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Review of Growth Models in Less Developed Countries

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ABSTRACT

It is more than two decades that economic growth and its determinants have been of great importance in both theoretical and applied aspects. All these theories have been focused to find out why growth rates across countries are different and what factors cause this difference. The primary origin of almost all growth theories and models is the needs and the requirements of developed countries manifested in the neoclassical theory. A key prediction of the neoclassical growth models which has been frequently applied as an empirical hypothesis in recent years is conditional convergence; in the sense that the lower (compare to long-run or steady-state position) the starting level of per capita gross domestic product, the faster the growth rate. Many less developed countries have had a growth experience that was very far from the conditions of a steady-state. This study reviews the literature of growth theories and models to investigate their relevance and applicability to less developed economies. The findings of this research showed that contemporary growth theories and models have not been capable enough to determine the main factors affecting economic growth rates in less developed countries. Even if a few of these determinants have been indicated in economic growth literature, their definitions and measurements in less developed countries are imprecise and different from those in developed countries. The current economic growth theories do not take into account cultural variables and religion as necessary, while religion is an important aspect of culture offering a set of values essential for economic development.

Key words: Growth theory, neoclassical growth models, endogenous growth models, less developed economies

INTRODUCTION

Over the last two decades economic growth and its determinants have been of great importance in both theoretical and applied studies. This is due to much importance of economic growth itself. This importance proceeds to a point that Lucas (1988) stated “once one starts to think about economic growth, it is hard to think about any things else.” The first steps towards developing the theories of economic growth were taken in the 1930's and early 1940's. All these theories have been directed to the two central questions: why growth rates across countries are different and what factors cause this difference? This difference manifests itself in different standards of living and quality of life in all over the world. In some economies the level of investment and the productivity is low; the workers face little change in their standard of living and the growth rate and level of development is low; whereas in some other countries, these indices are high enough. The present study reviews studies on economic growth theories and applied models in less developed countries.

This is to investigate the answers of growth theories given to the question addressed determining factors affecting economic growth in less developed countries.

A BRIEF HISTORY OF MODERN GROWTH THEORY

Classical economists, such as Smith (1991), Malthus (1798), Ricardo and Eck (1817) and much later, Ramsey (1928), Young (1928), Schumpeter (1934) and Knight (1944) provided many of the basic ingredients that appear in modern theories of economic growth. The main studies begin on these basic ingredients and focuses on the contributions in the neoclassical tradition since the late 1950s. From a chronological viewpoint, the starting point for modern growth theory is the classic article of Ramsey (1928), a work that was several decades ahead of its time. Ramsey's treatment of household optimization over time goes far beyond its application to growth theory. Between Ramsey and the late 1950s, Harrod (1939) and Domar (1946) attempted to integrate Keynesian analysis with elements of economic growth. They used production functions with little substitutability among the inputs to argue that the capitalist system is inherently unstable. Since these arguments were developed during or immediately after the Great Depression, they received sympathetically by many economists. Although, these contribution had a good deal of research at the time, very little of this analysis plays a role in today's thinking.

The next and more important contributions to modern growth theory have been the works of Solow (1956) and Swan (1956). The fundamental feature of the Solow-Swan neoclassical growth model, also known as the exogenous growth model, is its special specification, according to which the neoclassical production function makes the assumption of constant returns to scale, diminishing returns to each input and some positive and smooth elasticity of substitution between the inputs. The Solow-Swan production function is applied along with a constant-saving-rate rule in order to generate a simple general equilibrium model of the economy. A key prediction of these neoclassical growth models which has been frequently applied as an empirical hypothesis in recent years is conditional convergence, in the sense that the lower the starting level of per capita GDP, compare to the long-run or steady-state position, the faster the growth rate. This is due to the assumption of diminishing returns to capital according to which economies that have less capital per worker tend to have higher rates of return and higher growth rates. The convergence is conditional in the Solow-Swan model, because the steady-state levels of capital and output per worker depend, on the saving rate, the growth rate of population and the position of the production function that might vary across economies. Recent empirical studies suggest that additional sources of cross-country variation, particularly differences in government policies and in initial stocks of human capital, should be included. However, the key point of the Solow-Swan model, i.e., conditional convergence has considerable explanatory power for economic growth across countries and regions.

