INTERNATIONAL JOURNAL OF SOCIAL SCIENCE HUMANITY & MANAGEMENT RESEARCH

ISSN (print) 2833-2172, ISSN (online) 2833-2180

Volume 04 Issue 12 December 2025

DOI: 10.58806/ijsshmr.2025v4i12n05, Impact Factor: 6.79

Page No. 2244-2257

Economic Growth Theories: Comparative Analysis of Classical, Neoclassical, and Endogenous Models

Ali Salehi

DBA, Département des Sciences Administratives, UQO, QC, Canada 101, rue Saint-Jean-Bosco, C.P. 1250, succursale Hull, Gatineau, QC. Canada, J8X 3X7

ORCID: https://orcid.org/0000-0003-1739-5654

ABSTRACT: Economic growth is one of the most important topics in the economic area, which has been considered by politicians and experts of countries. Due to its importance, various models have been proposed for its study and analysis. The EG models are theories that are used for interpretation and explaining the existing realities of economic growth at the global level. This paper aims to compare these models, including classical, neoclassical, and endogenous, from different aspects. For this purpose, using the method of systematic study, the models, pioneers, and their characteristics are introduced. Then, their structure and theoretical foundations are briefly presented. Finally, these models and the components are analyzed and discussed in a comparative way to provide a strong argument for their use or rejection. The results of this research show that the EG models have characteristics that cause economists to justify their use or criticize them. the factors like capital accumulation and expansion of the employment force play special roles in the classical growth model. It postulates that a country's economic growth decreases with population increase and resources limitation. This model, despite its emphasis on technology, does not consider its important role in economic growth. On the other hand, neoclassical growth theory can explain most of the observed differences in income levels among countries by considering human capital inputs in the model. However, the explanation of income levels, which is emphasized by this model, is not considered the main function of growth theory. Finally, proponents of the endogenous growth model have tried to explain the growth of production per capita in a unified state and then express the differences in growth rates among countries. According to this model, sustainable growth can be realized endogenously, that is, without the intervention of any exogenous technological progress.

KEYWORDS: Economic growth, classical, neoclassical, and endogenous growth models

1. INTRODUCTION

Economic growth is one of the most important topics in the economic area, which has been considered by politicians and experts of countries because economic growth increases income, abundance of goods and services, progress and increases prosperity in countries. On the other hand, low economic growth causes economic problems and challenges such as unemployment, low per capita income, poverty and livelihood problems, and stagnation in societies (Daud, 2017; Kurniasih, 2017). Economic literature shows that until two hundred and fifty years ago, the growth gap between countries was not noticeable (Gordon, 2012), but with the industrial revolution, some countries had faster progress. The rapid growth of some countries raised questions in the minds of economists to know what factors affected their growth. Thus, it became one of the debated topics among economists and as a result different growth models were formed.

Economic growth models are theories that have been presented for interpretation and explaining the facts and realities observed in the growth area at the global level. Some of the facts and realities are the existence of a wide difference in the per capita incomes of countries (Barro & Lee, 1994), the big difference in growth rates among countries (Fagerberg, 1987), the non-consistency of growth rates over time, the close relationship between production growth and the growth of world trade volume (Grossman & Helpman, 1989), and the low growth rate of poor countries (Kuznets, 2019; Upreti, 2015). So, growth models and theories have played an important role in categorizing and formatting these facts and identifying the causes as well as recognizing the factors that have contributed to the economic growth of countries and accordingly, considering them in the process of policy decisions.

Some early authors and economists such as Adam Smith (1790–1723) and David Ricardo (1823–1772) have expressed ideas about economic growth, but after 1870, growth emerged as an economic theory. As it is clear from the articles in the economic writings of the 1930s, for the first time John von Neumann (1903-1957) presented a mathematical model for the theory of growth in a seminar

in Vienna, which mathematically consisted of a very simple linear equation, but the Roy Harrod's model (1978-1900) was the first growth model that examined the behavior of the economy in the long run. After Harrod's work, Evsey D. Domar (1914-1997) did a similar work independently and reached similar results. Harrod and Domar tried to adapt Keynesian theory, that had been presented during the Great Depression of the 1930s, to the conditions of such economies in the post-war years. These studies have continued in the following decades.

The economic growth models have characteristics, similarities, and differences so that their use is justified or criticized by economists. John Stuart Mill (1806-1873) the classical economist, for instance, examines his theory of growth based on factors such as land, labor, capital and their rate of return and factors affecting their ability (A. L. Harris, 1956), while the neoclassical economists believed that economic growth is created through the accumulation of the physical capital factor, the employment of labor, and technology which is exogenously entered into the model (Sredojević, Cvetanović, & Bošković, 2016). However, neoclassical theories have failed to explain the growth rate of some countries. On the other hand, a new model called endogenous has been proposed, which rejects the assumptions of neoclassical and classics about ideal markets and diminishing returns to factors (Cvetanović, Mitrović, & Jurakić, 2019). This model, which has emerged in a variety of theoretical and experimental works, has entered the field of economics since the 1980s. Endogenous growth distinguishes itself from neoclassical growth by emphasizing that economic growth is the result of the economic system, not the result of external forces.

Accordingly, the main purpose of this paper is a comparative study of economic growth models based on the theoretical perspective and their assumptions, the basic frameworks, the limitations, and finally their differences and similarities. By scientifically comparing the models, the question of 'which is the optimal economic growth model' can be easily answered.

2. THE LITERATURE REVIEW

2.1. Economic growth

Economic growth has a relatively long history and various definitions have been provided. It refers to an increase in the capacity of a country's economy to produce goods and services during a certain period. According to Michael Todaro, economic growth is a sustainable process, as a result of which, the capacity of economic production increases over time and causes an increase in the level of national income (Todaro, 1989) but Simon Kuznets believes that it has a more precise meaning. According to him, economic growth means the long-term increase of the production capacity of the country to supply more diverse economic goods to the people (Kuznets, 2013, 2019). A review of the various definitions shows that they all emphasize common concepts: Economic growth is a progress and raise in production volume in a specified period compared to the same period.

Historians mention mercantilism as the beginning of the new era of European countries' connection with the new world. This connection caused human knowledge to grow widely. In this period, the main goal of economic studies has been growth, meaning the increasing production of national wealth. However, no theorizing was done during this period. Adam Smith (1723-1790), who is sometimes called the father of economics, in his book "The Wealth of Nations" examined the reason for the different rate of progress in countries (Smith, 2010). Thus, growth issues in macro-economics have been the main concern of classical economists in the 18th and 19th centuries.

Economic growth can be measured by various indicators, the most common of which is the rate of change in gross domestic product (GDP) or the rate of change in gross national product (GNP) as well as consumption, government spending, investment, net exports (Lewis, 2013). Growth indicators can be expressed as nominal and real figures. In real variables, the effect of inflation has been removed and therefore the figures are comparable with the figures of previous years. It is possible to calculate the growth indicators per capita, which somehow indicates changes in the welfare of the society.

2.2. Definitions and objectives of the economic growth models

Economic growth is one of the important topics in economics, which has been discussed for a long time among the economic schools and theorists. The EG is increasing in the market value of goods and services which produce in the economy over time and conventionally, it is measured as a portion or percentage of the increase in real GDP (Henderson, Storeygard, & Weil, 2011). Also, the growth of GDP per capita, which is often called per capita income, is related to economic growth (Brasoveanu, Dragota, Catarama, & Semenescu, 2008). Since there are undeniable facts in the study of the EG that make its analysis and interpretation difficult, various economic models have been developed. Accordingly, it can be said that the EG models are tools for studying, analyzing, and interpreting economic growth, which are based on strong theoretical foundations.

Today, economic growth models have become one of the specializations in economic studies so that they follow the following goals:

1. Strengthening the skill of thinking about- They are more a method rather than a doctrine (De Silva, 2012). Therefore, these models are an apparatus of mind, a technique of thinking which helps its possessor to draw correct conclusions.

