. The disparity of cumulative assets across races and ethnicities in an economy also drags communities into a situation of persistent poverty. Estimates suggest that almost half of the world's wealth is now owned by just 1% of the population, amounting to $110 trillion, 65 times the total wealth of the bottom half of the world's population (Fuentes-Nieva and Galasso 2014).

The fundamental difference between the rich and the poor arises from the stark inequality in their income and wealth. The growth of wealth in a community can be understood by the transition equation (Garbinti et al. 2020):

$$W_{t+1} = (1 + q)[W_t + s(Y_t + rtw_t] \qquad (1)$$

$$Where, Y_t = (1 + g)Y_{t-1}$$

This equation implies that the per capita labor income (Y_t) of people in an economy evolves with a growth rate (1+g). The accumulation of per capita wealth (W_{t+1}) is determined by the rate of savings by households (s), capital gains (q), and return on wealth (r).

George's final, uncompleted work, *The Science of Political Economy* (1898), extended this inquiry into wealth accumulation itself, attempting to systematize the classical treatment of wealth and value inherited from Adam Smith and the Physiocrats. Though left unfinished at his death, the work underscores that questions of wealth distribution and equity were, for George, inseparable from the foundational theory of wealth itself, a connection that continues to inform contemporary policy debates on wealth disparity.

This dynamic connects to a longer-running debate in economics about the sources of wealth accumulation. Starting with the Kaldor-Pasinetti debate on capital and growth, subsequent work has shown that wealth inequality arises from several compounding channels: informational advantages, higher returns on assets, higher saving rates among the wealthy, and easier access to credit (Chappe and Semmler 2019; Parker and Semmler 2024). Tax advantages available primarily to wealth-holders, including the preferential treatment of capital gains relative to labor income, represent another significant driver of this disparity (Chappe and Semmler 2019). Inheritance and social interactions are another such channel: a person's family background and peer group also shape economic outcomes, passing wealth and poverty from one generation to the next (Brasington, Kato, and Semmler 2010).

The growing difference between the rich and the poor is reflected in the value of these variables. Those in poverty have a low rate of saving, low capital gains, and a low rate of return on their wealth. The rich and the poor may have the same growth opportunities, but their choice of investments decides the returns on those investments, and ultimately the accumulation of wealth over time. Since those with low incomes have little to invest and face greater constraints in investment choices, their wealth grows at a low rate compared to wealthier groups who achieve higher growth rates.

This dynamic has widened the wealth gap considerably. The distribution of wealth is highly unequal, with the wealthiest 1% of families holding about 40% of all wealth and the bottom 90% holding less than one quarter of all wealth (Leiserson, McGrew, and Kopparam 2019). Such disparity leaves those in poverty deprived of the opportunities enjoyed by wealthier groups.

2.2.2. Protection of Property Rights

Many scholars have argued that institutions that protect property rights, support technological research, and spread knowledge are key factors behind the great divergence in economic development across the globe. When property rights are weak, through expropriation of private wealth, corruption, excessive taxation, or barriers to adopting new technologies, economic growth tends to slow down.

A weak system of property rights can push economies into poverty traps, keeping per capita income permanently low. Governments may try to address this through protective policies, but some economies find it very hard to escape the poverty trap even when significant resources are directed toward that effort.

2.2.3. Political Setup

The lives of the poorest and most vulnerable are deeply affected by how their governments operate. When governments fail to provide basic security or services to the poor, the consequences can be very damaging, especially in countries already dealing with economic, political, and social inequality. Frequent conflict and war make things worse and create a cycle of poverty that is hard to break.

Weak governance and poor coordination between states often leave the poor ignored in policy decisions. Governance involves exercising political power, running political institutions, mobilizing resources, and building legitimacy. Poverty reduction strategies depend heavily on political factors and on how well pro-poor policies are put into practice.

Political turmoil, corruption, a weak judicial system, and discrimination based on race, gender, or ethnicity all affect how poverty plays out in different countries. Factors like electoral systems, political parties, courts, and local power structures have a strong influence on pro-poor policies. Better institutions and good governance, driven by genuine development goals rather than political interests, tend to produce better outcomes for the poor.

2.2.4. Public Private Partnership

Economic growth and poverty reduction may seem to pull in opposite directions but they are actually complementary. The right policies can create conditions where both happen together. Investment in infrastructure is one of the most effective ways to accelerate growth in developing countries and reduce income gaps. Governments however often struggle with insufficient funds, poor planning, and corruption, which leads to weak infrastructure.

Infrastructure assets are also often poorly maintained. Governments need to create an environment where the private sector can come in and help deliver benefits to the poor. Private sector involvement can make a real difference to the economic status of vulnerable groups. Public-private partnerships matter not just for building infrastructure but also for food security and access to finance. The management skills and innovative drive of the private sector can also make the public sector more efficient.

PPPs help address both market failures and the risk of government failure. But in practice both the public and private sectors are often reluctant to work together in low-income countries, where the need is actually the greatest. Private involvement reaches just over 10% in lower-middle-income countries and just over 5% in low-income countries (World Bank 2009). PPPs should be seen as part of a serious effort to end extreme poverty and promote shared prosperity, as better infrastructure and economic growth can gradually reach the poorest groups.

2.2.5. Climate Disaster

Climate change is one of the most important factors affecting the lives of people across the world. It threatens the well-being of people, puts those who are not yet poor at risk of falling into poverty, and makes it harder for the poor to escape it.

Climate change is only one of many causes of poverty but it is a serious obstacle to reducing it. Poverty itself causes environmental damage that then threatens people further. Deforestation, pollution, land degradation, and loss of biodiversity hit the poor the hardest. People living in poverty are often caught in

a downward spiral where they are forced to overuse resources just to survive, creating scarcity for both current and future generations. According to the UNCTAD Least Developed Countries Report 2002, the rate of forest depletion in least developed countries rose sharply in the 1980s and 1990s, to more than three times the rate in other developing countries.

Climate change affects economies in many ways, touching ecological balance, investment, consumption, productivity, prices, and asset accumulation. Poverty outcomes depend heavily on socio-economic conditions, demographic structure, and economic growth, and climate change makes all of these harder to manage (Werrell and Femia 2015). Poor people are especially exposed and have very little capacity to adapt. These shocks tend to grow over time and push the goal of poverty eradication further out of reach.

Frequent natural disasters, droughts, storms, heat waves, rising sea levels, and warming oceans create new and serious challenges to survival. The future impacts of climate change are hard to predict, which makes long-term poverty planning even more difficult.

2.2.6. Financial Market Constraints

The financial sector plays an important role in the efficient allocation of resources and economic growth. Macroeconomic instability slows growth in developing economies, making it important to build diverse financial markets with a wide range of institutions and better risk management. Diverse institutions broaden the reach of financial markets, reduce liquidity constraints, and offer some protection against boom-and-bust cycles. Greater diversity leads to faster growth, larger credit markets, a broader deposit base, and a lower chance of asset bubbles, all of which contribute to greater stability (Weller and Zulfiqar 2013).