Due to the assumption of diminishing returns to capital, the Solow-Swan growth model predicts that in the absence of continuing improvements in technology, per capita growth must eventually come to an end. This prediction resembles those of Malthus and Ricardo. But it has already been observed that positive rates of per capita growth can persist over a century or more and these growth rates have no clear tendency to decline.

In the late of 1950s and 1960s, the neoclassical growth theorists came to recognize this modeling deficiency. In order to overcome this deficiency, these theories tend to assume that technological progress occurred in an exogenous manner. This assumption would permit a positive constant per capita long term growth rate, while retaining the prediction of conditional

convergence. But the shortcoming still remains that the long-run per capita growth rate is determined entirely by the rate of technological progress and also by the growth rate of population that are exogenous in the standard theory and outside of the model.

Cass (1965) and Koopmans (1965) applied Ramsey's analysis of consumer optimization to the neoclassical growth model in order to make adequate preparation for an endogenous determination of the saving rate. This extension tends to preserve the hypothesis of conditional convergence, while allowing for strong transitional dynamics. However, it is not easy to create compatibility between the theory of technological change and the neoclassical framework; because the standard assumptions of competition cannot be met since technological progress requires the creation of new ideas which are partially non-rival.

The first attempt was made by Arrow (1962) and then followed by Sheshinski (1967) to introduce models in which ideas are considered. In these models ideas were unintended by-products of production or investment. This mechanism is described as learning by doing. In these models, each new idea immediately spreads across the entire economy. This diffusion process might be technically feasible because knowledge is non-rival. Romer (1986) showed later that an equilibrium rate of technological advance can be determined in this case if the competitive framework can be retained. But such a growth rate would typically not be Pareto optimal. In general, the competitive framework may not be valid if new ideas depend partially on purposive R and D effort and if innovations spread only progressively to other producers. In this case, the theory of technological progress requires basic changes in the neoclassical growth models in order to cope with the analysis of imperfect competition. These theoretical considerations and items added to the growth theory did not come until Romer's (1987, 1990) research in the late 1980.

Later, the basic neoclassical growth model was further developed and refined by Cass (1965, 1972), Koopmans (1965) and others. By the late 1980s, attention turned anew to economic growth rate theory. Thereafter, growth theory became excessively technical and gradually distanced from empirical applications. In contrast, economists required to deal with less developed economies continued to keep an applied perspective and tended to use technically unsophisticated models but empirically useful. In this phase the fields of economic development and economic growth drifted apart and the two areas became almost completely separated.

Due to the lack of relevance and empirical supporting evidence, growth theory effectively came to the end as an active research field by the early 1970, with the advent of the rational expectations hypothesis and on the eve of the oil shocks. For about 15 years, macroeconomic research concentrated on short-run vacillation. To the extent that the major contributions embraced only the inclusion of rational expectations into business-cycle models, improved approaches to policy evaluation and the application of general equilibrium methods to real business cycle theory.

The years after the mid 1980, have witnessed a boom in research on economic growth theory, beginning with the work of Romer (1986) and Lucas (1988). This research aimed to study the determinants of long-run economic growth and to put much emphasis on these determinants, far rather than the mechanics of business cycles or the countercyclical effects of monetary and fiscal policies. But the recognition of the importance of long-run growth was only a first step. The second step was to abandon the main idea of the neoclassical growth model, according to which the long-term per capita growth rate is linked to the rate of exogenous technological progress. Thus, these contributions led to introduce the endogenous growth models determining the long-run growth rate within the model.