2. Policy guide - Some models were designed to particularly address specific economic policy issues. According to experts, despite pessimism about the usefulness of growth models, it can be claimed that these models have left important effects in the intellectual discipline used in the process of formulating growth patterns in economic policies, even though the effects are not direct (Jones, 1975).

3. Separation of unforeseen possibilities - The simplest models of economic growth can reveal possibilities that cannot be achieved without using a theoretical model. In addition, the models create results that may seem highly contradictory, but documentation of the models help researchers to discover the roots of contradictions (Jones, 1975).
4. A framework for estimation and forecasting - The models can provide tools and technics to estimate the sources of economic growth and predict the future growth of countries (Temple, 2003). Thus, the growth models include logic that help researchers in making predictions about economic growth in the medium and long-term.

3. THE METHODOLOGY

To review the published scientific materials in the field of growth models, the systematic literature review method has been used, which is suitable for reviewing a large amount of information (Petticrew & Roberts, 2008), carefully collects resources and offers suggestions for future research plans (Rousseau, Manning, & Denyer, 2008). This method in a transparent and systematic way and by presenting coherent and comprehensive results, increases the knowledge about a phenomenon in scientific texts and directs the executive actions in the real world. To create a systematic literature review that attempts to identify all studies, the research subject was broken down into four keywords including "economic growth models/ theories", "classical growth model/ theory", "neoclassical growth model/ theory", and "indigence growth model/ theory". Furthermore, an effort was made to consider the most reputed keywords in the past. So, to have more valid results, both automated and manual searching options were used for each single bibliographic database.

After finding research terms, to identify relevant sources, the electronic databases are searched which contains millions of international sources including articles, books chapters, essays, and other scientific papers from hundreds of different international publishers: ScienceDirect, Scopus, Sage journals, Cambridge Journals, EBSCOHOST, Emerald, IEEE, JSTOR, SAGE Journals, Taylor and Francis, Web of Science, Wiley Online, Google Scholar, and others. All databases were selected with attention to coverage of the scientific literature and level of overlaps. In addition, Endnote (version X9) used for storing and managing different publications, and VOSviewer (version 1.6.15) was utilised for cataloguing, organising, analysing, and synthesising the set of data. Figure 1 indicates the output of the software including the main concepts, sub-concepts, and their connections.

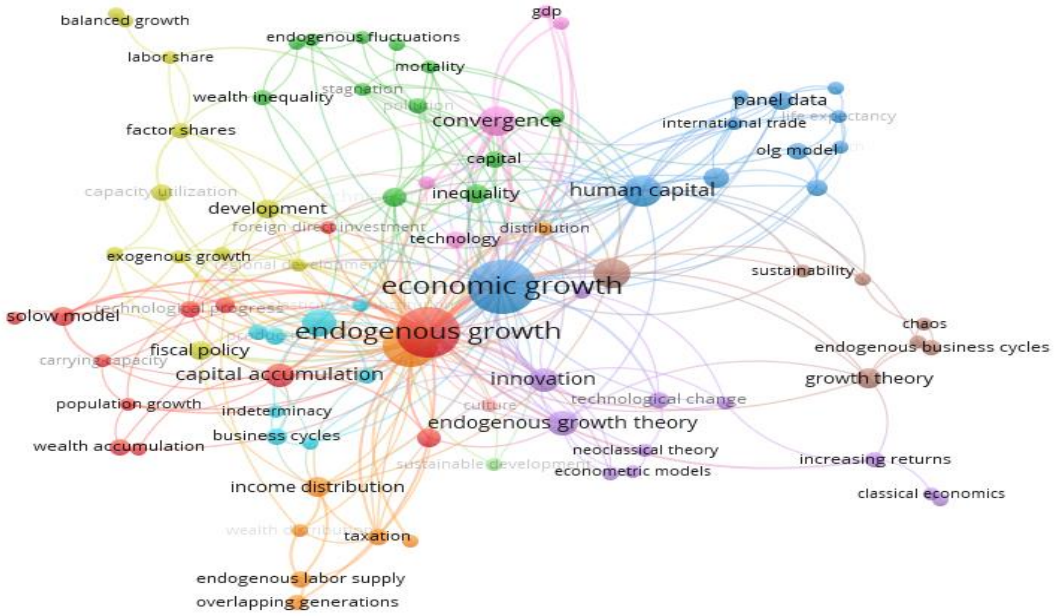

Figure 1. General map of literature keywords relationships

To select relevant sources, the following factors and stages were taken into consideration: 1) The sources should cover the opinions of economists from the 19th century to the present. 2) The full texts of the sources must be available in English or French languages. 3) The sources must be part of valid databases. 4) the sources must be written by knowledgeable authors and be affiliated with universities and reputable scientific centers. 5) The abstracts, keywords and citation information of the sources were downloaded, and then duplicate publications were deleted. 6) At last, the final filter was done and the sources that most matched with the paper's title were selected. According to these indicators, initially 554 papers were found related to the main concepts. The papers' abstracts were carefully read and at last, 118 papers were selected that addressed the research title.

4. ANALYZING AND DISCUSSING THE ECONOMIC GROWTH MODELS

4.1. Classical growth model

4.1.1. Theoretical perspective of classical economists

According to the classical economic growth model, a country's economic growth will decrease with an increasing population and limited resources, this is because the increase in population leads to the limitation of resources and thus the reduction of economic growth (Gordon, 2022). The assumption of this model is based on perspectives of the classical economists who believe a temporary augmentation in real GDP per person inevitably leads to a population explosion, which would limit a nation's resources, consequently lowering real GDP. As a result, the country's economic growth starts to decrease.

Classical growth theories, which generally concentrated on the concept of the EG and population growth, are often developed by Adam Smith and Thomas Malthus (1766-1834). These theories examined the impacts of population growth on the EG. According to classical growth theories, initially there is enough land and soil for households, where they work and get their livelihood, but at some point, all good and productive lands were occupied and when population increased, the available lands required more efforts and produced little harvests. Land became a limitation for the population, thus the productivity diminished. These situations gave the belief that when humans continue to reproduce and increase in population, hunger and war is at hand (D. J. Harris, 2007). In addition to these perspectives, different classical theories emerged in the 18th century when a massive growth occurred. According to David Ricardo and Karl Marx, a main factor for the EG is capital. An increase in the number of labor force affects capital. On the other hand, workers also increase when there is an accumulation of capital (Gordon, 2022).

4.1.2. The basic framework of the model

Classical growth theory consists of a modern category of economic theory that was formed by the leading economists of the classical school such as David Hume (1711-1776), Adam Smith (1723 -1790), and David Ricardo (1772 -1823) in the 18th century and ended with John Stuart Mill (1806-1873) and Karl Marx (1811-1883) in the middle of the 19th century. This theory explains economic growth as a result of capital accumulation and the reinvestment of profits derived from specialization, the division of labor, and the pursuit of comparative advantage (Kenton, 2018). Classical growth model is generally based on three basic assumptions.

1. Labor supply is determined exogenously- According to the first assumption, the labor force has an exogenous growth rate which it is determined outside the system (Salvadori, 2003). Therefore, with the exogenous growth rate, the amount of available labor can be determined at any moment. Also, in addition to the growth of the labor force, its productivity is also growing over time. Accordingly, if it is shown with ʎ, the effective workforce will be $\lambda + n$ at any time.

2. The production function relates labor and capital inputs to the level of production - That is, the production function in the growth model converts capital and labor into production. Based on model 1, production output is a function of two factors, physical capital, and labor supply:

$Y_t = F(K_t, L_t)$ (1)

where Y_t, K_t and L_t are product output, labor supply, and physical capital, respectively (Feldstein & Horioka, 1992).

