Selected Issues on Current International Economics and Macroeconomics

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Edited by

Selim Başar and Atakan Durmaz

Cambridge Scholars Publishing



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PREFACE

The debates on economics, as old as the history of humanity, undergo transformation according to changing and developing conditions. The developments of the Industrial Revolution and its aftermath, especially in the 19th century, brought a different dimension to the discussions of economics. While economic production and income levels reached dimensions that they had never been able to reach before, the distribution of this production and income was seriously impaired. This situation caused economic discussions to focus on these issues.

By the end of the 20th century, discussions were concentrated around the phenomena of liberalization and globalization, including cross-border mobility of production factors. The improvement of economic relations began the process of globalization. Internationally applied policies, with the effects of globalization, have had a major impact on firms and the financial market. This interaction between economics and finance has enabled the development of branches and interdisciplinary studies. Interdisciplinary studies have enabled the emergence of new theories, with mutual solutions to economic problems. In today's world, branches of social science such as economics, finance, and accounting, have become an integral whole, and have enabled the expansion of theories and assumptions.

In this book, we have addressed the various issues and concepts that we think are influential in the formation and development of the economy. The topics that are discussed were selected either from basic, or from recently developed, approaches. We hope this book will meet the needs of those concerned.

The aim of this collection is to provide a readable, non-technical publication which provides a comprehensive presentation of international and macroeconomic issues, trends, and data.

The Editors

PATENT COUNTS, LABOUR PRODUCTIVITY AND ECONOMIC GROWTH

ZEYNEP KARACA

Introduction

According to the generally accepted view, efficiency is a concept that measures the rate of outputs to inputs. If the same amount of input (land, labour, capital) produces more output, productivity increases. The simplest and easiest efficiency measure is labour productivity. The increase in productivity is an important determinant of the increase in real wages, and hence, standard of living. If output increases, not due to efficiency, but because more input is used in production, all the additional output is needed to pay the suppliers of the additional inputs at their old rates of compensation. In the absence of productivity, the only way workers get higher real wages is to work longer hours. On the other hand, with productivity growth, the ratio of outputs to inputs rises, and the factors of production find that they are compensated at higher real rates, as the prices for goods and services rise less rapidly than nominal wages and profits. The increased prosperity generated by increased productivity not only leads to higher living standards, but also mediates social conflict. When productivity increases, some people consume less, and others consume more. A community with high living standards makes the wealthy members more willing to share with the less fortunate. If the pie is not growing, people start to protect what they have, and show less interest in the poorer members of society (Munnell 1990, 4-5).

Productivity is a measure of performance comparing the quantity of goods and services produced with the quantity of inputs used to produce them. Output is the total amount of goods and services produced by an industry to be sold to consumers or businesses. Input is the workers, capital, energy, and materials, which are used to produce goods and services. Labour productivity is the relationship between the amount of output and the amount of labour used to produce this output (Industry Productivity Measures 2017, Bureau of Labour Statistics).

The economic factors of productivity gains are innovative changes, production, and management. These include: development of management structure; development of financial and technical infrastructure; development of personnel training; and development of distribution and cooperation (Durmaz and Pabuçcu 2018). There are two factors that increase output: the first is the increase in production inputs, and the second is the increase in productivity. The evolution of middle-to-long-term economic growth substantially depends on efficiency (Myronenko 2012, 7-8).

There is also a positive relationship between innovation and labour productivity. The presence of more innovative firms can lead to productive progress. First, innovation in existing firms not only enhances their own activities, but also improves the goods and services they offer. Therefore, with increased demand, production costs are reduced. Secondly, innovating firms tend to grow more than others, and new entrants with better products can replace existing, inefficient, firms with an increase in the average productivity level. In both cases, the relationship between innovation and productivity is influenced by the institutional and macroeconomic environment in which firms operate (Hall 2011, 172).

Labour Productivity

When economic growth is analysed, the production function is taken into account. The production function reflects the production process in which inputs such as labour, capital, and raw materials, are transformed into products.

The labour market is very important for the performance of the economy. It affects the volume of employment, the rate of employment, and growth.