The initial phase of the new endogenous growth models which was based on the research of Arrow (1962), Sheshinski (1967) and Uzawa (1965), including those of Romer (1986), Lucas (1988) and Rebelo (1991) did not really present a theory of technological change. In these models, growth may continue limitlessly; because the returns to investment in capital resources, including human capital, do not diminish necessarily as economies grow. Human capital and the flow of knowledge across producers help to prevent the tendency for diminishing returns to the capital accumulation. This wave of new research which incorporated RandD theories and imperfect competition into the growth models began with Romer (1987, 1990) and found significant contributions by Aghion and Howitt (1992) and Grossman and Helpman (1991). In these models, purposive RandD activity which results from some form of ex post monopoly power, results to technological progress. If the economy is not devoid of ideas new ideas, the growth rate can be raised in the long run. However, the growth rate and the inventive activity may not be Pareto optimal, due to the failure to create the new products and to innovate the new production methods. In this framework, the long-term growth rate depends on government intervention. The intervention can be through such aspects as taxation, maintenance of law and order, provision of infrastructure services, protection of intellectual property rights and regulations of international trade, financial markets and other aspects of the economy. Therefore, the long-term growth rate can greatly be influenced by the government actions. The new research on new endogenous growth model also includes models of the diffusion of technology. The diffusion models are related to the way in which follower economies contribute to these advances by imitation of leading-edge economies, while the analysis of innovation deals with the rate of technological progress in these advanced countries. Since imitation is cheaper than innovation, the diffusion models predict a form of conditional convergence that resembles the predictions of the neoclassical growth model. Some recent studies have addressed the importance of technological diffusion in the convergence framework.

Another key exogeneity assumption in the neoclassical growth model is the growth rate of population. The higher the growth rate of population, the lower will be the steady-state level of capital and the lower will be the output per worker, as well as the lower the per capita growth rate for a given initial level of per capita output. The standard model of the neoclassical growth model does not, however, take account of the effects of per capita income and wage rates on population growth and also does not consider the resources used up in the process of child rearing. But the new recent research on the endogenous growth models tends to assume the endogeneity of population growth rate by incorporating an analysis of fertility choice into the neoclassical model. The results obtained from these studies are consistent with the empirical regularity of fertility rates. In the sense that, for example, fertility rates tend to fall with per capita income over the main range of experience, but it may rise with per capita income for the poorer countries. Another growth research based on the endogeneity of labor supply is concerned with migration and labor-leisure choice.

In general, the endogenous growth theory has developed into two generations. The first phase was the development of the generation of semi-endogenous growth models and the second was the Schumpeterian growth theory. The most contributors to the semi-endogenous models were Jones (1995), Kortum (1997) and Segerstrom (1998). The key element of this contribution is the abandon of the scale effects in ideas generating by assuming diminishing returns to the stock of R and D knowledge. Thus, RandD is assumed to increase continuously to sustain positive total factor productivity (TFP) growth rate. The second generation was the Schumpeterian growth models

which has been developed by Aghion and Howitt (1994, 1998), Peretto (1998), Young (1998), Dinopoulos and Thompson (1999), Howitt (1999) and Peretto and Smulders (2002). These models maintain the assumption of constant returns to the stock of RandD knowledge. But they assume that the effectiveness of RandD decline due to the prosperity of products as the economy grows. In general, growth can still be sustainable at a constant level, provided that RandD is kept to a fixed proportion of the number of product lines. This is, in turn, proportional to the size of the population along the balanced growth path. As such, RandD has to rise over time to overcome the increasing range and complexity of products lowering the productivity effects of RandD activity, in order to ensure a sustainable total factor productivity growth rate.

The main distinction between the growth theory of the 1960s and that of the 1990s can be summarized in two things: the first is that the 1990s theories pay more and close attention to empirical implications and the second is that these recent researches are most concern with the relations between theory and data. However, much of this applied research rooted in applications of empirical hypotheses from the older theory, particularly the neoclassical growth model's prediction of conditional convergence. As such, the fixture of research in the 1990s came to be cross-country regression analysis based upon the neoclassical model. The notable recent development in this field includes assessment of the accuracy of these estimates. Other empirical analyses involves more directly the recent endogenous growth theories, including the roles of increasing returns, RandD activity, human capital and the diffusion of technology.

Such an efficient integration of theoretical studies and empirical research has caused research on growth to be a permanent and ongoing phenomenon. This feature has led the 1990s theories not to get into difficulty like theories in the 1960s.

NEOCLASSICAL GROWTH MODELS

The aforementioned studies have not focused on the applicability of growth theories in developing countries. The combination of theoretical and empirical research began to pave the way for researchers to be involved in researches focusing on economic growth and its determinants in less developed countries. In this line Tyler (1980) studied export-led growth theory in 55 middle income developing countries. In his study 6 of the 55 selected countries were oil exporters from OPEC. The findings of this research showed that countries which neglect their export sectors through discriminatory economic policies are likely to have settled for lower rates of economic growth.