3. There is a close relationship between saving and investment - Investment and capital formation are the most important factors in the growth model structure that indicates the relationship of these two factors (Jangili, 2011). Thus, every economy must allocate a certain proportion of its income to savings to generate new investment that represents a specific increase in the capital stock. Accordingly, if we consider model 2, in equilibrium status, investment should be equal to total savings (model 3).

$$I_t = \Delta K_t = \frac{dk}{dt} \quad (2)$$

That is:

$$S_t = I_t = \frac{dk}{dt} \quad (3)$$

The origin of the classical growth model is essentially the static and short-term equilibrium model of Keynes, which was carried out by Harrod and Domar in 1934-1936 separately with similar results. This model which is considered the first model analyzes economic behavior in the long run, Harrod and Domar consider the real optimal growth rate (Chetty & Pradhan, 2020). The optimal growth rate is the growth rate at which all producers are in a situation where they are unwilling to increase production (Chetty & Pradhan, 2020). According to this model, since in equilibrium conditions capital must be employed at full employment, production must grow at a guaranteed rate. On the other hand, for full employment of the labor force, while productivity is growing, production must grow at the natural rate. For labor and capital to be at full employment when the economy is growing, we must have $\Delta Y/Y = s/k\%$ (Siddiqui, 2020). Since the labor force and the savings rate are all fixed according to the assumption, therefore, the possibility of balanced growth with full employment of capital and labor is almost zero; This major weakness goes back to the classic model of Howard and Domar.

4.1.3. Limitations of the classical growth model

According to economic experts, the classical growth model has obvious limitations as follows:

1. One of the important limitations of this model is related to the assumptions on which the model is based (M.Asl, 2003). Critics argue that contrary to the assumptions of this model, there is no substitutability between capital and labor and the savings rate is constant.
2. The classical growth model is unaware of the role of technology (CFI, 2015). In other words, this model ignores the role that efficient technical progress can play in the efficient running of the economy while technological progress can minimize diminishing returns.
3. The classical growth model assumes that the total wage does not exceed or fall below the subsistence level, while this assumption is not quite true. Changes in industrial structure and significant economic development can lead to an increase or decrease in total wages from the subsistence level (CFI, 2015). This theory ignores the role of trade unions in the wage setting process, while they play an important role in this process (Ross, 1956).
4. Based on this model, the growth of GDP per capita causes population growth, while in developed economies such as Japan and Europe, this is the opposite. In other words, in many examples, despite the growth of GDP per capita, the growth of the population has even become negative.

4.2. Neo-classical growth model

4.2.1. Theoretical perspective of neoclassical economists

The second model that we study in this paper is the neoclassical model that deals with research on growth with new data that became available after World War II. The effective works in this model belong to Robert Solow (1924), Simon Kuznets (1901-1985), Moses Abramovitz (1912-2000), Hollis B. Chenery (1918-1994), and Edward Fulton Denison (1915-1992). The basis of the thoughts of the neoclassical theorists is that the growth of per capita income, which has increased significantly since the industrial revolution in developed countries, is not only the result of an increase in the labor force and capital stock (Solow, 1956). Almost all economists agree that an important part of growth in industrialized countries is the undeniable result of technical advances and technology. Thus, in the neoclassical growth model, which was first proposed by Solow (1956), the technology factor is considered exogenous (Popa, 2014). Hence, neoclassical growth theory states, in addition short-term equilibrium results from varying amounts of labor and capital in the production function, technological change has a major influence on an economy so that economic growth cannot continue without technological advances (Prescott, 1988). Accordingly, it outlines the three factors necessary for a growing economy: labor, capital, and technology. However, neoclassical growth theory clarifies that temporary equilibrium is different from long-term equilibrium, which does not require any of these three factors (Banton, 2020).

The simplest and most popular version of the Neoclassical Growth Model is the Solow-Swan Growth Model. He assumed that Harrod-Domar's model was based on some unrealistic assumptions. The model, which was developed independently by them in 1956, superseded the Keynesian Harrod–Domar model (Acemoglu, 2010). Thus, Solow has dropped these assumptions while formulating its model of long-run growth. He indicates that by the introduction of the factors influencing economic growth, Harrod-Domar's Model can be rationalised, and instability can be reduced to some extent. Solow has shown that if technical coefficients of production are assumed to be variable, the capital labour ratio may adjust itself to equilibrium ratio in course of time (Dykas, Tokarski, & Wisła, 2022).

The production function used in this model is a homogeneous linear production function with constant returns to scale, which has the special form of the Cobb-Douglas production function:

$$Y_t = A_t K_t^{\propto} L_t^{1-\propto} \qquad (4)$$

In addition to linear combination, the model has assumptions that distinguish it from others:

1. Prices and ratios of factors are completely variable and there is full employment of capital and labor. In addition, the remuneration of production factors is equal to the final product. Therefore, product and factor markets are completely competitive (M.Asl, 2003).
2. People are rational in making choices between identifiable and value-associated outcomes. Furthermore, the main goals of people are to maximize utility. For this purpose, they act independently on complete information (CFI, 2015).
3. In addition, in the neoclassical model, it is generally assumed that technology grows in an exponential function format with compound interest rates n and g. That is:

$$A_t = e^{gt} L_t = L.e^{nt} \qquad (5)$$

4. It is also assumed that, in general, investment is always sufficient to equal savings at full employment, and savings is always a constant proportion of national production. That is:

$$I_t = \frac{dk_t}{dt} = sY_t \qquad (6)$$

Finally, by combining the assumptions and applying mathematical methods, we will have the following equation:

$$Y_t = Y.e^{\left[n+\frac{g}{1-\propto}\right]t} \qquad (7)$$

Accordingly, in the long run, national production grows ultimately assuming that it is only a function of the growth rates of labor supply and technology. In fact, under neoclassical conditions, equilibrium growth occurs at the natural growth rate (Sato, 1964), but this long-term growth rate is clearly independent of the national proportion output which devoted to savings and investment (M.Asl,

2003). The flexibility of this ratio comes from the classical assumption that production takes place in conditions where, in addition to the factors' flexible prices, there is a set of different methods of production.

4.2.2. The basic framework of the neoclassical growth model

To explain the basic framework of the neoclassical model, it is assumed that the economy consists of many households, each of them trying to maximize the current value of their life-cycle utilities at the desired time, $t = 1$. That is (Drozd & Kowalik, 2022):

$$u(c_1) + \beta u(c_2) + \beta^2 u(c_3) + \cdots \quad (8)$$

where c_1 is the per capita consumption of an individual from the sample household during the time t and $\beta = \frac{1}{1+\rho}$, and $\rho > 0$ is the time preference rate. It is also assumed that the utility function of U is well-behaved[1], so that $\acute{u}(\infty) = 0$, $\acute{u}(0) \geq \infty$, $\acute{\acute{u}} < 0$, $\acute{u} > 0$. If leisure is included as another variable along with consumption in the utility function, the results of the neoclassical model will not change much. For simplicity and convenience in the analysis, we do not consider rest and leisure time. Instead, we assume that each household member supplies one unit of labor in each period in an inelastic and constant manner. It is assumed that the number of people in each household grows at the rate V in each period so that at any time the number of members becomes $1 + V$ times their number in the previous time. With such population growth, some analysts consider the utility function of the household in such a way that for $u(t)$ in each period, a weight based on the number of household members is considered. If in the following equation $\psi = 1$, then the utility function will be as follows (Philippon, 2011):

$$u(c_1) + (1+v)^{\psi}\beta u(c_2) + (1+v)^{2\psi}\beta^2 u(c_3) + \cdots \quad (9)$$

Assuming $\psi = 0$, function 8 becomes the same as function 9, while the exponent between 0 and 1 for ψ reflects intermediate states. Every household is engaged in production and its input-output facilities are represented by a production function in the form of $Y_t = F(K_t, N_t)$ where $K_t \; and \; N_t$ are the amount of labor and capital inputs, and Y_t is the level of production in period t. It is assumed that the function F is homogeneous first-degree, so that if we denote the per capita value of Y_t and K_t by y_t and k_t respectively, we will have:

$$y_t = f(k_t) \quad (10)$$

where $F(K_t) \equiv F(K_t, 1)$ and it is assumed that the function f is well-behaved. If we denote government transfer payments by v_t so that v_t is net of taxes, the household budget limit in period t in terms of per capita amounts will be as follows:

$$f(K_t) + V_t = c_t + (1+v)K_{t+1} - (1-\delta)K_t \quad (11)$$

where δ is the capital depreciation rate. In $t = 1$, the household chooses the values of $c_1, c_2 \ldots k_2, k_3 \ldots$ so that function 8 is maximized according to limitation of function 11 and the certain value of k_1. It can be easily shown that the first order condition, i.e., the necessary condition for optimality, will be as follows:

$$(1+v)\acute{u}(c_1) = \beta\acute{u}(c_1+1)\left[\acute{f}(k_{t+1}) + 1.\delta\right] \quad (12)$$

In this case, condition the final limit will be as follows (Rios-Rull, 2020):

$$\lim_{t\to\infty} k_{t+v}\beta^{t-1}u^1(c_t) = 0 \quad (13)$$

The latter condition, as a new limit condition along with the initial values condition, makes it possible to obtain a single time path for $c_t \; and \; K_{t+1}$ using equations 11 and 12. Conditions 11, 12 and 13 are the necessary and sufficient conditions for optimal household selection.