The challenge for any business is to effectively manage natural resources, labour, and capital, to create added value and revenue. For this reason, economic policy tries to provide appropriate conditions for using these factors effectively. From a sustainability point of view, its task is to make the economic system more sustainable. This means promoting employment and reducing the consumption of natural resources, thus ensuring prosperity and a high quality of life. In order to achieve these goals, productivity is the key, because factors of production are limited, both economically and environmentally (Stocker et al. 2015, 10).

An increase in productivity through the use of one of the production factors can also change the use of other factors. So there is an incentive to use the first factor. Labour, capital, and natural resources can also affect each other, because better technologies and structural changes can affect the productivity of all production factors at the same time (Stocker et al. 2015, 11).

Labour productivity is defined as real economic output per working hour. The increase in labour productivity depends on three factors. These are: investments and savings in physical capital; new technology; and human capital. As an economy's labour productivity increases, more goods and services are produced by working in the same proportion. This increase in output makes it possible to consume more goods and services at more reasonable prices. There are a number of ways in which governments and firms can improve labour productivity (Labour Productivity 2018, https://www.investopedia.com/terms/l/labor-productivity.asp):

- Investing in Infrastructure: The increase in infrastructure investment by the government and the private sector can help to improve efficiency by lowering the cost of doing business.
- Tax and Welfare Reforms: Applying them increases the income of people who work more efficiently.
- Quality of Education: Providing employees with opportunities to increase their skills, and providing training at a reasonable cost, helps increase the efficiency of the company.
- Business Investment: Raising the company's capital stock by throwing out old and less efficient machines also increases labour productivity.
- Deregulating Markets: Increasing competition to enter the market can lead to greater productivity.

Productivity is an important determinant of living standards. It measures how the economy uses resources.

Higher productivity can lead to:

- Lower Unit Costs: These cost savings result in consumers reaching lower prices, encouraging demand, increasing output, and increasing employment.
- Improved Competitiveness and Trade Performance: Productivity growth and lower unit costs are important for companies to compete in global markets.
- Higher Profits: Productivity is an important source of support for long-term growth of businesses and for companies to re-invest.
- Higher Wages: Firms can pay higher wages when employees are more productive.

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• Economic Growth: If an economy can increase productivity growth, the growth trend of the national output can also accelerate (Productivity and Economic Growth, https://www.tutor2u.net).

Labour productivity and economic growth are key factors in an economy. Labour productivity significantly affects production processes and production costs, and production costs affect the competitive power of the country in the global market (Auzina-Emsina 2014, 317). Without successful labour productivity, a country will not be able to grow, in the economy as a whole, or in individual economic activities (Bušelić and Pavlišić 2016, 405).

How to Measure Labour Productivity?

Labour productivity is calculated as the real output per labour hour, and the increase in labour productivity is measured as the change in this ratio over time. The increase in labour productivity allows more production in a given number of work hours. As an example, let's assume that workers working in a factory make 20 cars an hour. In a month, the company modernizes machines, and workers undergo training to improve their performance. Using the new machines and the gained knowledge, the same workers can now make 30 cars an hour. The productivity is 10 cars per hour. As you can see in this example, there are multiple sources and factors that increase labour productivity (Sprague 2014, 2).

Productivity = Total Output / Total Input

To calculate the labour productivity index, the industry output index is divided by the working hour index:

$$\frac{Q_t}{Q_0} \div \frac{L_t}{L_0}$$

Q = quantity of aggregate output, expressed as an annual index

L= total labour hours worked, expressed as an annual index

t = the current year

0 =the base year.

You could also look at labour productivity in terms of individual employee contribution. In this case, instead of using hours as the input, you would use number of employees. More specifically, it is known that labour productivity and multifactor productivity are measured by the traditional production function. The most common formulation of the production function is as follows:

 $\begin{array}{ll} \mathsf{Q} (t) = \mathsf{MFP} (t) * \mathsf{f} [\mathsf{K} (t), \mathsf{L} (t)] & (2) \\ \text{Where:} \\ \mathsf{Q} (t) = \mathsf{real} \ \mathsf{output} \\ \mathsf{MFP} (t) = \mathsf{index} \ \mathsf{of} \ \mathsf{multifactor} \ \mathsf{productivity} \ \mathsf{on} \ \mathsf{technological} \ \mathsf{progress} \\ \mathsf{K} (t) = \mathsf{real} \ \mathsf{capital} \ \mathsf{input} \\ \mathsf{L} (t) = \mathsf{real} \ \mathsf{labour} \ \mathsf{input} \end{array}$