The Multiple Financial Markets Failures model, or MFMF, captures how the absence of borrowing and insurance options traps people in poverty (Barrett and Carter 2013). The model variables are defined as follows: c is consumption, x is income, A is assets, α is ability, δ is the discount rate, θ is an asset shock, τ is the depreciation rate, Fh is high technology with a fixed cost to adopt, and F′ is low-cost technology with no fixed cost.

Under the MFMF assumption of no borrowing and no insurance, the household tries to maximize its total expected utility from consumption over time:

$$max_{cA} E_o\{\sum_{t=0}^{\infty} \quad \delta^t u(C_{it})\} \qquad (2)$$

subject to : $X_{it}(A_{it}\theta_t) = F(A_{it}\alpha_t) + (1+r)\theta_t A_{it}\theta_t$

$$F(A_{it}\alpha_t) = max\left[F^h(A_{it}\alpha_t)\, F'(A_{it}\alpha_t)\right] \qquad (3)$$

Where:

$$C_{it} \leq X_{it} and\ A_{it+1} = X_{it} - C_{it}$$

Equation (2) says that a household maximizes expected utility from consumption over time, valuing present consumption more than future consumption through the discount factor δ. Equation (3) says that

total income depends on assets and any shock that hits those assets. A bad shock reduces the productive value of assets and therefore income. The household chooses between two technologies, high technology $F^{h,}$ which requires a fixed upfront cost to adopt, and low-cost technology F′, which has no fixed cost. Poor households get stuck using the less productive low-cost technology simply because they cannot afford to switch to the better one, even if it would make them more productive over time. The constraint $C_{it} \leq X_{it}$ means a household cannot consume more than its income, and $A_{it+1} = X_{it} - C_{it}$ means next period's assets equal whatever is left after consumption, so consuming everything today leaves nothing to build on tomorrow.

Since individuals cannot borrow against future income or protect consumption against shocks, borrowing constraints represent the first financial market failure. Where there is no insurance market, individuals have no way to compensate for asset losses, trapping poor people in persistent poverty. Once an economy crosses the critical threshold and adopts better technology, it can achieve greater output and higher returns, but getting there requires resources that the poor simply do not have.

The MFMF model shows how people who start with low endowments, or who suffer a shock that pushes them below a critical asset threshold, become trapped in poverty. The model divides individuals by ability level and initial endowments of productive assets. Those with assets above the Micawber Threshold,[3] the minimum level needed to escape the poverty trap, converge to a high-income equilibrium. Those pushed below it by shocks collapse to a low-level poverty trap equilibrium and find it very hard to recover. Single and multiple equilibria poverty traps can exist at the same time, meaning individuals of varied abilities may face very different outcomes regardless of where they started.

Poverty and economic growth have a close relationship. The greatest incidence of poverty is found where growth has been weakest. Growth can only help reduce poverty when the poor can participate in and benefit from it. Where poverty creates a vicious circle, growth has the potential to generate virtuous circles of prosperity and opportunity.

3. Poverty Traps Mechanism: Through the Lens of Growth Models

Dani Rodrik observed that historically nothing has worked better than economic growth in enabling societies to improve the life chances of their members, including those at the very bottom (Rodrik 2007).

Many theories of economic growth have been put forward over the years. Despite their differences, they share the common goal of understanding how higher growth can be achieved and what conditions are essential for development to occur. They seek to identify the key determinants of growth and explore alternative explanations for why some economies grow while others do not.

This section traces the intellectual arc of economic growth theory from the classical perspective through to modern endogenous growth models, examining how each tradition helps explain the conditions under which economies get trapped in poverty and what it takes to escape. The discussion moves from Adam Smith's classical insights through the neoclassical Solow model, endogenous growth theories, and the

[3] The term Micawber Threshold is drawn from the character Wilkins Micawber in Charles Dickens' David Copperfield, who observed that income slightly exceeding expenditure leads to happiness while expenditure slightly exceeding income leads to misery. Barrett and Carter use this analogy to describe the critical asset threshold below which households cannot escape poverty.

unified growth framework, showing how different variables, whether capital, technology, human capital, or institutions, determine whether an economy converges to a high or low level equilibrium.

It is worth being explicit about how this shift in focus relates to the discussion above. George's critique in Section 2 is not a claim that economic growth or technological progress themselves cause poverty; his argument is that under private land monopoly, the gains from progress are captured disproportionately as land rent rather than distributed to labor and capital. The growth models that follow are largely silent on this distributional question: they model how output per capita expands, not who captures the resulting gains. Read together, the two literatures are complementary rather than contradictory. Growth theory explains how the pie grows; George's diagnosis, and the wealth-accumulation channels discussed in Section 2, help explain why the poor often receive a shrinking share of it.

3.1. Classical Perspective

Adam Smith argued that the division of labor is limited by the extent of the market. This idea highlights how important externalities and increasing returns to scale are for sustaining growth in an economy. Economies that could not achieve increasing returns stayed trapped as least developed countries, while others were able to take off.

Figure 1 shows how market expansion, driven by more capital and production, leads to higher factor productivity and increasing returns to scale. This raises the surplus, encourages saving, and generates more capital, creating a circular flow of growth.

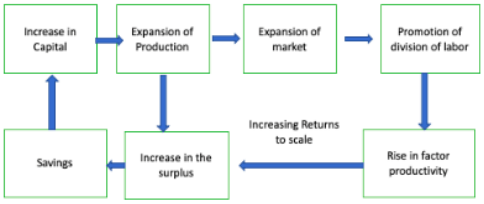


Figure 1: Smith's Growth Process
Source: Authors' own illustration based on Smith (1776)

Economists like Paul Rosenstein-Rodan (1943), Ragnar Nurkse (1953), Gunnar Myrdal (1957), and Walt Whitman Rostow (1960) argued that a nation can only achieve increasing returns after reaching a certain threshold level of output per capita. Poor nations get stuck in poverty because they cannot push themselves above that threshold. Developing nations can get over it through a large injection of capital, allowing them to take off. This is the core idea behind the Big Push theory of economic development (Rosenstein-Rodan 1943).

The experience of South Korea and Taiwan in the 1960s and 1970s illustrates this well. Both economies took off through large-scale capital investment and export-led growth, pushing themselves above the threshold needed for increasing returns (Rodrik 1995). In contrast, many Sub-Saharan African economies stayed below that threshold despite receiving foreign aid, suggesting that the scale and coordination of the initial push matter as much as the investment itself (Sachs and Warner 1997).

3.2. Traditional Perspective

The Solow-Swan growth model is one of the clearest ways to understand poverty traps. It says that growth in output per capita comes from capital accumulation and technological progress (Solow 1956). Neoclassical economists built on this by arguing that economies can determine their own long-run growth rate of output per capita through three things: the rate of technological change, the saving-to-investment rate, and the population growth rate. Based on the Cobb-Douglas production function, labor and capital drive the short-run equilibrium, while technology, as an external factor, helps offset the diminishing returns that come from adding more labor and capital.

The model says that as economies grow, they eventually reach a steady state, where the rate of investment per worker ($sf($$\frac{K}{N}$equals the rate of depreciation per worker.