To describe the competitive equilibrium in the economy, we assume that all households are identical and similar to each other, so that the individual behavior can be described using equations 11, 12 and 13. The government expenditure in t is based on the per capita values of g_t whose value is determined exogenously. To develop the analysis, the possibility of borrowing for the government can also be considered, but for simplicity, the budget of government is assumed to be balanced. Thus, the government budget limitation based on per capita amounts will be as follows:

$$g_t + v_1 = 0 \quad (14)$$

So, the values of $c_t \; and \; v_t$ in the equilibrium of general competition are determined based on equations 11, 12, 14 and the final limit condition (13). In the following, we assume $g_t + v_1 = 0$. In this case, the values of $c_t \; and \; k_t$ are determined in competitive equilibrium according to equation 12 and the following condition provided that the answers work also in equation 13:

$$f(K_t) = C_t + (1+v)K_{t+1} - (1-\delta)K_t \quad (15)$$

What is more important is the paths of competitive equilibrium, which must also have the characteristics of the unified. That is, the paths along which all variables grow at a constant rate. It can be shown that in the current framework, which lacks any technical progress, the unified characteristic is that the values of $c_t \; and \; k_t$ are static. Hence, according to equation 4, in the unified state of competitive equilibrium, we will have:

$$\acute{f}(K) + 1 - \delta = (1-v)(1-\rho) \quad or \quad \acute{f}(K) - \delta = v + \rho + v\rho \quad (16)$$

This equation states that the net marginal return on capital (regardless of the mutual effects of $v\rho$) is approximately equal to $v + \rho$. If we consider the utility function more generally as equation 9, this condition becomes as follows:

1. Most utility functions used in modeling or theory are well-behaved (Bergstrom, 1999).

$\acute{f}(K) + 1 - \delta = (1 - \rho)\ (1 - v)^{1-\psi}$ (17)

So, in $\psi + 1$, i.e., in the situation where household size is effective in its utility, we will have:

$\acute{f}(K) - \delta = \rho$ (18)

It can be shown that in this model, the path of competitive equilibrium tends towards the equilibrium path of unified state in over time. In other words, starting from an arbitrary K_1, K_t tends towards the value of K^* over time ($t \to \infty$), which also applies to equation 16. This claim can be examined in the special case of $u(C_t) = logc_t$, $f(K_t) = AK_t^a$ and $\delta = 1$ which was not mentioned to avoid prolonging the discussion.

Because the neoclassical growth model tends toward a uniform position along which per capita values remain constant over time, this model does not have the proper structure for uniform growth analysis. In neoclassical foundations, per capita growth is possible assuming the occurrence of uniform technical progress that continuously shifts the production frontier over time. If technical progress takes place at the rate γ, the production function in its general state can be shown as follows (Sims, 2011; Solow, 1999):

$\mathrm{Y_t} = \mathrm{F(K_t}\,, \mathrm{N_t}\,, (1+\gamma)^{\mathrm{t}}$ (19)

However, uniform growth is only possible if technical progress is labor augmenting such that:

$\mathrm{Y_t} = \mathrm{F(K_t}(1+\gamma)^{1}\mathrm{N_t})$ (20)

In this case, if the function F is homogeneous of the first degree, we will have:

$\hat{\mathrm{y}}_{\mathrm{t}} = \mathrm{f}(\hat{\mathrm{k}}_{\mathrm{t}})$ (21)

where $\hat{\mathrm{y}}_{\mathrm{t}} = \mathrm{Y_t}/(1+\gamma)^{\mathrm{t}}\mathrm{N_t}$ and $\hat{\mathrm{k}}_{\mathrm{t}} = \mathrm{K_t}/(1+\gamma)^{\mathrm{t}}\mathrm{N_t}$ represents the amount of production and capital per unit of labor (per unit of efficiency).

4.2.3. Limitations of the neoclassical growth model

Economists have criticized the neoclassical growth model, the most important of which are as follows:

1. Inability to explain the most basic facts of the growth behavior- The inability of this model in this field comes from the prediction of the model, whereby the production per capita tends towards a uniform path along which it will grow with the exogenous rate of γ. That is, the growth rate is determined outside the model and is independent of preferences, characteristics of the production function, and the behavior of political variables (Conlisk, 1967; Solow, 1956). According to this model, the same growth rate is provided for all economies. Therefore, this model cannot explain the differences in long-term growth rates between countries.
2. Inability to explain continuous growth - Critics of the neoclassical growth model believe that this model is unable to explain continuous growth (Solow, 1999) because according to this model, per capita production rates tend to constant values in the absence of exogenous technical progress.
3. Inability to demonstrate income levels- Critics believe although this model can explain a major part of the differences in income levels among countries (Pack, 1994) by considering the input of human capital but explaining the income levels is not considered the main task of this model. So, to cover its weaknesses, economists have introduced another model called the endogenous growth model.
4. Ignoring technological factors- This model does not explicitly state the main factors of technological growth and does not consider how the technological factor changes over time. In other words, it puts technological factors outside the model and exogenously and ignores it as a driver of economic growth.

4.3. The endogenous growth model

4.3.1. Theoretical perspective of economists of the endogenous growth model

In response to the shortcomings of the neoclassical model, a group of economic growth theorists developed a model that replaced the exogenous growth variable (unexplained technical progress) with a model in which the key determinants of growth were specified in the model. The basis of this model was formed and developed by the work of economists such as Kenneth Arrow (1962), Hirofumi Ozawa (1965), and Miguel Sidrauski (1967), Paul Romer (1986), Robert Lucas (1988), Sergio Rebello (1991) and Ortigueira and Santos (1997). They removed technological change from the model (Romer, 1990; Sredojević, Cvetanović, & Bošković, 2016). According to this group of economists, growth in the endogenous model is due to unlimited investment in human capital, which has a spillover effect on the economy and reduces the diminishing return of capital accumulation (Barro, 1995). That is, economic growth should be realized without the intervention of any exogenous technological progress.

The basis of the word "endogenous" is a botanical term, and in fact, endogenous is a plant that develops within existing tissues through the irregular growth of normal tissues and new endogen. Based on the endogenous growth model, since growth or production is from within, this is a suitable metaphor for economic and technological growth. Accordingly, endogenous growth theory is a simple concept for economic growth which is realized from within the system or in better words from within a country (Aghion, Howitt, Howitt, Brant-Collett, & García-Peñalosa, 1998). In this model, the uniform growth rate depends on the parameters of the utility functions, the production, and the fiscal policy (Ortigueira, 1998; Turnovsky, 2000). There are three different approaches in developing endogenous growth models, each of which focuses on one of the following factors: 1) external effects caused by the

accumulation of physical capital, 2) accumulation of human capital (skilled labor), and 3) continuous growth in new product designs which in turn facilitates the creation of new product designs (Abrishami et al., 1999).