To express this relationship in terms of growth over time involves taking the differential with respect to time and rearranging the terms to yield:

% Q growth = % MFP growth + s_k %K growth + s_l %L growth (3)

The s_k and s_k weights are the production elasticities of the factor inputs. In other words, the weight s_k shows how much output will increase in response to a change in labour. If further assumptions are made about the factor market, weights can be defined more precisely. In particular, if the factor market is assumed to be perfectly competitive, the factors are paid out to their marginal products. If the production function shows constant returns to scale, a 10% increase in capital and labour leads to a 10% increase in output. Equation (3) is a simple relation that computes to growth in multifactor productivity. It shows the growth in output to be equal to a weighted average of capital and labour inputs plus the growth in multifactor productivity (Munnel 1990, 5).

A different labour productivity calculation will be used in this study. Labour productivity will be calculated based on the number of patents. This method was used following Crepón, Duguet, Mairesse's methodology (the CDM Model). They considered labour productivity as value added per employee in their work. And factors affecting labour productivity are physical capital per employee, output, patent, total number of employees, and R&D investments. In other words, one of the factors affecting labour productivity in this model is the number of patents. The CDM model, looking at the links between productivity, innovation, and research, in the manufacturing sector, has become increasingly popular in the last few years. The CDM model studies four interrelated stages of the innovation chain: the choice of a firm whether or not to engage in innovative activities; the number of patents per employee it decides to invest in R&D; the effects of

these R&D investments on innovation output; and the impacts of innovation output on the productivity of the sector (Crepón et al. 1998).

Patent Counts, Labour Productivity, and Economic Growth, in Turkey

There are many economic studies that establish the relationship between productivity and innovation which, though distinct, point to a positive relationship between the two variables. Arvanitis (2006) investigated the determinants, and the effect, of innovation performance on labour productivity, in Swiss manufacturing firms, during the period 1994-2002. Innovation has been found to have a strong relationship with labour productivity. Value added per employee as labour productivity is used in the study. Bogliacino and Pianta (2009) investigated the impact of innovation on economic performance in the manufacturing industry and services sector for eight European Union countries. Factors that determine labour productivity in the study are: R & D expenditure per employer: human capital: share of firms making innovations; and the rate of increase in value added. Auzino-Emsina (2014) found that an increase in labour productivity increases economic growth in times of crisis. Alam, Arshad and Raiput investigated the relationship between economic growth, foreign direct investment, and labour productivity. In the long run, it has been shown that there is a relationship between economic growth and productivity. Kurt and Kurt (2015) investigated the effects of innovation and labour productivity variables for the 2000-2012 period on the BRICS economies. Innovation variables are patent applications and internet use per 100 people. The labour productivity variable is Gross Domestic Product per employed person. Martin and Nguyen-Thi (2015) assessed the role of R&D investments, and information and communication technologies (ICT), in innovation of firms and labour productivity. ICT and R&D contribute to innovation of firms, and positively affect labour productivity. The natural logarithm of value added per employee is known as labour productivity. Cui and Li (2016) found a positive relationship between the number of patents and productivity for the US manufacturing industry.

Innovation leads to opportunities such as new goods, better quality goods, new production methods, new markets, or new organizational structures. It is accepted that innovation is the main source of competitive advantage, and innovation capacity is the most important determinant of a firm's performance. Labour productivity, usually defined as value added per employee, is an important measure of performance and competitiveness. Labour productivity is often regarded as an indicator of the innovation

Zeynep Karaca

performance of the firm, because successful product innovations are expected to increase the value added of the firm (Preenen et al. 2017, 273). Innovation is a production factor derived from the outputs of R & D work, and their use in daily life. This production factor has efficiency in production, development, and productivity. Technology and innovation lead to the development of the production process, which is very influential, directly affecting production and productivity. There are also significant changes in the labour force within this process. The union of technological development, innovation, and labour, creates a qualified labour force. It improves capital and productivity (Kurt and Kurt 2015, 1296). Labour productivity depends on new knowledge and innovation, as well as physical and human capital. It is therefore important to have some views on economic performance and innovation (Arvanitis 2006, 6).