Some studies have been attempted to examine the circumstances under which different government policies, particularly different trade strategies and competitive environments have different effects on growth. Some have argued that countries with less government intervention have experienced higher growth rates. The so-called four tigers, i.e., Hong Kong, Singapore, South Korea and Taiwan, are good examples for this relationship. In these countries, except Hong Kong, government intervention was, more extensive than is often depicted. Some such as Chenery and Syrquin (1975), Chenery (1979, 1983), Chenery *et al.* (1986) and Morris and Adelman (1988) also contributed to this finding, but with more caution. However, according to these studies, different sectors in less developed countries may have very different institutional arrangements. There may be a number of distortions preventing resources to be optimally allocated. In this context the shift of resources from one sector to another may have an important effect on the overall level of output.

Chenery *et al.* (1986) have a substantial and important contribution to the analysis of the sources of growth in different countries. This study was built on the bases of the growth accounting approaches pioneered by Solow (1957) and Denison (1962). The review of the growth literature of the period 1960-73 by Chenery showed that the contribution to growth of the unexplained residual was substantial. For developed countries the residual constituted generally more than one-half of the growth rates. However, for middle-income less developed countries the proportion of growth explained by factor input was generally above three-quarters, with the residual explaining less than one-quarter. The explained proportion for less developed countries becomes still higher if sectoral transfer from less productive to more productive sectors has been taken into account. Whereas an attempt to use this type of idea to explain some of the residual for developed countries has been less successful.

Gregorio (1992) studied growth determinants in 12 Latin American countries. In a growth accounting framework, the share of labor in income is found to be lower in the sample group than in developed countries, while factor productivity growth accounts for a larger proportion of growth in the fastest growing countries. Using panel data, macroeconomic stability is found to play, in addition to investment (physical and human), a crucial role in growth. To a lesser extent, growth is negatively correlated with government consumption and political instability. The terms of trade appear to have no significant effect on growth.

Knight and Villanueva (1993) have examined the determinants of economic growth using cross-sectional data for 98 countries to determine the quantitative importance for human capital, public investment, outward-oriented trade policies. The empirical results support the view that these factors exert a positive and significant influence on growth. They provided estimates of the speed at which the gap between the real per capita income of rich and poor countries is likely to be reduced over the longer term.

Yaghmaian (1994) challenged the results of empirical literature in support of neoclassical theory of export-led growth in less developed countries and provided a theoretical and empirical alternative. He applied cross-section and time series regression analysis to test the neoclassical hypothesis that exports lead to superior economic performance (higher growth output) and alternative hypothesis that both exports and economic growth are determined by prior economic development and structural change. He found that the sectoral distribution of employment and output toward the manufacturing sector contributes to improved exports and overall economic performance. Positive and statistics significant association was obtained between exports growth and the growth of output when population statistic were used for the labor variable in the neoclassical growth model substituting employment for population, found no statistical support for the export- led growth theory.

While studying relation between economic policies and growth rate, Sachs and Warner (1995) using a sample of 111 countries divided into open and closed economies, claimed to have found that the open economies showed strikingly faster growth and convergence than the closed ones.

Radelet *et al.* (1997) analyzed Asia's dramatic economic growth. The basic framework of study is based on an extended version of the neoclassical growth model. They found that East Asian countries grew faster than the rest of the world; because these economies promoted exports through a combination of policies – relatively free trade, convertible currencies, macroeconomic stability and through a set of innovative institutions such as exports processing zones, duty exemption schemes and incentive packages for foreign investment. Instead, less developed countries in South Asia turn away from international trade, protect domestic industries from international competition and

follow more profligate fiscal policies. The results were little or no growth and continued widespread poverty. They also found that economic institutions and policies have been the most important factors differentiating the performance of fast growing and slow growing nations.