In general, there are two main reasons for developing endogenous growth models: first, economic growth and increase in production in developed countries is much higher than in the last century (Ickes, 1996). According to economists, high economic growth needs theories that can explain technological and economic growth in the best way. Romer notes in his 1990 study that the value of output per capita of workers in the United States at that time was ten times its value in the previous 100 years (Romer, 1990). He attributes this growth to technological changes and the development of human capital. The second reason is that the theory of endogenous growth offers another aspect of development, which is independent of trade (Aghion et al., 1998). Traditional growth theories emphasized trade and considered it the engine of growth, while endogenous growth theory emphasized education, labor skills, and the development of new technologies. In fact, endogenous growth theory criticizes the theory of globalization, and it sees globalization in the education and training of human resources.

4.3.2. The basic framework of the endogenous growth model

We begin the discussion about the endogenous growth model by re-introducing the model that includes the external effects of physical capital and was discussed in the previous sections. This model, which lacks exogenous technical progress, is modified here. Despite the existence of technical progress, there are some external effects in production, so that the per capita production function of the sample can be written as follows:

$$y_t = f(k_t, \bar{k}_t) \qquad f_1 > 0 \ , \ f_{12} < 0 \qquad (22)$$

where $\bar{k}_t$ is average of the individuals' capital stock at the level of the macroeconomy. According to Romer, this type of production function can be considered as one of the characteristics of public goods due to having knowledge and innovation (Romer, 1996). If there is a constant ratio between new physical capital, knowledge, and innovation, then $\bar{k}_t$ is not only an indicator of the total physical capital stock, but also measures the total general knowledge stock that each firm can benefit from. However, each firm or household is a small unit that assumes $\bar{k}_t$ is constant in its decision regarding k_{t+1} and other decisions.

The second essential component of the endogenous growth model is human capital in the sense of skilled labor (Winter-Ebmer, 1994). By using the necessary resources, the skills of the workforce can be strengthened and improved. A simple way to show the effects of human capital is to describe the accumulation of physical output as follows:

$$AK_t^a(h_t n_t)^{1-a} = C_t + (1+v)k_{t+1} - (1+v)k_{t+1} \qquad (23)$$

Where n_t is a share of the working hours of the sample household allocated to the production of goods, and h_t represents the human capital, i.e., the work skills of a member of the sample household at time t. These skills are produced by allocating part of working hours $(1 - n_t)$ to the formation of human capital. In general, physical capital is also an important input in the process of forming human capital, but to simplify the discussion, we first assume that the accumulation of labor skills follows the following law:

$$h_{t+1} - h_t = B(1 - n_t)h_t - \delta_h h_t \qquad (24)$$

Where in which the depreciation of skills is reflected due to the passage of time and is assumed $v = 0$ (Abrishami et al., 1999).

In the following, based on the theoretical framework of the endogenous growth model, it is necessary to know whether this model has more validity and popularity than the neoclassical model or not. In other words, although the advantage of this model is that it at least tries to explain the growth process endogenously, are these efforts logically and empirically acceptable?

4.3.3. Limitations of the endogenous growth model

Although endogenous growth models have attractive features, such that they consider the external effects of knowledge (Bharadwaj, Clark, & Kulviwat, 2005; Rivera-Batiz & Romer, 1991) and the fact that the development of workforce skills depends to a large extent on the allocation of resources to produce skills (Acs, Audretsch, Braunerhjelm, & Carlsson, 2004; Mishra, 2016), it seems the limitations in this model should be investigated before any conclusions and comments.

The first problem is that in the Lucas' model or in the model of Lucas and Rebello (Aghion et al., 1998), continuous growth requires an endless increase in human capital h_t, which is defined as an index of the production skills of a sample worker, but for such a variable, endless growth is not a reasonable assumption because the production skills of workers are skills that are owned by them. That is, these skills are not automatically transferred to the next generation, but they must take action to acquire the skills, and for this purpose, it is necessary to spend resources. Therefore, human capital is different from knowledge that is owned by the public (society) and is easily available to all those who wish to use it. Thus, only some types of knowledge that do not include human capital can be the basis of continuous growth (Romer, 1989).

The second limitation of the endogenous growth model refers to the assumption of returns to scale in the production process. For example, in the Lucas- Rebello model (Rebelo, 1991), the sum of the powers of physical and human capital in equation 23 must be exactly one to achieve uniform growth. If the sum of the exponents is even 0.01 less than 1, the economy tends towards the uniform path, where there will be no growth in per capita values. There are similar problems in other models. Hence, this means that the endogenous growth model does not actually produce continuous uniform growth in the absence of exogenous technical progress.

Despite these limitations, the endogenous growth model is a very useful model, and it has been the source of valuable results because assuming returns to scale of 1 in equations 23 and 24, the transition process in the model will be very slow. The speed of adjustment of k_t towards $-k_t$, which was calculated $(1 - a)$ in the neoclassical model under the assumption of LDC based on equation 29[1], is close to $1 - (a_1 + a_2)$ in this model, where $(a_1 + a_2)$ is the sum of the coefficients of physical and human capital. Therefore, if we enter the effect of human capital into the model in the form of skilled labor as in equation 24, it is expected that the adjustment coefficient of $1 - (a_1 + a_2)$ will be close to zero and convergence will occur slowly. However, if the transition process is too slow, the difference in growth rates due to transitions towards the unform state of competitive equilibrium will persist, and the differences in growth rates can continue for a long time. Thus, even if the endogenous growth approach cannot explain continuous uniform growth, it can justify many features observed in empirical data and potentially be the basis of useful policy analyses.

5. COMPARATIVE REVIEW OF ECONOMIC GROWTH MODELS

Literature review shows that economic growth models have been developed over time. In other words, the challenges in measuring economic growth and the weaknesses of existing models have led economists to develop more effective ones. Thus, the new models, while covering the weaknesses of the old ones, have had a better match in measuring economic growth. Accordingly, among the three models studied in this article, the classical growth model has a longer history, while the endogenous growth model has been proposed since the 1980s. These models are a collection of theories that have been presented over time to interpret and explain the observed facts in the field of global growth and according to the prevailing conditions in each period, they have focused on specific issues.

Classical growth theory is formed based on the opinions of economists such as Adam Smith and Thomas Malthus, with a focus on population. They have a negative view of the population and believe that the increase in population growth leads to a decrease in economic growth. They believe that with the increase in population, resources will be limited, and this limitation will reduce economic growth. Therefore, according to them, the population explosion or increase is caused by a temporary increase in the real GDP of a country.

As can be seen, the proponents of classical growth theory not only do not consider the population and the human factor to be effective, but also consider it an obstacle to economic growth, so that Malthus proposes to limit the population through abstinence from sex, hunger, disease, and war (Farley, 1766). However, there are many ideas in classical theory that do not match Thomas Malthus's belief. For example, according to David Ricardo and Karl Marx, the main factor of economic growth is capital. Therefore, the increase in the number of workers affects the capital, workers also increase in case of accumulation of capital (Salvadori, 2003). It can be said that this is the starting point of thinking about the population and the human factor as capital. Accordingly, in the classical growth model, the production function relates the inputs of labor and capital to the level of production, the supply of labor is determined exogenously, and with the formation of capital, a relationship is established between savings and investment.