Figure 2 shows that without technology, economies in the steady state produce at the output level ($\frac{Y^*}{N}$) with input ($\frac{K}{N^*}$).

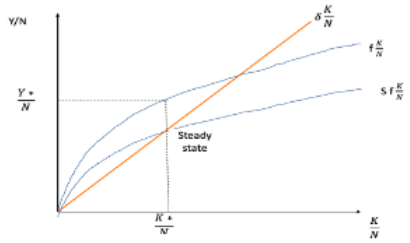


Figure 2: Solow's Growth Model
Source: Solow (1956)

When technology is introduced, total factor productivity rises[4], savings increase, and the economy moves to a higher steady state, as shown in Figure 3.

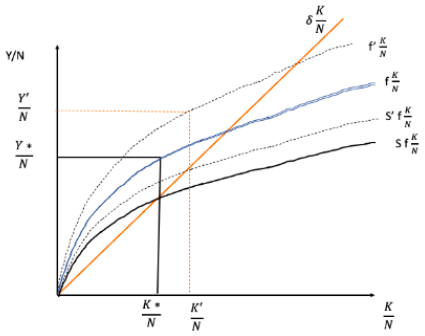


Figure 3: Higher Steady State
Source: Solow (1956)

[4] Total factor productivity, also referred to as the Solow residual, captures the portion of output growth that cannot be explained by increases in labor and capital inputs alone.

With the introduction of technology, economies reach a higher output level f($\frac{K}{N}$). The new steady state has investment per worker rising to($sf(\frac{K}{N})$), output per worker at ($\frac{Y'}{N}$), and inputs per worker at ($\frac{K'}{N}$).

For economies that cannot access or afford technological progress, this lower steady state becomes a poverty trap, a point of equilibrium from which escape requires an external push.Many least developed countries in Sub-Saharan Africa and South Asia have remained at low steady states for decades, not because they lack labor or capital entirely, but because they have limited access to modern technology and the institutional capacity to adopt and diffuse it across the economy (Acemoglu, Johnson, and Robinson 2001).

3.3. Modern Perspective

Endogenous growth theories build on and extend the Solow model. Unlike exogenous growth models, they treat the growth rate of technology (g_{At}) as a function of labor and capital stock at a given time, meaning growth is driven by factors inside the economy rather than outside it. The production function in these models is adjusted to reflect this:

$$Y = Af(K, H, L, I) \qquad (4)$$

Where K is capital, H is human capital, L is natural resources, and I represents institutions, or the environment in which economic decisions are made.

Institutions play a central role in endogenous growth. Economies that grow well tend to have positive institutions such as transparent government, secure property rights, and stable money and prices. Economies with weak institutions, marked by corruption, political instability, or lack of individual freedom, restrict growth and discourage the long-term investment and innovation that economies need. When the factors driving endogenous growth improve, they push the production function upward, generating more output from the same amount of capital.

Figure 4 shows that with the same amount of capital, an economy with better institutions produces more output more efficiently. This creates incentives for people to develop their own technology and ideas, making the economy more productive over time. Good policies and institutions are therefore central to sustainable growth.

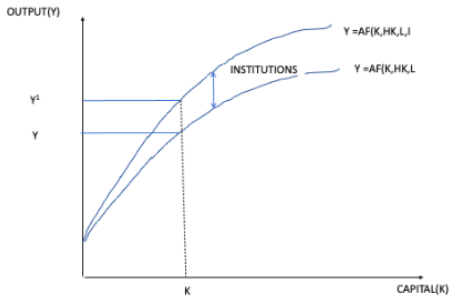


Figure 4: Endogenous Growth Model
Source: Authors' own illustration based on Romer (1986)

Economists like Scitovsky (1954), Myrdal (1957), Romer (1986), and Mankiw, Romer, and Weil (1992) built on the Solow model to explain why different economies grow at different rates. They argued that economies converge to different steady states depending on their institutions and other internal factors. Knowledge built up within firms and embodied in workers as human capital is one of the key externalities that drives this process.[5] Mankiw, Romer, and Weil (1992) extended the neoclassical model by adding human capital, research and development, and other externalities as inputs in the production of national income.

The endogenous growth framework shows that poverty traps are not accidents. They are the natural result of what happens when economies lack the institutions, skills, and technology needed to grow. China's rapid growth since the 1980s is often cited as an example of how institutional reforms, investment in human capital, and technology adoption can shift an economy to a higher steady state (Rodrik 2007). In contrast, economies like Haiti and Zimbabwe, despite having similar natural resource endowments, have remained trapped at low levels of output due to weak institutions, political instability, and limited human capital investment (Acemoglu and Robinson 2012).

3.3.1. Externalities of Investment

Externalities play a vital role in most theories of economic growth. The endogenous growth model shows that both positive and negative externalities have specific impacts on how an economy grows. Investment in physical capital, for example, not only increases the tangible stock of assets but also the intangible one, through knowledge and skills that spill over into the wider economy (Long and Summers 1991).

The production function can be written as:

$$Y(t) = [A(t)L(t)^{\alpha}K(t)^{1-\alpha}] \qquad (5)$$

Where Y(t) is aggregate output, L(t) is the stock of labor used, K(t) is the aggregate stock of physical capital, A(t) is the individual stock of knowledge, and $\alpha \in (0, 1)$ is the labor share in the production function.[6]

Building on Schumpeter's idea that profit-motivated innovation drives out obsolete technology, these models highlight what Solow called the "investment effect," the impact that investment-related policy changes have on growth. Equipment investment in the post World War II period has been identified as a key driver of growth across economies at all levels of development (Long and Summers 1991). Growth that relies on human capital formation depends heavily on equipment investment, particularly in countries at different stages of industrialization. Investment in equipment is also associated with higher total factor productivity and yields a high net social return. The expertise that workers develop in handling modern equipment and technology creates external benefits and helps organizations become more productive.

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[5] Externalities refer to the spillover effects of economic activity that affect parties outside the immediate transaction, positive externalities like knowledge spillovers from R&D benefit the wider economy beyond the investing firm.

[6] The notation $\alpha \in (0, 1)$ means that α takes a value strictly between 0 and 1, indicating that both labor and capital contribute positively to output, with neither factor alone accounting for all of it.

This model, based on equation (5), examines an economy where households derive utility from consumption and supply inelastic labor. Population (L) is constant, and household preferences are represented by the isoelastic utility function:

$$U = \int_0^{\infty} \quad e^{-pt} \frac{C_t^{1-\theta}-1}{1-\theta} dt. \qquad (6)$$

Subject to the budget constraint, households set a utility.

$$C_t^* = \frac{r_t-\rho}{\theta}. C_t. \qquad (7)$$

The savings are used for innovative investments. The production function looks like:

$$Y_t = L_{y,t}^{1-\alpha} \int_0^{At} \quad x_{j,t}^{\alpha} dj \qquad (8)$$

where x_j is the quantity of the intermediate good j, At is the measure of intermediate goods available at t, L_y is labor and $\alpha \in (0, 1)$

Taking: ρ as a constant discount factor, u(C) the increasing concave utility function; $u'(C) > 0$ & $u''(C) < 0$ I is the return to capital, W is the wage rate, and δ is the depreciation rate. The amount of labor is constant and equal to 1.