R&D spending is advantageous, in that it is a variable about the innovative activity of the firm at the appropriate level. For the same reason, R&D is only an input to innovation, and does not say anything about the innovation process. The number of patents is a measure of the success of an invention, and can be considered as at least a partial measure of innovation output (Hall 2011, 168). In this study, the relationship between patent number and economic growth will be investigated first. Since it is known that the number of patents affects labour productivity (the CDM model), the relationship between labour productivity and economic growth will be established. When patent data in Turkey is analysed, it is seen that the number of domestic patents is significantly lower than the number of foreign patents. Therefore, few innovative products exist. Moreover, the number of domestic patents is considerably higher than the number of registered patents. However, when foreign patent applications are examined, it can be seen that the number of patent applications is close to the number of patent registrations (Turkish Patent and Trademark Office).

According to the CDM model, as the number of patents increases, innovative sales will increase, and this will increase labour productivity and growth.

At this stage, the correlation between GDP and patent registration numbers will be examined. Correlation analysis is one of the most widely used statistical methods which summarize research. It is usually used to show the relationship between two different variables. It shows how the association between these two variables is meaningful and powerful. The correlation coefficient, or *r* coefficient, is a statistic used to measure the power or degree of such a relationship. Intuitive or empirical observations may show that variables are linearly related, but the correlation coefficient measures the degree of the relationship between two variables that are related to each other. It may take on a range of values from -1 to 0 to +1, where the values are absolute and non-dimensional with no units involved. A zero correlation coefficient indicates no relationship between two variables. The correlation coefficient approaches \pm 1, regardless of direction, indicating that the linear relationship between the two variables is strong. Correlation is not tied to direction or sign. Therefore, the relational ratios of the variables R = 0.90 or R = -0.90 are equal. A positive correlation coefficient indicates that an increase in the first variance will lead to an increase in the second variance. A negative correlation coefficient indicates that the second variable will decrease when the first variable increases. When the correlation coefficient is less than, or equal to, 0.35, it represents weak correlation, 0.36 to 0.67 modest correlation, 0.68 to 1, high correlation, and greater than, or equal to, 0.90, very high correlation.

The coefficient of determination is more meaningful. The coefficient of determination can be used to more fully interpret r, and is obtained by squaring the correlation coefficient (R). The coefficient of determination (R²) is defined as the percentage of the variation in the values of the dependent variable that can be explained by variations in the value of the independent variable. This technique results in a percentage value which makes it easier to interpret more precisely. Thus, if a correlation coefficient of R = 0.20 was observed between variable x and variable y, then the coefficient of determination is R² = 0.04. This means that only 4% of the total variation in variable y can be explained by variation in variable x (Taylor 1990, 36-37).

The correlation coefficient between the number of patent registrations and growth is 0.974363. Then the coefficient of determination is $R^2 = 0.95$. This means that 95% of the total variation in variable economic growth can be explained by variation in the variable of the number of patent registrations. As shown in the correlation analysis, there is a very high correlation between economic growth and the number of patent registrations. One of the factors determining labour productivity, according to the CDM model, is the number of patents. In this study, while the relationship between labour productivity and growth was explored, the number of patent registration variables was used. Accordingly, as the number of registered patents increases, labour productivity will increase, and this will increase economic growth.

Conclusion

It can be said that, with the increase in productivity, the gross domestic product increased faster than the input factors. So, it is accepted that productivity is the main source of social progress, an increase in standards of living, and economic development. Undoubtedly, despite the fact that there are many fundamental factors which affect productivity, from technology to financing, from human power to marketing, the main productivity aspect today is labour productivity. Productivity is achieving the highest result with the lowest possible resource expenditure. If any production unit has obtained more and better products from the composition of materials, energy, machinery, manpower, and management resources used in that unit than in previous periods, productivity is increased. According to this definition, productivity is a measure of the output/input correlations of all the changes in the output mix, in the methods applied in the current production process, in the input quantities, and production capacity. Productivity is a coefficient obtained by proportioning the production factors (inputs) used to realize this production, with the products and services (output) produced at the end of a certain period. The productivity dimension is much more evident, in the sense that productivity gains are driven by managers, employees, and even national interests. Productivity increases mean better quality, more production at lower cost, and more revenue and profit at the business level. The results of productivity are felt at country level when managers and employees share the balance of cost reductions, due to productivity gains in a balanced way, as profit and wages increase and customers benefit from fixed or lower prices. The result is the improvement in people's living standards, declining inflation, and declining unemployment.