Hall and Jones (1999) showed that differences in physical capital and human capital can only partly explain the variation in output per worker. According to this research, a large amount of variation in the level of the Solow residual can be found across countries. The differences in capital accumulation, productivity and output per worker are caused by differences in institutions and government policies, i.e., by social infrastructure. Social infrastructure was treated as endogenous factor in this research. Across 127 countries selected for this study, a powerful and close association was found between output per worker and measures of social infrastructure. Countries with long-standing policies are in favor of productive activities, rather than diversion, in order to produce much more output per worker. For example, their analysis suggested that the observed difference in social infrastructure between Niger and the United States is more than enough to explain the 35-fold difference in output per worker.

Using panel data analysis, Hoeffler (2000) addressed this question that whether Africa's growth performance can be accounted in the framework of the augmented Solow model. The findings of the research showed that if unobserved country specific effects and the endogeneity of investment are taken, this model can account for Africa's low growth performance. According to these findings African's low investment ratios and high population growth rates are sufficient to explain Africa's low growth rates.

Senhadji (2000) has estimated augmented production functions for 88 countries during 1960-1994. This estimation showed that the contribution of total production function to growth is generally small in many less developed countries. The findings found support for conditional convergence and therefore for the validation of using the augmented Solow model for countries with different economic structures. It was found that life expectancy, reserves to import ratio and capital account convertibility would positively influence the growth of the country's economy, while public consumption, real exchange rate, external debt to GDP ratio and the ratio of war casualties to population have negative influence on growth. Almost all these findings are useful for policies in the less developed countries. It can be seen that many of these results have been successfully used by the East Asian countries as well as China and India to enjoy higher growth rates. But it seems that higher growth rates may not be sustained. Longer periods are needed to implement political stability, institutional reforms, improvements in health and human capital formation in order to maintain high growth rates.

Using annual data for the period 1950-1997, Medina-Smith (2001) investigated the export-led growth hypothesis in Costa Rica. The study had gone beyond the traditional neoclassical theory of production by estimating an augmented Cobb-Douglas production function. In this estimation exports has been included as a third input to provide an alternative procedure to capture total factor productivity growth. The test results showed that the export-led growth hypothesis is valid in this particular case. However, the empirical results showed that physical investment and population have mainly been influential in Costa Rica's overall economic performance from 1950 onwards. However, they noted that the review of the literature has insufficient support for the relationship between exports and growth. Although, the results of the studies suggest that exports has a positive effect on the overall economic growth rate and could be considered as a growth engine as the export-led growth hypothesis advocates, their short and the long run impact found to be quantitatively relatively small. The evidence, however, supports the neoclassical theory of

production and, to a lesser extent, the so-called new-fashioned economic wisdom. Moreover, it challenges the empirical literature concerning the export-led growth hypothesis and shed serious doubts on promoting exports as a comprehensive development strategy. Medina-Smith concludes that the export-led growth hypothesis is probably beneficial only for a limited number of developing countries and only to a certain extent.

Masters and McMillan (2001) have tested growth theories empirically using a sample of 132 countries classified according to climate conditions into two groups including temperate countries and tropical countries. The findings of the research showed that since 1960, temperate countries have moved towards a convergence to high levels of income, while tropical nations have not experienced such a convergence. They have converged towards various income levels related to the extent of markets and the economic scale (measured by the country's population size, population heterogeneity and exposure to the world as a whole). To explain this result, they stated that temperate countries growth was due to their climate perhaps for their transition out of agriculture, while tropical countries growth was associated with their benefits from specialization and trade. In general, the findings have indicated the high importance of economic scale for low income tropical countries than for high income temperate countries.

Dobson and Ramlogan (2002) studied income convergence in Latin America, analyzing a panel data from 19 countries during 1970 to 1998. The results showed little evidence of income convergence in the region, indicating a need for regional development policies in order to reduce the income inequalities.

Dobson *et al.* (2003) investigated the convergence hypothesis for a sample of less developed countries covering 80 countries into three broadly defined regions including Africa, Latin America-Caribbean and Asia-Pacific countries. The findings of the research showed that traditional cross-section unconditional convergence model suggested no evidence of intra-regional convergence. However, test results of the conditional convergence hypothesis showed some evidence of intra regional for Africa and Latin America-Caribbean, but only weak evidence for Asia-Pacific region. The results also showed support for the main hypothesis of both neoclassical and new growth theory.