Subject to the budget constraint:

$$K^* = (iK + w) - C - \delta K \ldots\ldots\ldots K(0) = K_0 \qquad (9)$$

The maximization position for a firm in an economy in the above case would be as:

$$max\ c(t) \int_0^{\infty} \quad e^{-pt} u(C(t) dt \qquad (10)$$

This model (Greiner & Semmler, 2001) analyzes that endogenous and sustained per capita growth is feasible. This implies that to initiate and ensure economic growth, economies must invest in capital stock with a greater increase in human capital, as then only the decline in the marginal product of physical capital can be offset.

Without this combined investment in physical and human capital, economies risk falling into a low level equilibrium from which escape becomes increasingly difficult. Post World War II Japan and Germany illustrate this point well. Both economies rebuilt rapidly through simultaneous investment in physical capital and a skilled workforce, generating the knowledge spillovers and productivity gains that the model predicts. This combined investment allowed both economies to sustain growth well beyond the initial reconstruction period and converge to high income equilibria. In contrast, economies that invested heavily in physical infrastructure alone, such as many oil rich Middle Eastern economies in the 1970s, found that growth was not sustained once oil revenues declined. Without the accompanying investment in human capital and knowledge spillovers, the productivity gains proved temporary and these economies struggled to diversify and escape dependence on natural resource revenues (Gylfason 2001).

3.3.2. Education and Human Capital

The Uzawa-Lucas endogenous growth model builds on Lucas's concept of human capital investment (Lucas 1988). According to Lucas, human capital is created through investment in education and is a

crucial factor in economic growth. He argued that more educational investment would permanently raise living standards and temporarily boost the growth rate during the transition to a new equilibrium. The Uzawa model (Uzawa 1965) determines annual output using the existing capital stock and the quantity of labor in production, assuming that labor embodies all changes in technological knowledge. Education, health, and the maintenance of public goods all create efficiency in labor, and the education sector spreads these gains across the economy. This is the only endogenous growth model that captures both long run growth and transition dynamics.

The model rests on three key assumptions (Mattana 2017). First, the economy has two reproducible inputs, physical capital and human capital. Second, there are two sectors, manufacturing and education. The manufacturing sector produces goods used for consumption and investment, while the education sector produces a service used only in production. Third, consumption and savings decisions are determined by a centralized Ramsey planner.

Both sectors display production functions with constant returns to scale relative to their own capital at the firm level:

$$Y_{1=}A_1K_1^{\alpha}H^{1-\alpha} - - - - - - - - (manufacturing) \quad (11)$$

$$Y_2 = A_2H_2 - - - - - - - - \ (education/training) \quad (12)$$

Taking H as human capital, total output can also be written as:

$$Y = C + I_K + I_H \quad (13)$$

This shows that total output is divided between consumption, investment in physical capital, and investment in human capital, reflecting the two-sector structure of the model.

Lucas's production function is given as:

$$Y = AK^{\alpha}(\epsilon hL)^{1-\alpha}h^{\zeta}a, 0 < \alpha < 1 \quad (14)$$

Where Y is output, A is the constant technology level, K is physical capital, L is labor, H is human capital, α is the share of physical capital, h is human capital per capita, ε is the fraction of labor time devoted to producing output, and $(1 - \varepsilon)$ is the fraction of labor time devoted to human capital accumulation, assuming $0 < \varepsilon < 1$. The term εh represents the total effective labor force, measured in efficiency units, employed to produce output. The term h^{ζ} a measures the externally associated average human capital of the workforce, where a is the average human capital of the workforce and ζ is the positive external parameter in the production of human capital.

With the capital and human capital accumulation conditions, the model can be written as:

$$max_{c1,\epsilon 1} \int_t^{\infty} \quad e^{-(\rho-n)t}[c(t)^{1-\alpha} - 1]/(1-\sigma)dt \quad (15)$$

Where capital accumulation is:

$$K^* = AK^{\alpha}(\epsilon h)^{1-\alpha} h_{\alpha}^{\zeta} - c - (n)\delta)k \quad (16)$$

and the human capital (h) accumulation is as :

$$h^{'} = \eta h(1 - \epsilon) \quad (17)$$

Where η is schooling productivity, and population grows at a rate n. Human capital accumulation in the Lucas model is therefore determined by the resources devoted to its creation, which depends in turn on years of schooling and the productivity of the education process.

At steady state, we have $k^* = 0$, such that:

$$AK^{\alpha}(\epsilon h)^{1-\alpha} h_{\alpha}^{\zeta} - c = (n)\delta)k \quad (18)$$

This means that at the steady state, output net of consumption is exactly enough to cover depreciation and the dilution of capital caused by population growth.

An increase in the externality parameter ζ causes the savings rate to increase, since households are willing to substitute current consumption for future consumption in response to changes in the real interest rate (Hall 1988). When σ, the inverse of the intertemporal elasticity of substitution, is low, people are more willing to save. As a result, labor shifts from output production toward human capital production. This means that with sufficient accumulation of human capital, the economy can also achieve faster accumulation of physical capital over time, since a more skilled workforce supports higher productivity and investment.

Lucas's model finds strong support in the East Asian experience. South Korea, Singapore, and Taiwan deliberately shifted resources toward education, building up human capital over time. As schooling productivity rose and more workers became skilled, these economies were able to accumulate physical capital faster, raise output, and sustain long-run growth, breaking out of the low-level equilibrium that had trapped poorer economies at earlier stages of development (World Bank 1993). India tells a more complicated story. Its world-class engineering and technical institutions produced the talent that drove the IT boom from the 1990s onward, but the long neglect of primary and secondary schooling meant that most of the population was left behind. This uneven investment in human capital created a dual economy, where a skilled minority escaped the poverty trap while the majority remained stuck in it (Drèze and Sen 2013).

Countries like Pakistan and Nigeria show what happens when this investment does not happen at all. Despite having large and young populations, both economies have struggled to convert their demographic potential into sustained growth, largely because schooling quality and educational investment have remained persistently low (Hanushek and Woessmann 2008).

3.3.3. Knowledge Accumulation and Growth

Romer built a model in which the long-run growth rate is determined endogenously. His approach captures the idea that improvements in technology come from including knowledge capital alongside

physical capital. Romer argued that technological change results from the efforts of researchers and entrepreneurs responding to economic incentives. Also known as the learning by investment model, it stresses that knowledge is a by-product of investment and is a nonrival good, meaning it can be used by many at the same time without being depleted (Jones 2019). When more resources are dedicated to research and development, more discoveries follow, and growth is sustained over extended periods.

Romer assumed constant returns to scale at the firm level but increasing returns at the economy level. Following Arrow's theory of learning by doing (Arrow 1962).[7] Romer argued that increased productivity is related to experience and can be measured through investment. He observed that each new machine put into use changes the production environment so that learning continues with new stimuli (Romer 1994).

Figure 5 shows Romer's two sector growth model, set in continuous time. One sector produces final goods and the other is a research and development sector where knowledge accumulates. Technological progress is endogenous in this model, meaning it is determined by the actions of economic agents, and it is this technological progress that drives long-run growth in output per worker.