Neoclassical growth theory, as one of the oldest mathematical equations that tried to explain growth, is the developed and improved form of the classical growth model. This model has developed by using the results of economists' studies such as Solow, Swan, Mankiw, Romer and Weil, and it has been able to some extent to respond to the growth process of countries and explain how growth is formed. In this model, labor force, capital, and technology are considered as three economic forces that create constant economic growth (Conlisk, 1967). This theory assumes that the short-run economic equilibrium is the result of different amounts of labor and capital that play a vital role in the production process. This theory argues that technological change significantly affects the overall performance of an economy (Gomulka, 2006; Verspagen, 2001). It can be said that the neoclassical growth model has a production function characterized by a set of labor-capital and capital-output ratios. As a result, its equilibrium growth rate, such as the capital-output ratio, is variable. Therefore, this growth rate can be equal to the growth rate of full employment. This growth model allowed for substitution between labor and capital. Also, based on the neoclassical growth model, diminishing returns on capital, and flexibility in prices and wages were established. This development will continue until the guaranteed growth rate of capital is

---

1. If we consider the following equations:

$$\frac{1+v}{C_t} = \frac{\beta a A K_{t+1}^{a-1}}{C_{t+1}} \quad (25), \quad AK_t^a = C_t + (1+v)k_{t+1} \quad (26)$$

Since the economic situation at the time of t is summed up in the value of k_t^a, it is reasonable to imagine that each of the values of k_{t-1} *and* C_t are proportional to k_t^a. By considering these equations, the correctness of this idea will be confirmed:

$$C_t = (1 + a\beta)Ak_t^a \ \ and \ \ K_{t+1} = a\beta(1+v)^{-1}AK_t^a \quad (27)$$

These answers also apply to condition TC, equation 13, so that it shows the path of competitive equilibrium. Thus, answer of k_t can be expressed as a first-order linear equation as follows:

$$logK_{t+1} = log\left[\frac{a\beta A}{1+v} + alogk_t\right] \quad (28)$$

Considering that $|a| < 1$ has dynamic stability in the above equation, $\log k_t$ tends towards $(1-a)^{-1}log[a\beta A/(1-v)]$. If we subtract $logk_t$ from both sides of the equation, we will have:

$$logk_{t-1} - log_t = (1-a)[logK^* - logK_t] \quad (29)$$

Where $K^* = [a\beta A/(1+v)]^{1/(1-a)}$. In this special case, $1 - a$ shows the speed of convergence of k_t towards k^*.

coordinated with the natural growth rate of the labor force and it provides full employment conditions. Thus, we are in uniform stable equilibrium when the level of per capita income, savings, population growth rate, and technology are all exogenously entered into the growth model.

In a general conclusion, it can be said that the neoclassic growth model is a model with the characteristics of being exogenous, long-term, and within the framework of classical school theories. The model attempts to explain long-term economic growth by examining capital accumulation, population or labor force growth, and productivity increasing which commonly known as technical progress. it is also clear that the neoclassical growth model, despite its shortcomings, by moving from exogenous to endogenous growth models, can be the answer to the economic growth of countries to some extent. Also, the use of this model in developed countries is more reliable and decisive. In other words, from the results of the studies, it can be concluded that to explain the economic growth of countries, in addition to the classical variables emphasized by the past theories, there are many foundations and economic-social structures, and other factors that influence the growth process in countries which the neoclassical model is partially responsive to them.

The endogenous growth model was developed to cover the weaknesses of the neoclassical models, as it made predictions about economic growth without factoring in technological change. The endogenous growth theory challenges such an idea by placing importance on the role of technological advancements. Since long-term economic growth is derived from the growth rate of economic output per person, it would depend on productivity levels. In turn, productivity would depend on the progress of technological change, which relies on innovation and human capital; these factors are considered internal to an economy. As a result, according to the proponents of this model, investment in human capital, innovation, and knowledge have a significant effect on economic growth. Because in the neoclassical growth model, the long-term growth rate of the economy is determined exogenously based on the savings rate (in the Harrod-Domar model) or the technology growth rate (in the Solow model), and since there is no detailed explanation about the rate of savings or the speed of technological progress, the endogenous growth model tries to overcome these deficiencies by providing macroeconomic models based on the principles of microeconomics. Accordingly, households maximize utility (according to budget constraints) and firms maximize profit. In these models, great importance is given to new technologies and human capital. Also, the driver of growth in simple models is the return to scale of production, and in more complex models, the spillover effects from a knowledge-based economy.

According to endogenous growth theories, policies that support an open economy, competitive markets, and innovation lead to growth. On the other hand, policies that limit or reduce innovation and support industries that are not very creative slow down economic growth in the long run. Therefore, it can be said that since economic growth is a process of permanent transformation, it cannot occur without accepting extensive social and internal changes in countries. That is, according to the endogenous growth model, an economy that avoids internal transformation has actually left the growth path. Based on what was said, Table 1 briefly compares economic growth models.

Table 1. **The similarities and differences of economic growth models**

	Classic	**Neoclassic**	**Endogenous**
Economists	Adam Smith, David Hume, Davis Ricardo, Thomas Malthus,	Robert Solow, Trevor Swan, George Mankiw, David Romer, and David Weil	Paul Romer, Robert Lucas, Robert G. King Sérgio Rebelo,
The time of period	18th and 19th centuries	19th end of 20th centuries	From the 1980s until now
economic forces	Capital accumulation Expansion of employment Advancement of technology	Labor force Capital Technology	Human capital Innovation Knowledge
Approaches to per capita income, population, and technology	Exogenous	Exogenous	Endogenous
Focuses	Technology-Physical Capital	Technology-Labor	Technology-Human Capital
The time of period		Long term	Long term
Explores	Savings as a source of Capital Accumulation		Education as a source of Human Capital Development
Taskforce	Population Negative effect Resources limiter Growth barrier	Labor Quantity Physical Isolated	Human capital Quality Intellectual Among humans

Economic Growth Theories: Comparative Analysis of Classical, Neoclassical, and Endogenous Models

	Classic	Neoclassic	Endogenous
		Individual	Institutional

6. CONCLUSION

Economic growth is one of the most important topics in economics, which has been challenging to measure. Realizing the importance of measuring economic growth, economists have developed various models over the past few hundred years. Classical, neoclassical, and endogenous growth models are among them, each of which has strengths and weaknesses that were mentioned earlier.

As a conclusion, it can be said that the focus of classical growth theory is on population instead of capital and technology. Thus, the hypotheses of classical growth models have two wrong assumptions. First, according to classical models, the growth of GDP per capita causes population growth, while in developed economies such as Japan and Europe, this is the opposite. In addition, it does not consider that technology development can neutralize the effect of diminishing returns and cause an increase in per capita income which is seen in most developed countries. Therefore, economists developed the neoclassical growth models.

In neoclassical growth models, regardless of the ratio of capital to primary labor or the level of technology, the EG rate reaches its stability state. Based on this model, capital deepening in which the capital per worker is increasing in the economy, can only affect the level of production and cannot affect the long-term growth rate. Hence, it can be said that this model does not explicitly state the factors of technological growth and, also, does not consider how the technological factor changes over time. In other words, neoclassical growth addresses it exogenously, and outside the model. So, it ignores the factors of technological growth as drivers of economic growth.

The endogenous growth model was developed to overcome these deficiencies. This model is based on the idea that there is no diminishing returns effect despite the technological factor. Thus, it is possible to achieve continuous and long-term growth by investing in human resources, and R&D. In this model, population growth does not have much effect on the growth of GNP. Furthermore, contrary to the neoclassical theory, which sees temporary economic growth as a result of saving and investment, endogenous theory considers economic growth to be permanent with savings and investment, especially in human capital and R&D. Accordingly, it can be concluded that economic growth is a function of technical accumulation, and technical knowledge is the basis of capital, which is emphasized by the endogenous growth model. To be effective, this model should be based on some basic pillars which a healthy, trained, expert and skilled workforce is one of the most important. So, the position of human capital in growth models has exceeded the physical accumulation of capital. That is, wherever human power is focused, whether directly or indirectly, its positive effects can be seen in real economic growth. It is a factor that is determined endogenously. Therefore, it can be said that the endogenous growth model is the most justified model that can cause long-term growth.