The ability of a country to attract foreign capital, create new jobs, and increase the level of prosperity and growth, depends on the level of productivity. Innovation increases the productivity of labour and capital. And productivity is the key to growth. Sustained productivity growth is central to increasing living standards and reducing the fiscal pressure from growing debt and deficit. Innovation is the key to productivity, Government-supported enterprise, and the continued dynamism of the modern economy through the ideas boom. Long-term increases in living standards and wellbeing depend on sustained growth in productivity. This, in turn, depends on investment, including in innovation and new technologies, and the allocation of resources. The number of patents is an alternative measure of knowledge, R&D intensity, and innovation.

For this reason, in this study, the number of registered patents, which is one of the variables determining labour productivity, was used with support from the literature. As the increase in labour productivity is known to increase economic growth, it has been shown that the increase in number of patent registrations will increase labour productivity and increase economic growth in productivity. In Turkey, the correlation coefficient between the number of registered patents and economic growth is 0.97. A more accurate indicator, the coefficient of determination, is 0.95. In other words, 95% of the change in economic growth is explained by the number of patent registrations. In Turkey, the number of patent applications and the number of patents registered is quite different. By registering more patent applications, labour productivity will increase, and this will support economic growth.

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DETERMINANTS OF GROWTH

Kübra Karakuş and Nazli Tekman

Introduction

Economic growth is a concept that gained significance after the Second World War. In the literature of economics, this concept is generally defined as an increase in the national income of a country in a certain period. In a broader sense, it is defined as expansion, providing higher real output per capita in the basic variables of a country's economy. The increases ensure that economic growth can be realized in the long-term, as they can be realized with the growth of a country's production scale, or more efficient utilization of the existing production resources (Cinel 2014).

Economic growth is an important issue for both developed and developing countries. While developed countries attach importance to economic growth, namely the rise in real GNP in a period, developing countries lav emphasis on the concept of economic growth as well as the concept of economic development. In addition to being a concept encompassing economic growth, economic development is also concerned with reducing income inequality and unemployment in society. It is also concerned with social and political areas as much as economic ones (Sevidoğlu 2006). Growth is one of the most important macroeconomic indicators of countries. Therefore, it is significant to identify what the factors influencing growth are, and what policies should be followed to ensure sustainable growth. Different studies have been carried out on arowth. The first studies focused on the premise that growth is related to quantitative increase. The subsequent studies carried out provided evidence that growth is related to gualitative increase. While the emphasis was laid on the increase in quantity during the period of industrial revolution, it was aimed to boost production, capital, and labour. In today's policies, it is aimed to enhance social welfare, improve income distribution, enhance social justice, income per capita, and employment, and reduce unemployment. The present study emphasises the significance of growth. Also, the determinants of growth from the past to the present day, according to growth models, are discussed.

Determinants of Economic Growth

The differences in the long-term growth rates of countries are ascertained by the determinants of economic growth. Growth determinants are capital accumulation, population growth, and technological advancement, which include all investments made in land, physical equipment, and human resources.

Capital accumulation: This is defined as the allocation of some of the values a society produces to capital assets, without consuming all of them (Han & Kaya 2006). In an economy, a portion of the national income obtained in a certain period is saved. The high rate of savings alone is not adequate for economic growth. These savings need to be transformed into productive investments. Put another way, capital accumulation stands for a rise in physical capital accumulation, through integrating machines and equipment into the production process, or the establishment of new production institutions with new investments. New investments lead to an increase in production capacity and production levels in the economy (Ağayev and Yamak 2009).