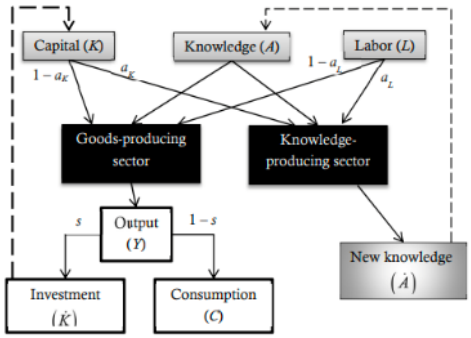


Figure 5: Romer's Growth Model
Source: Romer (1986)

The model defines the following variables: L, K, A, and Y are labor, capital, technology, and output, respectively. A(t) is the stock of knowledge at time t, used in both sectors. The share of labor used in the R&D sector is a_L, while 1- a_L is the share used in the goods-producing sector, both taken as constant and exogenous. Similarly, a_K is the share of capital used in the R&D sector, and $1 - a_K$ is the share used in the goods-producing sector.
Assuming that labor productivity depends on the accumulation of knowledge, which in turn depends on the past investment experience of all firms in the economy, the production function at time t is:

$$Y(t) = [(1 - a_K)K(t)]^{\alpha}[A(t)(1 - aL)L(t)]^{1-\alpha}, (0 < \alpha < 1) \qquad (19)$$

Given constant returns to scale, the accumulation of knowledge depends on the proportion of labor and capital engaged in research and development. Taking B as a shift parameter, the knowledge accumulation function can be written as:

[7] Learning by doing, introduced by Arrow (1962), refers to the process by which productivity improves as a direct result of accumulated production experience. Workers and firms become more efficient over time simply by doing more of the same activity, making past investment a proxy for experience and hence productivity growth. This concept was central to Romer's argument

$$A^*(t) = B[(a, K(t)]^{\beta}[a, L(t)]^{y}A(t)^{\theta}(B > 0, \beta \geq 0, y \geq 0, \theta = 1) \quad (20)$$

Where θ = 1 indicates that the existing stock of knowledge has a positive impact on the success of R&D. This gives the growth rate of knowledge as:

$$\frac{A^*}{A} = B[aK(T)]^{\beta}[aL(t)]^{\gamma}A(t)^{\theta}$$

Meaning the growth rate of A depends on the amounts of capital and labor devoted to research. Following Solow (1956), the model assumes that the saving rate and population growth are both exogenous and constant, and takes depreciation equal to zero:

$$K'(t) = sY(t) \quad (21)$$

$$L(t) = nL(t), n \geq 0 \quad (22)$$

Romer argued that even with a fixed population and fixed physical capital, knowledge will never reach a level where its marginal product is so low that research is no longer worthwhile (Romer 1986). Technological change acts as an incentive for capital accumulation by improving efficiency per worker. Higher productivity from R&D, combined with more labor devoted to research and a larger population, leads to a higher growth rate. Romer stressed that the growth rate of knowledge depends positively on population size, implying that larger economies should grow faster than smaller ones.

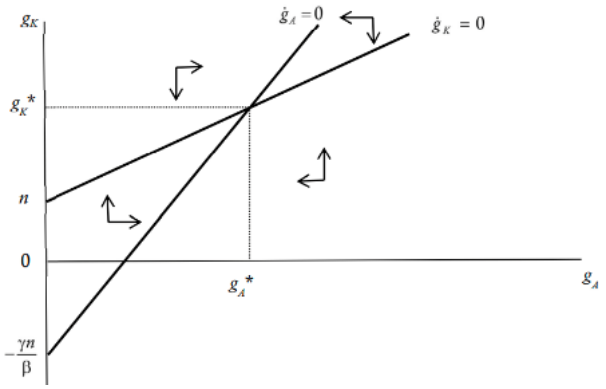


Figure 6: Local Convergence to Steady State
Source: Romer (1986)

In Figure 6, the $g^*_K = 0$ has a slope of 1 and an intercept on the g_K axis at $n \geq 0$. Below the line, $g^*_K > 0$ and above the line, $g^*_K < 0$ (shown by the vertical arrow lines). This implies that returns to scale in the production of new knowledge using the two produced factors K and A are measured by β + θ. To conclude, Romer's endogenous R&D model shows that with a steadily increasing labor force and no initial capital, the model converges to a steady state with constant growth only when there are diminishing returns to the produced factors. With constant or increasing returns, the growth rate accelerates indefinitely.

Romer argued that even with a fixed population and fixed physical capital, knowledge will never reach a level where its marginal product is so low that research is no longer worthwhile (Romer 1986). The full mathematical derivation of the growth dynamics of K and A in this model is provided in Appendix A. The gap between advanced and developing economies in research and innovation offers a striking illustration of Romer's model in practice. The United States, for example, has built sustained growth on decades of R&D investment, where knowledge created in universities and firms spills over into the wider economy, raising productivity and driving innovation. In contrast, many low-income countries in Sub-Saharan Africa invest very little in research and development and remain dependent on primary commodity exports. Without the engine of knowledge accumulation that Romer describes, these economies find it very hard to generate the technological progress needed to escape poverty traps (Fagerberg and Srholec 2008).

3.3.4. Infrastructure and Growth

The development of infrastructure is another important driver of growth potential in an economy. Hall and Jones (1999) showed that international differences in productivity and in endowments of physical and human capital are fundamentally driven by differences in social infrastructure, meaning the institutions and government policies that shape economic incentives.

Figure 7 shows that social infrastructure affects both capital accumulation and human capital accumulation, which in turn affects output per worker. Good infrastructure has a positive impact on the durability of private capital and hence on growth. It frees the private sector to allocate investments to other growth-promoting options. The productivity of private capital depends largely on the state of public infrastructure (Aschauer 1989).

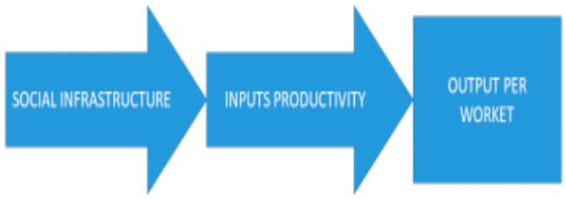


Figure 7: Infrastructural Growth
Source: Aschauer (1989)

Public capital complements private capital. Higher public investment boosts labor productivity, leading to higher wages and lower borrowing costs, which in turn encourages more private investment and higher GDP. However, additional public infrastructure investment should not be financed through additional debt, as this risks crowding out private capital and reducing output.

The level of public capital ultimately determines the net effect on output. Differences in social infrastructure explain much of the variation in economic performance across economies, since they depend on institutions and government policies that shape incentives for individuals and firms. To enhance social capital, both physical infrastructure and social cohesion matter. Infrastructure has a dual

impact, serving both as a direct production factor and as an influence on total factor productivity. The production function capturing this dual role is (Holtz-Eakin and Schwartz 1995):

$$Y_t = K_t^{\alpha} G_t^{\beta} (\psi, L)^{1-\alpha-\beta} \quad (23)$$

Where Y_t is output, K_t is private capital, G_t is public capital, Ψ is the technical efficiency of labor (L), and t is time.