In his study, Pritchett (2006) showed that, in spite of much progress in the growth literature, there remained a tension between the logic of academic interests and the needs of policy practitioners of the less developed countries. According to him, nearly everything about the first generation growth models was in a dispute with the needs and perspectives of policy makers of the less developed countries. The main stream of endogenous models is to focus on the very long run and on the incentives to broaden the technological frontiers. Neither the long run growth nor expanding the technological frontiers is the main concern of less developed countries. They mainly interested in short to medium term growth and accelerating technological catch up by adopting existing innovations.

Rao and Cooray (2009) followed Pritchett (2006) and searched for the gap between the theoretical and empirical growth literature. The findings of their research showed that there is a wide gap between the theoretical and empirical growth literature and the policy needs of the less developed countries. Growth literature has focused on the long term growth outcomes, but the main need of the less developed countries is to accelerate improvements in the growth rate in the short and medium terms. According to them, this gap can be bridged by paying attention to the dynamic effects of policies. In this relation, using data on Singapore, Malaysia and Thailand, they have shown that an extended version of the Solow (1956) model is more compatible with the status of

less developed countries. The results showed that the short to medium term growth affect investment ratio much more than the long run growth does and the short to medium term growth effects persist. Dynamic simulations for Singapore showed that these short and medium run growth effects are significantly higher than the steady state growth rate for up to 10 years. In spite of some limitations, Rao and Cooray believe that their framework is well suited to meet the short and medium term needs of the policy makers of the less developed countries.

ENDOGENOUS GROWTH MODELS

In his investigation regarding endogenous growth theories, Stern (1991) argued that although growth theory has contributed to understanding the determinants of growth in developed countries, it has failed to determine some of the crucial issues affecting growth in less developed countries. It is necessary to pay careful attention to such factors as the role of management and organization, the improvement of infrastructure and sectoral transfer in less developed economies in order to make a real contribution to understanding of the determinants of growth and to the design of policy. There is pressing need to model these factors productively using careful applied studies. Although these factors are not directly concerned with the long-run rate of growth in the sense of the steady-states in the endogenous growth models, they are important for a medium term of some considerable duration. In this sense the focus on the long run in the theories may have been, at least in part, diversionary.

Pio (1994) investigated developments in endogenous growth theory in applying to less developed countries. His findings showed that not all relevant issue facing less developed countries can be analyzed in dynamic optimization framework of endogenous growth model. In this context it has been also emphasized that some crucial issues should be taken into account in modeling in less developed countries; among these, the state of development, objective function of the government and its political and economic allegiances, different political and economic structures, a broader definition of human capital (encompassing health and nutrition as well as education), income distribution, population growth and age structure of population can be mentioned.

Bosworth *et al.* (1995) have examined economic growth experiences of 88 less developed and industrial economies during the period 1960-1992 using both approaches of growth accounting and regression methods. The findings of the research have shown that increases in Total Factor Productivity (TFP) have been surprisingly small in less developed countries and that accumulation of physical and human capital account for most of the growth per worker. These findings are consistent with results of some previous studies, but for a much larger sample of countries. The fact that countries with high rates of factor accumulation do not have high rates of total factor productivity growth, provides little support for the new endogenous growth theories. The results of regression analysis strongly supported the belief that stable, orthodox macroeconomic policy, combined with outward oriented trade policies foster economic growth. Among other findings, the study has shown that larger budget deficits operates mainly through slowing growth by reducing capital accumulation, while real exchange rate volatility slows total factor productivity growth. Many studies have been done to investigate the link between trade policy and growth using cross-section regressions over relatively long time periods.

Ahmad and Naz (2000) studied a sample of 54 countries comprising of some developed, less developed and underdeveloped countries. They classified the sampled countries in four groups comprising poor, lower middle income, upper middle income and rich countries on the basis of per capita income ranks. This classification made it easy to analyze behavior of a group having some

common characteristics rather than analyzing a country individually. They calculated the average ranks for each period across all the countries within a group. The findings of the research showed that there are no significant changes in the average ranks of the four groups of countries over time. Although, there are slight changes in the averaged ranks of poor and lower middle income groups, these changes are not substantial. Therefore it can be concluded that the evidence on convergence is not strong enough to confirm the so-called convergence hypothesis. In case of upper middle income group of countries.