Population growth: An increase has been noted in the demand for labour, due to population growth. The rise in the demand for labour enhances economic growth. On the one hand, population growth leads to an expansion of the domestic market, and, on the other hand, allows for a surge in the quantity of skilled labour. An inadequate labour force affects the production process adversely. The labour force is of great value in the advancement of technology and knowledge, and in the transfer of technology and knowledge to the production process. The quality of the labour force plays an important role in the efficient utilization of the available capital stock, and in the level and form of new investments. Therefore, along with capital accumulation and technology, the labour force constitutes one of the three main sources of growth and development (Savgılı & Cihan 2005). In the literature, the relation of the population to economic growth is addressed in terms of human capital. Human capital is a well-trained and skilled human resource. The two most important sources of growth are human capital and physical capital. Better educated, more cultured individuals raise labour productivity during the production process (Han & Kava 2006).

Technological advancement: An increase in capital accumulation and new investments is needed to achieve economic growth. The increase in production can be realized by extending the production capacity of the economy, as well as by increasing the production efficiency, or productivity (Ağayev and Yamak 2009).

The Historical Development of the Economic Growth Theory

Some economists accept classics as pioneers of economic growth, while others accept the Harrod Domar model as a pioneer. In recent years, neoclassical growth theory has been accepted as the pioneer of economic growth (Barro and Martin 1995).

According to the mercantilists, the wealth of a country depended on money and precious metals, in line with the rationale of capitalism, and they cited that the way to boost wealth was to reduce imports and increase exports. They argued that precious metals could be enriched through colonialism. They gave importance to the population. Population is a factor that increases demand and stimulates exports by lowering wages, which in turn, enriches the country.

Unlike the mercantilists, the physiocrats noted that wealth does not stem from the exchange, but from production. The source of growth with the accumulation of wealth is the economic surplus in agriculture. The only productive sector in terms of growth is agriculture (Bocutoğlu 2012). The economy is closed to the outside, and there is no foreign trade. They opposed State intervention. They encouraged the use of technology to increase growth in agriculture (Özgüven 1991). They opposed the export of agricultural products, and their cheap sale. They thought that this would lessen the income of the country. According to them, agriculture was the only productive sector and it was the source of growth. There was no capital accumulation in the economy. Therefore, savings were made for the conservation and amortisation of current capital capacity (Bocutoğlu 2012).

The first economist who dealt with economic growth was Adam Smith, who published his book *An Inquiry into the Nature and Causes of the Wealth of Nations* in 1776. Smith argued that profit-targeting initiatives would bring along division of labour, as well as specialization of capital accumulation provided by savings and investments. With the growth of the market, the division of labour and specialization will grow, internal and external economies will be formed, and subsequently, the law of increasing returns will apply, in contrast to diminishing returns in labour. Smith stated that growth is a self-fostering process (Hiç 1994). Malthus, one of the other classical economists who followed Smith's work, attributed the real income that emerged in the economy to soil and labour. But as the soil is constant, the real income will increase in line with the population growth. Malthus described the factors that affect growth with four items. These are:

- While population growth increases geometrically, food products increase arithmetically, one by one;
- Increase in savings;
- Soil fertility;
- Innovations in technology (Özgüven 1991).

Ricardo, another classical economist, analysed the factors affecting exchange value, and investigated how total production is divided between wages, rent, and profit. According to Ricardo's theory, growth primarily occurs automatically on its own, then undergoes a recession. In foreign trade, the total production amount is raised based on the theory of comparative advantage. Thus, growth takes place in a relative fashion (Özgüven 1991). Ricardo examined the production inputs and division laws in the growth process, and argued that, with population growth, increase in production will be accomplished, and accordingly, growth will be actualized. With the rise in profits, savings will be directed to investment and capital accumulation will increase. The minimum subsistence level will be exceeded in wages (Ricardo 2008).

However, in the growth model of Karl Marx, capital accumulation is important. While technological change is striking, repetitively continuous production is required for capital accumulation. If it is used for saving, the capital used to attain surplus value is included in the production process again, and repetitive production takes place (Kazgan 1991). Marx regarded the source of growth as the surplus value created by the economy through labour. The capitalist system meets the necessary conditions for the increase of capital accumulation, and for the application of changes in the production method. With the changes in the production method, the total profit is increased by using less labour in a more efficient manner. Therefore, while the share of labour in production diminishes, the share of profits will expand. This will result in a long-term demand inadequacy, and cause the system to collapse (Acar 1990).