Infrastructure provides an economic environment that boosts innovation, entrepreneurship, and economic incentives, all of which depend on sound policies and institutions. Long-run growth requires a combination of strong property rights protection to safeguard the returns to innovators, a good education system to improve R&D efficiency and the supply of skilled labor, and a stable macroeconomy to keep interest rates low and raise the net present value of innovative activity.

The growth model with infrastructure (Semmler et al. 2011) can be written as:

$$max_{c(t)} \int_t^{\infty} \quad e^{-(\rho-n)t} L_{0u}(C(t))dt \quad (24)$$

With the per capita production function, the model takes T as government revenue, r as tax, c as consumption per person, and ρ as the subjective discount rate, subject to:

$$K^* + B^* = (w + r_1 K + r_2 B)(1 - r) - C + T_p - (\delta_K + n)K - nB$$

$$G^* = \varphi_3(1 - \varphi_0)T - (\delta_G + n)G$$

$$B^* = r_2 B + C_p + T_p + I_p - T - nB$$

The model suggests that I_p goes to public infrastructure, C_p covers transfers and public consumption, and T_p funds public administration. Public investment supports market productivity, human capital, and education. The model predicts that intensive economic growth results from public capital accumulation, which in turn depends on the level of private capital. Differences in infrastructure policies therefore translate directly into differences in output and productivity.

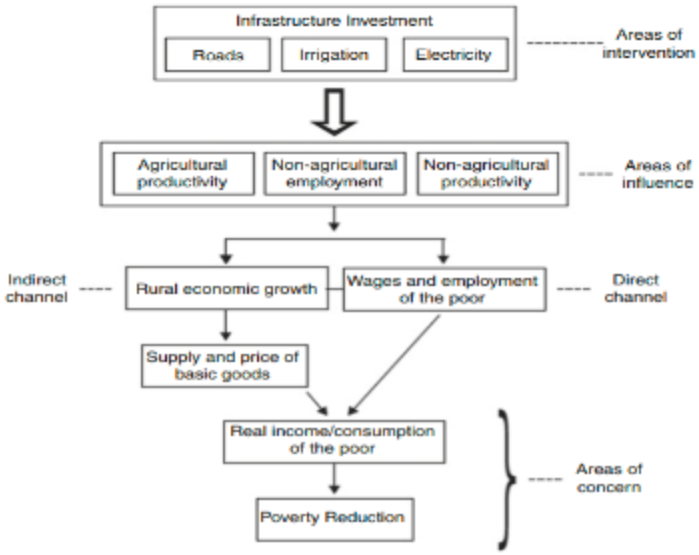


Figure 8: Multidimensional Impact of Infrastructure
Source: Semmler et al. (2011)

As shown in Figure 8, infrastructure investment has a multidimensional impact on economic growth, directly and indirectly supporting productivity in both farm and nonfarm sectors and eventually contributing to poverty reduction. All forces of economic growth depend on public policy and how government expenditure is planned and allocated. This impact is especially large in low income countries where the initial capital stock is low and basic infrastructure is lacking.

The rapid expansion of roads, railways, ports, and electricity networks in China over the past three decades created the conditions for private investment to flourish, raising productivity across both farm and nonfarm sectors and lifting hundreds of millions out of poverty. In contrast, the persistent infrastructure deficit in Sub-Saharan Africa, where poor roads, unreliable electricity, and limited connectivity raise the cost of doing business, helps explain why private investment has remained low and poverty traps have proved so hard to escape (Calderón and Servén 2008).

3.4. Unified Growth Theory

The unified growth theory (Galor 2011) looks at how economic, social, and behavioral factors interact with the evolutionary processes of human development over time. It traces the path of health, life expectancy, human capital, and population growth across different stages of development. The theory covers the key phases of this journey, from the Malthusian epoch and the Malthusian trap (Komlos and Artzrouni 1990), through the rise of human capital as a driver of growth, the decline in fertility rates, the emergence of sustained modern economic growth, and the roots of income inequality across nations.

Galor and Moav (2002) argued that during the Malthusian era, evolutionary pressure gradually favored individuals whose traits were better suited to the growth process. This created a positive feedback loop between technological progress and education that eventually brought about the Industrial Revolution and the transition from stagnation to sustained economic growth.

Gallup, Sachs, and Mellinger (1998) similarly argued that this theory captures a reinforcing interaction between human capital investment and technological progress, one that drives the demographic transition and sets economies on a path of sustained growth.

According to Malthusian theory, physical and mental traits that generate higher earning potential are passed on to offspring, creating an evolutionary advantage that spreads through the population over time. As these traits become more prevalent, investment in human capital and technological progress deepens, eventually triggering a demographic transition and shifting the economy toward a state of sustained growth. Economies that fail to make this transition remain caught in the Malthusian trap, unable to escape the cycle of stagnation and poverty.

3.5. Poverty Traps Mechanism: Graphical Representation

The growth models reviewed in this chapter help identify the key factors, both exogenous and endogenous, that determine whether economies grow or remain trapped in poverty. At the most basic level, poverty traps can be classified into three types:

a. Capital Poverty Trap

Low income leads to low savings, which results in low investment and low capital formation. This keeps productivity low, which in turn keeps income low, completing the trap.

$$P_x = f(Y) = g(C, S) = h(C, I)$$

b. Labor Poverty Trap

Low income means low food intake, which reduces productivity and keeps income low.

$$P_x = f(F) = g(Pr) = h(Y)$$

c. Technology Poverty Trap

Low income limits investment in research and development, which slows economic growth and keeps income low over time.

$$P_x = f(T) = g(C, S) = h(C, I)$$

The following figures illustrate these poverty trap dynamics across different growth models, showing at both the individual and economy level how poverty traps form, persist, and in some cases can be escaped.

While endogenous models stress the importance of R&D investment (Romer 1994), human capital (Uzawa 1965), social infrastructure (Hall and Jones 1999), and positive externalities for raising labor productivity and growth, a wide gap in per capita incomes across countries persists.

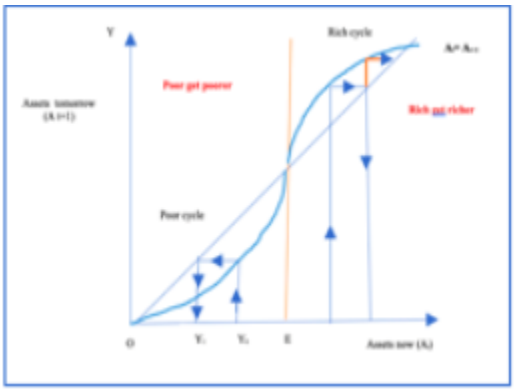


Figure 9: Poverty Trap: Micro Model
Source: Semmler and Ofori (2007)

In the S-shaped curve shown in Figure 9, the poor are stuck on the left side of the diagonal line, where future income is lower than present income and continues to decrease over time.