REFERENCE

1) Abrishami, H., & Manzoor, D. (1999). Comparative analysis of neoclassical and endogenous growth models". Journal of Economic Research, (55), 27-64. Retrieved from https://scholar.google.ca/scholar?q=related:OfsNagdQXFkJ:scholar.google.com/&scioq=Endogenous+growth+%2BAbrishami+1999&hl=en&as_sdt=0,5
2) Acemoglu, D. (2010). Introduction to modern economic growth. Privredna kretanja i ekonomska politika, 123, 89. Retireved from https://books.google.ca/books?hl=en&lr=&id=DsPH5fWNdrsC&oi=fnd&pg=PP1&dq=Introduction+to+modern+economic+growth+%2BAcemoglu+2010&ots=wjNse3kq85&sig=O3nOqTNNEflmWHXIPIjXDDCo-ps
3) Acs, Z. J., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2004). The missing link: The knowledge filter and entrepreneurship in endogenous growth. SSRN 667944. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=667944
4) Aghion, P., Howitt, P., Howitt, P. W., Brant-Collett, M., & García-Peñalosa, C. (1998). Endogenous growth theory: MIT press. Retrieved from https://books.google.ca/books?hl=en&lr=&id=tLuqjIVJUcoC&oi=fnd&pg=PA1&dq=Endogenous+growth+theory&ots=mzD4XqMi1Q&sig=TwNURZpbMJZvldKAK3ARmZ1oRfU
5) Banton, Carolin. 2023. What is the Neoclassical growth theory, and what does it predict? Investopedia. Online. Retrieved from https://www.investopedia.com/terms/n/neoclassical-growth-theory.asp#:~:text=Neoclassical%20growth%20theory%20outlines%20the,any%20of%20these%20three%20factors.
6) Barro, R. J. (1995). J., and Xavier Sala-I-Martin. Economic growth, McGraw-Hill. New York. Retrieved from https://scholar.google.ca/citations?user=xbXfZdkAAAAJ&hl=en&oi=sra
7) Barro, R. J., & Lee, J.-W. (1994). Sources of economic growth. Paper presented at the Carnegie-Rochester conference series on public policy. Retrieved from https://www.sciencedirect.com/science/article/pii/0167223194900027

8) Bergstrom, T. C. (1999). Systems of benevolent utility functions. Journal of Public Economic Theory, 1(1), 71-100. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/1097-3923.00004
9) Bharadwaj, S., Clark, T., & Kulviwat, S. (2005). Marketing, market growth, and endogenous growth theory: An inquiry into the causes of market growth. Journal of the academy of marketing science, 33(3), 347-359. Retrieved from https://link.springer.com/article/10.1177/0092070305276324
10) Brasoveanu, L. O., Dragota, V., Catarama, D., & Semenescu, A. (2008). Correlations between capital market development and economic growth: The case of Romania. Journal of applied quantitative methods, 3(1), 64-75. Retrieved from http://jaqm.ro/issues/volume-3,issue-1/pdfs/obreja-brasoveanu_dragota_catarama_semenescu.pdf
11) Barro, R. J., & Lee, J. W. (1994, June). Sources of economic growth. In Carnegie-Rochester conference series on public policy (Vol. 40, pp. 1-46). North-Holland. retrieved from https://www.sciencedirect.com/science/article/pii/0167223194900027
12) Chetty, V., & Pradhan, B. K. (2020). Harrod-Domar Formula for Two Sector Growth Models: Institute of Economic Growth, University Enclave, University of Delhi. Retrieved from https://www.iegindia.org/upload/profile_publication/doc-040121_135052wp413.pdf
13) Conlisk, J. (1967). A modified neoclassical growth model with endogenous technical change. Southern Economic Journal, 199-208. Retrieved from https://www.jstor.org/stable/1055037
14) Cvetanović, S., Mitrović, U., & Jurakić, M. (2019). Institutions as the Driver of Economic Growth in Classic, Neoclasic and Endogenous Theory. Economic Themes, 57(1), 111-125. Retrieved from https://sciendo.com/article/10.2478/ethemes-2019-0007.
15) Corporate Finance institution. 2015. Theories of Growth. Online. Retireved from https://corporatefinanceinstitute.com/resources/economics/theories-of-growth/
16) Daud, N. (2017). The effect of sector economic growth on the performance of employment and welfare of people. International Journal of Biometrics. Auigust. DOI:10.5539/IJBM.V12N9P194. Retrieved from https://pdfs.semanticscholar.org/e3c3/7147da6c6edf8329c975bb7698a34ad3e978.pdf
17) De Silva, S. (2012). The political economy of underdevelopment: Routledge. Retrieved from https://books.google.ca/books?hl=en&lr=&id=Ahx9EAAAQBAJ&oi=fnd&pg=PP1&dq=The+political+economy+of+underdevelopment:&ots=2KBXKwJ0lo&sig=R2gk-ls4pSshORubWmIvzHOMJrs
18) Drozd, L. A., & Kowalik, M. (2022). On the Optimality of Zero APR on Credit Cards: An Analytical Framework. Retrieved from http://www.lukasz-drozd.com/uploads/4/3/1/8/43183209/zapr-v9.pdf.
19) Dykas, P., Tokarski, T., & Wisła, R. (2022). The Solow Model of Economic Growth: Application to Contemporary Macroeconomic Issues: Taylor & Francis. Retrieved from https://library.oapen.org/handle/20.500.12657/76881
20) Fagerberg, J. (1987). A technology gap approach to why growth rates differ. Research policy, 16(2-4), 87-99. Retrieved from https://www.sciencedirect.com/science/article/pii/0048733387900254
21) Farley, S. (1766). Thomas Malthus. Anarcho-primitivism, 366. Retrieved from https://books.google.ca/books?hl=en&lr=&id=eFFv7k_ewpwC&oi=fnd&pg=PA366&dq=Thomas+Malthus.+Anarcho-primitivism,+366&ots=V2lT48KjJL&sig=Aoy1X6BHW-Q9wV6cwpUYPHmlnAs
22) Feldstein, M., & Horioka, C. (1992). The Solow growth model. Quarterly Journal of Economics, 107(2), 407-437. Retrieved from http://www.fidrmuc.net/ec5518/01.pdf
23) Gomulka, S. (2006). The theory of technological change and economic growth: Routledge. Retrieved https://books.google.ca/books?hl=en&lr=&id=G56KAgAAQBAJ&oi=fnd&pg=PP3&dq=The+theory+of+technological+change+and+economic+growth&ots=ZZW0FB7y-c&sig=SZRI5NPl5MwKQ9qBAjPkNP69f8E
24) Gordon, R. J. (2012). Is US economic growth over? Faltering innovation confronts the six headwinds. Retrieved https://search.proquest.com/openview/74c67daa6b303f91fa6b2b4f50697100/1?pq-origsite=gscholar&cbl=4424412
25) Gordon Jason. 2022. Classical Growth Theory - What is Classical Growth Theory? Online. Retrieved from https://thebusinessprofessor.com/en_US/economic-analysis-monetary-policy/classical-growth-theory-definition.
26) Grossman, G. M., & Helpman, E. (1989). Product development and international trade. Journal of political economy, 97(6), 1261-1283. Retrieved from https://www.journals.uchicago.edu/doi/abs/10.1086/261653
27) Harris, A. L. (1956). John Stuart Mill's theory of progress. Ethics, 66(3), 157-175. Retrieved from https://www.journals.uchicago.edu/doi/pdf/10.1086/291054
28) Harris, D. J. (2007). The classical theory of economic growth. The new Palgrave dictionary of economics, 1-10. Retrieved from http://web.stanford.edu/~dharris/papers/The%20Classical%20Theory%20of%20Economic%20Growth%20[pre-print].pdf.
29) Henderson, V., Storeygard, A., & Weil, D. N. (2011). A bright idea for measuring economic growth. American Economic Review, 101(3), 194-199. Retrieved from https://www.aeaweb.org/articles?id=10.1257/aer.101.3.194