Keynesian Growth Model

The views of Keynes began to be valid in the economy after the Great Depression in 1929. Keynes rejected the full employment concept of classical economists. He argued that the cause of the Great Depression experienced by developed countries was lack of demand, and stated that classical economic theory had failed to offer a solution. Keynes stressed that what was needed was to attach importance to demand-side policies to resolve the recession (Yalçın 2002). The factors that determine investment

are the marginal productivity of capital and interest. Investment demand is not stable, due to expectations. This situation hinders the achievement of full employment. It was emphasized that the State should intervene in the economy. The State aimed to increase investment demand by encouraging consumption demand through various means. The way a stagnating economy can enter a growth phase again, in the short term, by increasing public investments, and decreasing taxes, shifting tax burdens from areas that reduce consumption to areas where savings will be reduced, and taking measures to reduce profit rates and drive competition, was investigated (Tekeoğlu 1993). In the Keynesian model, investment expenditures are dealt with as a component of effective demand. However, the short-term capacity increase brought about by investment expenditures is not underlined. Keynesian equilibrium will not be achieved if this capacity increase creates a supply below, or above, the demand taking place in the short term (Alkin 1981). Studies which concentrated on how an economy can maintain its full employment level in the long term constituted the dynamic growth model of R. Harrod and E. D. Domar in the 1940s. In the two models, investment is considered as the main determinant of growth, and it is assumed that the expectations of entrepreneurs determine investment levels. In other words, the Kevnesian growth model is pursued. The model developed in the literature is accepted as the Harrod-Domar model. Harrod investigated the full employment equilibrium based on inadequate employment (Harrod 1939). Domar, on the other hand, examined the conditions that would promote growth, based on full employment (Domar 1946). The model was created for a single-good, twoproduction-factor market economy. A single good that can be used for consumption and investment is produced. Money is not included in the economy, and the State is excluded. All economic decisions are made by special decision-making units. The economy is a closed economy with no commercial and financial openness (Turan 2008). The model is illustrated with a constant coefficient production function. If the economy has a fixed coefficient technology, that is, if α workload (L) and capital (K) are needed to produce a unit from Y production, then the production function is written as:

 $Y = min (K/v), L/\alpha$

In the equation, v is the capital-output coefficient, and α is the ratio of labour demand to total output. The growth rate of labour, and technological advancement, are determined as fixed and external. Therefore, the constancy of coefficients reveals that it is essential to combine a constant

amount of labour and capital for a certain quantity of production. In other words, labour and capital cannot be replaced by one another for an efficient production level. In this respect, although the capital-output coefficient is determined externally in the Harrod-Domar model, growth becomes internal, as economic growth is determined by this coefficient (Yardımcı 2006). In the Harrod-Domar model, in order to increase economic growth, the savings rate, or the efficiency of the capital, needs to be raised (Yülek 1997). The model has been subject to criticism, on the grounds that it cannot explain the growth performance of economies other than developed ones. For this reason, in the 1950s, studies were carried out in order to compensate for the shortcomings of the Harrod-Domar model. The main assumptions of these studies have been developed within the framework of the classical economic view (İncekara and Tatoglu 2008).

Neoclassic Growth and the Solow Model

The neoclassical growth model was developed by Solow's 1956 work, titled A Contribution to the Theory of Economic Growth. For this reason, it is called the Solow (neoclassical) Growth Model. In his growth model, Solow dealt with Harrod's knife-edge equilibrium, and noted the presence of a solid equilibrium in the capitalist system (Solow 1956). In the neoclassical growth model, capital and labour input determine the output level in a fully competitive market, and fixed vield conditions are valid in line with diminishing returns and scale (Özdemir 2002). The increases in population and labour force are integrated into the model externally, and productivity or efficiency changes in human capital are not taken into account in the model. As a result, the model is a balanced growth model that increases at the same rate as capital, production, or consumption per capita. Technology, an external variable, is the sole factor that raises income per capita. Hence, the growth rate in the equilibrium state is independent of savings (Shaw 1992). Investment per worker is equal to exhaustion per worker. The state in which the capital per labourer, and accordingly, the production per labourer, remain unchanged, is called the steady-state. In the neoclassical growth model, the steady-state which maximizes consumption is called the golden rule level of capital. The golden-rule of capital stands for the capital level where the difference between output per labourer and exhaustion per labourer is maximum (Ünsal 2007). The factor that determines economic growth in the model is technological advancement, along with the population growth rate. The country which saves more will be more capitalintensive in the steady-state, in comparison with the country which saves less. However, when the steady-state is reached, the increase in the savings rate does not alter the rate of economic growth. Determination of economic arowth through external technological progressions will, in the long term, bring the income levels of countries closer to each other. The idea that the income gap between developed and developing countries will vanish in the long run is called the 'convergence hypothesis' (Kar 2003). In theory, technological advancements increase production efficiency and production per labourer. A higher output is obtained with the same production inputs. After the contribution of production factors to production is calculated, the remaining part demonstrates the contribution of technology to production. This is called the Solow residual (Sevidoglu 2006). The neoclassical growth model has been dominant in many studies for a long time, but it has failed to explain the diversity in the development levels of countries. There are two outcomes of this model growth theory. The first one emphasises that growth cannot be achieved without technical advancement, and the latter emphasizes that an increase in the rate of savings will bring about an increase in growth as much as itself (Parasiz 2003).