This micro model is also applicable at the macro level. The basic need line E, indicating expected expenditure, divides the model into two parts: a poor cycle and a rich cycle. When commitments are bigger than income or assets, a person falls into a debt trap and remains poor. Poverty begets poverty. On the other side, those with more assets than commitments can save out of their incomes. Savings lead to investment, which leads to higher income. Wealth begets wealth.

Solow's exogenous model (Solow 1956) and traditional growth models explored the possibility of convergence between low-income and high-income countries, arguing that low-income countries initially have higher investment returns and can therefore accumulate capital faster. At the macro level, however, a key reason economies remain trapped in poverty is that they start with a low marginal product of capital and cannot benefit from the higher returns that accrue at slightly higher income levels.

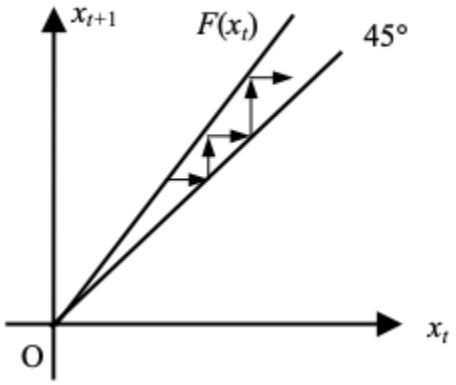


Figure 10: No Poverty Trap
Source: Matsuyama (2008)

In Figure 10, the state of the economy in period t is X_t, where a higher X indicates more development. With initial condition X_o and the equilibrium path $X_{\{t+1\}} = F(X_t)$, the economy's entire trajectory can be

traced. Since F(X) stays above the 45° line everywhere, the economy grows forever and faces no poverty trap, illustrating an endogenous growth model.

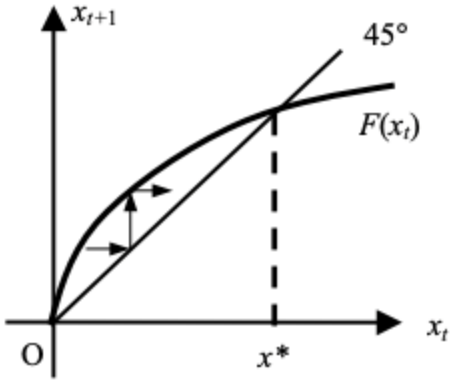


Figure 11: Exogenous Long Run Growth
Source: Matsuyama (2008)

In Figure 11, for any initial condition X_0, the economy converges to X*, typical of the Solow model, where long-run growth is determined exogenously and is independent of where the economy started.

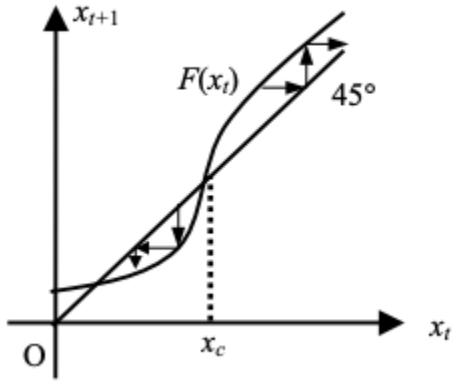


Figure 12: Growth Determined by Initial Position
Source: Matsuyama (2008)

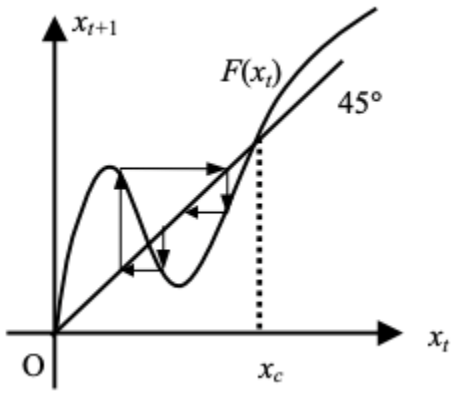


Figure 13: Self-Perpetuating Trap
Source: Matsuyama (2008)

Figures 12 and 13 show that the long-run performance of the economy depends on its initial condition. In Figure 12, if the economy starts above the critical level $X_{c,}$ it will keep growing, but if it starts below $X_{c,}$ it will converge to a low-level steady state. Figure 13 depicts a stronger form of the trap, where an economy starting below X_c fluctuates around that level and remains permanently trapped in poverty. Both figures illustrate the self-perpetuating nature of the poverty trap and show that while escape is difficult, it is not necessarily impossible.

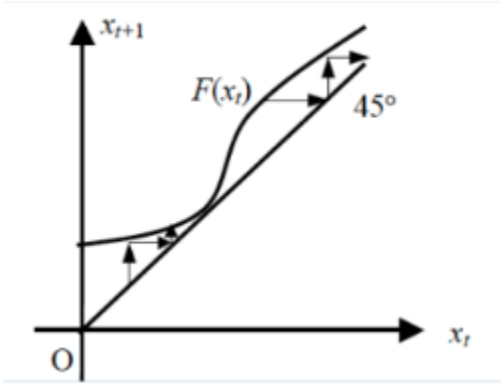


Figure 14: Weak Form of Poverty Trap
Source: Matsuyama (2008)

Figure 14 shows a weak form of the poverty trap. The economy is not permanently stuck but has to pass through a long period of slow growth before it can eventually take off. Escape is possible but it takes time.

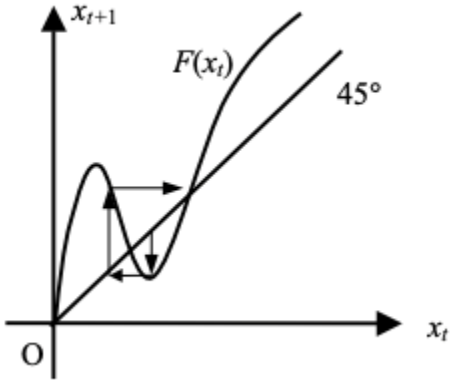


Figure 15: Model of Endogenous Stochastic Shocks
Source: Matsuyama (2008)

Figure 15 shows what happens when random shocks are added to the system:

$$X_{\{t+1\}} = F(X_t + \mu_{\{t+1\}}) \qquad (30)$$

Shocks like natural disasters, epidemics, and wars can push the capital-to-labor ratio up or down. When this happens, the economy may escape the trap for a while or fall back into it. Poverty persistence in this case depends not just on initial conditions but also on the shocks the economy faces over time.

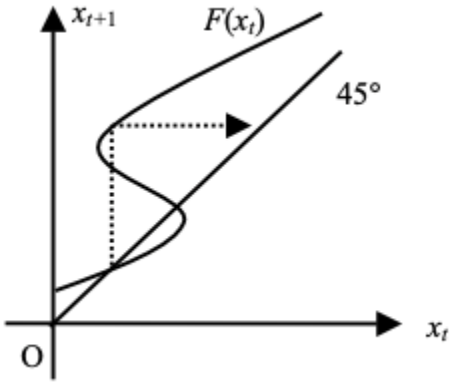


Figure 16: Caught in Coordination Failures
Source: Matsuyama (2008)

Figure 16 shows an economy stuck in a low-level stationary state due to coordination failures. Unlike the other poverty trap models, the problem here is not a lack of resources or technology but a failure of economic agents to coordinate on a better outcome. The economy could escape the trap if it could successfully coordinate on a higher equilibrium, as shown by the dashed arrow in the figure.