30) Ickes, B. W. (1996). Endogenous growth models. Department of Economics Penn State University University Park, PA, 16802, 1-26. Retrieved from https://scholar.google.ca/scholar?cites=15984815124162138729&as_sdt=2005&sciodt=0,5&hl=en
31) Jangili, R. (2011). Causal relationship between saving, investment and economic growth for India–what does the relation imply? Retrieved from https://mpra.ub.uni-muenchen.de/id/eprint/40002
32) Jones, H. G. (1975). An introduction to modern theories of economic growth: Antoni Bosch editor. Retrieved from https://www.jstor.org/stable/41797880.
33) Kenton, W. (2018). Classical Growth Theory. Investopedia. Retrieved from https://www. investopedia. com/terms/c/classical-growth-theory. asp.
34) Kurniasih, E. P. (2017). Effect of economic growth on income inequality, labor absorption, and welfare. Economic Journal of Emerging Markets, 9(2), 181. Retrieved from https://search.proquest.com/openview/74c67daa6b303f91fa6b2b4f50697100/1?pq-origsite=gscholar&cbl=4424412
35) Kuznets, S. (2013). Economic growth of nations. In Economic Growth of Nations: Harvard University Press. Retrieved from https://www.degruyter.com/document/doi/10.4159/harvard.9780674493490/html
36) Kuznets, S. (2019). Economic growth and income inequality. In The gap between rich and poor (pp. 25-37): Routledge. Retrieved from https://www.taylorfrancis.com/chapters/edit/10.4324/9780429311208-4/economic-growth-income-inequality-simon-kuznets
37) Lewis, W. A. (2013). Theory of economic growth: Routledge. Retrieved from https://www.taylorfrancis.com/books/mono/10.4324/9780203709665/theory-economic-growth-arthur-lewis
38) Mishra, S. (2016). Endogenous growth theory and role of education. Splint International Journal of Professionals, 3(10), 74. Retrieved from https://www.indianjournals.com/ijor.aspx?target=ijor:sijp&volume=3&issue=10&article=008
39) Mohammadzadeh Asl, Nazi. 1992. Neoclassical growth theory test. Economic research Journal. Online. Retrieved from https://joer.atu.ac.ir/article_3185.html.
40) Ortigueira, S. (1998). Fiscal policy in an endogenous growth model with human capital accumulation. Journal of Monetary Economics, 42(2), 323-355. Retrieved from https://www.sciencedirect.com/science/article/pii/S0304393298000257
41) Pack, H. (1994). Endogenous growth theory: intellectual appeal and empirical shortcomings. Journal of economic perspectives, 8(1), 55-72. https://www.aeaweb.org/articles?id=10.1257/jep.8.1.55
42) Petticrew, M., & Roberts, H. (2008). Systematic reviews in the social sciences: A practical guide: John Wiley & Sons. Retrieved from https://books.google.ca/books?hl=en&lr=&id=ZwZ1_xU3E80C&oi=fnd&pg=PR5&dq=Petticrew+%26+Roberts,+2008&ots=w_O6tMLQNn&sig=hc7yV1hrNqrdYtGghKJJkD68pxk.
43) Philippon, T. (2011). Has the US Finance Industry Become Less Efficient? Retrieved from file:///C:/Users/asalehi/Downloads/SSRN-id1972808.pdf.
44) Popa, F. (2014). Elements of the neoclassical growth theory. Studies and Scientific Researches. Economics Edition(20). Retrieved from http://www.sceco.ub.ro/index.php/SCECO/article/view/296
45) Prescott, E. C. (1988). Robert M. Solow's neoclassical growth model: An influential contribution to economics. The Scandinavian Journal of Economics, 90(1), 7-12. Retrieved from https://www.jstor.org/stable/3440145
46) Rebelo, S. (1991). Long-run policy analysis and long-run growth. Journal of political economy, 99(3), 500-521. Retrieved from https://www.journals.uchicago.edu/doi/abs/10.1086/261764
47) Rıos-Rull, J. V. (2020). Econ 704 Macroeconomic Theory Spring 2020. Retrieved from https://www.sas.upenn.edu/~vr0j/oldteaching/704-22/Luigi/ECON704_LectureNotes22-1.pdf.
48) Rivera-Batiz, L. A., & Romer, P. M. (1991). Economic integration and endogenous growth. The quarterly journal of economics, 106(2), 531-555. Retrieved from https://academic.oup.com/qje/article-abstract/106/2/531/1905473
49) Romer, P. M. (1989). Human capital and growth: Theory and evidence. In: National Bureau of Economic Research Cambridge, Mass., USA. Retrieved from https://www.nber.org/papers/w3173
50) Romer, P. M. (1990). Endogenous technological change. Journal of political economy, 98(5, Part 2), S71-S102. Retrieved from https://www.journals.uchicago.edu/doi/abs/10.1086/261725
51) Romer, P. M. (1996). Why, indeed, in America? Theory, history, and the origins of modern economic growth. In: National Bureau of Economic Research Cambridge, Mass., USA. Retrieved from https://www.nber.org/papers/w5443
52) Ross, A. M. (1956). Trade union wage policy: Univ of California Press. Retrieved from https://books.google.ca/books?hl=en&lr=&id=mycthYPtLMQC&oi=fnd&pg=PA1&dq=Trade+union+wage+policy+%2BRoss+1956&ots=6JDjYHS0nt&sig=pRW9lDR6DUt4LHW1ItmaKp6g8h4
53) Rousseau, D. M., Manning, J., & Denyer, D. (2008). 11 Evidence in management and organizational science: assembling the field's full weight of scientific knowledge through syntheses. Academy of Management Annals, 2(1), 475-515. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/19416520802211651

54) Salvadori, N. (2003). The theory of economic growth: A 'classical'perspective: Edward Elgar Publishing Limited. Retrieved from http://digamo.free.fr/salva03.pdf
55) Sato, R. (1964). The Harrod-Domar model vs the Neo-Classical growth model. The Economic Journal, 74(294), 380-387. Retrieved from https://academic.oup.com/ej/article-abstract/74/294/380/5249635
56) Siddiqui, D. A. (2020). Conceptual Framework of Sustainable Economic Growth: A Theoretical Review. Available at SSRN 3641573. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3641573
57) Sims, E. (2011). Graduate Macro Theory II: Notes on Neoclassical Growth Model. Retrieved from https://www3.nd.edu/~esims1/neoclassical_growth_notes_sp16.pdf.
58) Smith, A. (2010). The Wealth of Nations: An inquiry into the nature and causes of the Wealth of Nations: Harriman House Limited. Retrieved from http://web.ntpu.edu.tw/~guan/courses/Coase77.pdf.
59) Solow, R. M. (1956). A contribution to the theory of economic growth. The quarterly journal of economics, 70(1), 65-94. Retrieved from https://academic.oup.com/qje/article-abstract/70/1/65/1903777
60) Solow, R. M. (1999). Neoclassical growth theory. Handbook of macroeconomics, 1, 637-667. Retrieved from https://www.sciencedirect.com/science/article/pii/S1574004899010125
61) Sredojević, D., Cvetanović, S., & Bošković, G. (2016). Technological changes in economic growth theory: neoclassical, endogenous, and evolutionary-institutional approach. Economic Themes, 54(2), 177-194. Retrieved from https://sciendo.com/article/10.1515/ethemes-2016-0009
62) Temple, J. (2003). The long-run implications of growth theories. Journal of Economic Surveys, 17(3), 497-510. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-6419.00202
63) Todaro, M. (1989). Economic development in the third world countries. Translated by Gholam Ali Farjadi. Retrieved by http://digilib.fisipol.ugm.ac.id/handle/15717717/12206.
64) Turnovsky, S. J. (2000). Fiscal policy, elastic labor supply, and endogenous growth. Journal of Monetary Economics, 45(1), 185-210. Retrieved from https://www.sciencedirect.com/science/article/pii/S0304393299000471.
65) Upreti, P. (2015). Factors affecting economic growth in developing countries. Major Themes in Economics, 17(1), 37-54. Retrieved from https://scholarworks.uni.edu/mtie/vol17/iss1/5/
66) Verspagen, B. (2001). Economic growth and technological change: an evolutionary interpretation.
67) Winter-Ebmer, R. (1994). Endogenous growth, human capital, and industry wages. Bulletin of Economic Research, 46(4), 289-314. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8586.1994.tb00593.x