The Endogenous Growth Model

The term 'internal growth' emerged in 1986, with Romer's "Increasing Returns and Long Run Growth." He stated that technological advancement in internal growth models occurred within the economic system, and was influenced by decisions. While the convergence hypothesis highlighted in the neoclassical growth model was rejected, it was argued that the difference between developing countries and developed countries would broaden in the long term. He argued that the State plays an active role in growth and development. In order for the State to bridge the gap between developed and developing countries, it must implement active policies for human capital and R&D studies (Romer 1994). The source of internal growth rests on two approaches. According to the first approach, the source of internal growth is the return increasing in line with the scale that emerged during the production process. For example, in Arrow's internal growth model, the increase emerging due to the policy of learning by doing, when followed by firms, increases the marginal productivity of the capital in those firms during production. According to Arrow, acquiring knowledge is expressed as learning. It is stated that learning is a result of experience, and that learning takes place only while making an attempt to solve a problem. In the second approach, the role of Schumpeterian tradition in innovation and technological advancement was investigated. Romer (1990), Krugman (1994), and Grossman and Helpman (1991), emphasized that the second approach was superior to the first approach. This is because technological

advancement emerged coincidentally in the first approach (Türker 2009). The source of internal growth varies according to different economists.

The internal growth model is classified in two ways. These are spillover models, by Arrow (1962), Romer (1986), and Lucas (1988), and R&D models by Romer (1987,1990), and Grosman and Helpman (1990, 1991). The spillover models, pioneered by the first model economists, stated that technology in an economy was determined by special research activities and human capital. Technology emerges as a result of human capital and research of the firms. Technology, taken externally in the Solow model, is internalized in these models (Sarıbaş and Sekmen 2008). New technologies are the determinant of growth in the second model. Technological innovations are internal, and human capital is an external factor. The common view of the internal growth model is that it recognizes the presence of more than one source of growth. As the determinant of growth, Lucas expressed human capital, Romer, the knowledge generation, Barro, public policy, and Grossman and Helpmann, the R&D model (Berber 2006).

Conclusion

Growth is one of the most significant concepts indicating the macroeconomic structure of countries. Growth presents information on the extent to which the needs of the individual are met, and the welfare level. It has been debated extensively for years what has to be done in order to increase the welfare level of countries, and what needs to be done in order to achieve stable growth in the long term. Examining the views put forward about economic growth, it has turned out that growth does not depend on a single source. There are multiple sources that affect growth. Modern growth theories emerged in the 20th century, and investigated the underlying reasons for the growth of countries. In the literature, the sources of growth are given as capital accumulation and population growth; accordingly, labour increase and technological advancement, which encompass all investments made in the soil, physical equipment, and humans. According to economists, capital accumulation, employment growth, and technological advancement, are accepted as prerequisites for growth and development.

This study concentrates on growth models from the past to the present day. In these models, the source of growth varies according to each approach. These approaches incorporate the determinants of growth. According to the mercantilists, the main determinant of growth is precious metals, while the physiocrats admit that the agricultural sector is the determining factor of growth. According to the classicists, savings promote growth, while Keynesians stress that application of demand-side policies ensure growth. In Solow, and internal growth models, technology is highlighted as the determining factor of growth.

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