Together, these figures capture the full range of poverty trap dynamics discussed in this chapter, from the simple capital trap at the individual level to the complex coordination failures that can keep entire

economies locked in low-level equilibria. Section 4 draws these threads together and considers what they mean for poverty reduction policy.

4. Summing up

Understanding poverty is the first step toward addressing it. Poverty is about much more than just a lack of income. It is multidimensional, shaped by a web of factors that feed on each other and make escape very difficult. Understanding the thresholds and mechanisms through which poverty perpetuates itself is essential for designing policies that actually work for the poorest communities.

As Henry George observed more than a century ago, prosperity for all is possible when societies address the structural causes of inequality rather than treating poverty as an inevitable outcome (George 1879). This insight remains as relevant today as it was then. The United Nations has committed to ending extreme poverty as one of its Sustainable Development Goals, with a target of 2030 and a shared plan to reduce inequality and protect the planet (United Nations 2015). Progress toward this goal has been real but uneven. India has lifted hundreds of millions out of extreme poverty over the past two decades through a combination of economic growth, social programs, and infrastructure investment, yet significant pockets of deprivation remain, particularly in rural areas and among marginalized communities (World Bank 2022). Similarly, Bangladesh has made remarkable strides through targeted investments in education, health, and microfinance, while Sub-Saharan Africa continues to struggle with structural barriers that keep large sections of the population trapped despite sustained growth in some economies (United Nations 2022). These examples show that growth matters, but so does how that growth is distributed and who it reaches.

About 10% of the world's population still lives in extreme poverty, and for many of them, escape remains out of reach (United Nations 2022). Deprivation, malnutrition, poor sanitation, and lack of access to basic services reinforce each other, making the cycle very hard to break. Whatever perspective one takes on poverty, the goal remains the same: to help people improve their living standards, access better health and education, and gain greater control over their own lives.

The growth models reviewed in this chapter make clear that economic growth alone is not enough to reduce poverty. Growth that bypasses the poor or concentrates gains at the top does little to break the trap. Policies that spread the benefits of growth more widely must therefore be central to any poverty reduction strategy. Land reform, public spending that reaches the poor, and better access to financial markets are among the most important tools. Economies need to work toward equity alongside growth, modernize without damaging the environment, and build the capacity for self-reliance. No country can fully escape the poverty trap unless it makes good use of all its available resources, with future generations in mind.

Poverty traps are not confined to developing economies. In the United States, persistently poor communities in Appalachia and the Mississippi Delta have remained trapped in cycles of deprivation for generations, despite being located in one of the world's wealthiest nations. Lack of access to quality education, healthcare, and financial markets, combined with weak local institutions and declining industries, have made escape extremely difficult for these communities (Chetty et al. 2014).

Similarly in the United Kingdom, post-industrial towns in the north of England have struggled to recover from deindustrialization, with low human capital investment, poor infrastructure, and limited economic opportunities creating a self-reinforcing trap that persists decades after the initial shock (McCann 2016). These examples show that the mechanisms of poverty perpetuation identified in this chapter operate across all levels of development, not just in low-income countries.

The structural causes of poverty identified in this chapter, from wealth inequality and weak institutions to limited human capital and inadequate infrastructure, have been recognized by economists and thinkers across generations. Henry George's observation that poverty persists not from a lack of productive capacity but from how societies organize and distribute their resources remains relevant today (George 1879). The growth models reviewed here consistently show that escaping poverty traps requires deliberate, coordinated, and equitable intervention. With the United Nations 2030 Sustainable Development Goal of ending extreme poverty fast approaching, the stakes are high. The experiences of South Korea, Bangladesh, and China show that escape is possible, and that the right combination of institutions, investment, and policy can break even the most entrenched cycles of deprivation. The question is not whether it can be done, but whether societies have the will to do it.

Appendix

Appendix A: Dynamics of the Romer Endogenous Growth Model

This appendix provides the mathematical derivation of the growth dynamics of capital K and knowledge A in Romer's endogenous R&D model, supplementing Section 3.3.3 (Romer 1986; Jones 2019).

To understand the dynamics of K in this model, we start with:

$$K^*(t) = sY(t) = [s(1 - a_K)^{\alpha}(1 - a_L)^{1-\alpha}]K(t)^{\alpha}A(t)^{1-\alpha}L(t)^{1-\alpha} \qquad (25)$$

Replacing the constant term in brackets with c_K, the growth rate of K is calculated as:

$$g_K(t) = \frac{K*(t)}{K(t)} = C_K[\frac{A(t)\,L(t)}{K(t)}]^{1-\alpha} \qquad (26)$$

To look for a steady state where K grows at a constant rate (g^*_K) we analyze the change in growth rate as follows:

$$\frac{g^*_K(t)}{g_K(t)} = (1 - \alpha)(g_A + n + g_K) \qquad (27)$$

This gives:

- $g^*_K(t) = 0 \; if \; g_K(t) = g_A(t) + n$
- $g^*_K(t) > 0$ if $g_K(t) < g_A(t) + n$
- $g^*_K(t) < 0$ if $g_K(t) > g_A(t) + n$

Therefore at steady state:

$$g^*_K(t) = 0 : g^*_K = g^*_A + n$$

Similarly, to understand the dynamics of A, we have:

$$g_A(t) = \frac{A*(t)}{A(t)} = c_A.K(t)^{\beta}\,L(t)^{\gamma}A(t)^{1-\theta} \qquad (28)$$

Since $[Ba_K^{\beta}a_L^{\gamma}]$ is constant over time, it can be termed c_A. The change in the growth rate of A is:

$$\frac{g^*_A(t)}{g_A(t)} = \beta g_K(t) + \gamma n + (\theta - 1)g_A(t) \qquad (29)$$

This gives:

- $g^*_A(t) = 0 \; if \; g_K(t) = -\frac{\gamma n}{\beta} + \frac{(1-\theta)}{\beta}.g_A(t)$

- $g_A^*(t) > 0$ if g_K (t) $< -\frac{\gamma n}{\beta} + \frac{(1-\theta)}{\beta} . g_A(t)$
- $g_A^*(t) < 0$ if g_K (t) $> -\frac{\gamma n}{\beta} + \frac{(1-\theta)}{\beta} . g_A(t)$

Therefore, at steady state:

$$g_A^*(t) = 0 : g_A^* = -\frac{\gamma n}{\beta} + \frac{(1-\theta)}{\beta} . g_A^*(t)$$

Here $g_A^* = 0$ has slope $\frac{(1-\theta)}{\beta}$ and intercept on the g_K axis at $-\frac{\gamma n}{\beta} \leq 0$. Above this line $g_A^* > 0$ and below it $g_A^* < 0$, as shown by the horizontal arrow lines in Figure 6. This implies that returns to scale in the production of new knowledge using the two produced factors K and A are measured by $\beta + \theta$.

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