Acemoglu and Zilibotti (2001) focused on endogenous growth model with expanding variety. They argued that many technologies used by the less developed countries have been developed in the OECD economies and have been designed to make optimal use of the skills of these rich countries' labor forces. But the labor forces are mostly unskilled in less developed countries. This is why the productivity in the less developed countries has continued to be low. This study showed that the less developed countries and the developed countries share the same economic growth rates.

Sena and Fontenele (2004) studied the main growth policies arising from the new endogenous growth theory for less developed countries. The applied endogenous growth models which have taken into account some macroeconomic variables showed that level of education, labor skill and learning, saving, provision of productive services by the government and trade are key variables. Their investigation showed that economic policy, particularly growth policy's design and implementation have crucial role in influencing economic growth in less developed countries.

Based on endogenous growth theory, Utkulu and Ozdemir (2004) examined the effect of trade liberalization on long run income per capita and economic growth in Turkey. The findings of this research provided evidence to support the endogenous growth theory. Their study showed trade policy affected growth in both the short and long run in the studied country.

Madsen *et al.* (2009) studied endogenous theories in India. They tested whether the second-generation endogenous growth theories are consistent with India's growth experience. The results showed that RandD activity, international RandD spillover, distance to the technology frontier and economic reform explain growth in India. These results showed little support for semi-endogenous growth theory. According to this study, there is no robust long run relationship between total factor productivity and research activity and, therefore, total factor productivity growth cannot be explained by growth in research activity. The findings of this estimation provided a strong support for Schumpeterian growth theory.

Lin and Zhang (2007) developed an endogenous growth model combining structural change with repeated product improvements. Their study focused on two sectors: one is traditional sector and the other is modern sector. The technological progress takes place differently in these two sectors. In the traditional sector technology takes the form of horizontal innovation based on expanding variety, while the technology in the modern sector is not only increasingly capital intensive, but also progressively productive over time. The application of the basic model to the less developed countries showed that the optimal industrial structure in the less developed countries is endogenously determined by its factor endowments.

Petrakos and Arvanitidis (2008) investigated the determinants of growth in both less developed and developed countries using a questionnaire survey addressed to various experts including academics, policy makers and business people. This research was conducted in order to identify the factors that either support or inhibit growth potential and to assess their degree of significance. The findings of the research showed that determinants of growth do not have the same influence in the

developed and less developed countries. In the developed countries factors such as innovation, knowledge, technology and human capital seems to be of great importance, whereas in the less developed countries, the most important aspects are related to the socio-political framework.

Ang and Madsen (2009) studied endogenous growth theory and its applied models in Asia. They used data for six Asian miracle economies China, India, Japan, Korea, Singapore and Taiwan during 1953 to 2006. They estimated the extent to which growth has been driven by RandD and tested that which second generation endogenous growth model is most consistent with the data. The results strongly supported Schumpeterian growth theory, while only limited support has been found in favor of semi-endogenous growth theory. Furthermore, the findings showed that RandD has played a key role for growth in the Asian miracle economies.

In this line of research, some other empirical studies have been conducted to investigate the effects of several factors on economic growth in different countries. Among these studies have been, for example, those of Scully (1989), Sirowy and Inkeles (1990), Sarel (1996), Barro (2000), Bloom *et al.* (2001), Zarra-Nezhad and Zarea (2005), Moghtadaei *et al.* (2006), Zarra-Nezhad (2008) and Chan and Dang (2010).

As mentioned above, current economic growth theories do not take into account cultural variables at national levels. Leiknes (2009) has investigated how the norms and goals of a society affect economic growth and development. The result showed that among others, religion, attitudes towards institutions and general trust in a society are significant for economic growth. In addition, increased religiosity and power distance is found to be negatively associated with economic growth and development.

Religion is an important aspect of culture offering a set of values (Guiso *et al.*, 2006). A distinct feature of religion is the non-separation of religion and economic activities specific traits feasible to economic development (Zarra-Nezhad and Ansari, 2008). A classic work on religion and economics is Weber (1930) work on the Protestant ethic and the spirit of capitalism, though it does not show a clear link between religion and economic development.

Most religions support improving the quality of life and are committed to achieving economic growth as well as social justice and equality (Chapra, 2000; Zarra-Nezhad, 2004). Several theoretical and empirical studies support the relationship between religion and economic growth (e.g., Sadeq, 1997; Zarra-Nezhad, 1999, 2004; Barro and McCleary, 2003; Zarra-Nezhad and Ansari, 2008). Much more studies in this relation have dealt with economic growth in Islamic countries. Some of these studies have concluded that Islamic economy has had some results in terms of development, especially in South-East Asia (Rigg, 2002). Similarly, Woodrum (1985), Zarra-Nezhad (1999), Noble *et al.* (2007) and Arano and Blair (2008) looked into the relationship between economic success and religiosity and admitted that a perspective from religion is eminently suitable to bring out endogenous models of development. The others mostly do not hold religion responsible for low growth and underdevelopment of large parts of the Islamic world (Nunnenkamp, 2003; Zarra-Nezhad and Yousefi-Hajjibadi, 2008).

CONCLUSION

Considering that many less developed countries have had a growth experience that was very far from the conditions of a steady-state, it is of great importance for policy makers of less developed countries to find out the factors and aspects contribute to low growth. But the fact is that the primary origin of almost all growth theories and models is the needs and the requirements of developed countries.

The classical economists, from Adam Smith to Frank Knight, paved the way for the emergence of modern theories of economic growth since the late 1950s. Since, these theories were developed concurrent with the Great Depression, they received sympathetically by many nations. The more important contributions to modern growth theory have been the exogenous growth model of Solow and Swan. The fundamental feature of this model is its competitive framework and its assumption of constant returns to scale and diminishing returns. Due to these assumptions, the Solow-Swan growth model predicts that in the absence of continuing improvements in technology, per capita growth must eventually come to an end. But this prediction is not confirmed by facts. Then it became clear that the neoclassical growth theories and models need more basic changes to cope with the analysis of imperfect competition. These theoretical considerations did not come until Romer's research in the late 1980s. Thereafter, attention turned towards a new excessively technical growth theory with less empirical applications. But the need of the less developed economies continued to keep applied models although technically unsophisticated ones. In this faze the fields of economic development and economic growth drifted apart and the two areas became almost completely separated.

The research after the mid 1980s, have focused on studying the determinants of long-run economic growth. The second phase was to abandon the idea that the long-term growth rate is connected with the rate of exogenous technological progress. This led to introduce the endogenous growth models determining the long-run growth rate within the model. The endogenous growth theory has developed into two directions including semi-endogenous growth models and the Schumpeterian growth theory.

The 1990s growth theory has focused on empirical implications and been more concerned with the relations between the theory and the data. However, much of the applied research in this decade came to be cross-country regression analysis within the old neoclassical framework. The integration of theoretical studies and empirical research has caused research on growth to be a permanent and ongoing phenomenon. This feature has led the 1999s theories not to get into difficulty like theories in the 1960.

But almost all these studies have not concerned with the applicability of growth theories in non developed countries. This lack of attention has led to a tendency to research on economic growth and its determinants in less developed countries. In this line, some studies have been attempted to examine the circumstances under which different government policies, particularly different trade strategies and competitive environments have different effects on growth. Some research has tended to examine the determinants of economic growth rate in less developed countries using cross-sectional data within the neoclassical theory framework. But a few researches have challenged the results of empirical literature in support of neoclassical theory of export-led growth and the convergence hypothesis in less developed countries and provided a theoretical and empirical alternative.

In spite of much progress in the growth literature, there are still a considerable gap between the logic of academic interests and the needs of policy practitioners of the less developed countries. Unlike in the developed countries, neither the long run growth nor expanding the technological frontiers is the main concern of less developed countries. They mainly interested in short to medium term growth and accelerating technological catch up by adopting existing innovations.

In general, the growth theories have not been successfully able to assess the determinants of growth, particularly in less developed counties. Moreover, the definition and the measurement of

theoretically predicted determinants are much difficult and different in less developed countries from those in developed countries. The current economic growth theories do not take into account cultural variables and religion as necessary, while religion is an important aspect of culture offering a set of values essential for economic development.

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