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# CONTENTS


| Sr. No. | TITLE & NAME OF THE AUTHOR (S) | Page No. |
|---|---|---|
| 1. | **A DIAGNOSTIC STUDY ON SOCIO-ECONOMIC STATUS OF FISHERMEN: AN INSIGHT OF KARNATAKA STATE**<br>*KIRANKUMAR BANNIGOL & S. G. HUNDEKAR* | 1 |
| 2. | **POPULATION GROWTH AND ECONOMIC DEPENDENCY IN INDIA**<br>*DR. REJI B, PINKI & ANURADHA KUMARI RAI* | 5 |
| 3. | **AN ASSESSMENT OF LEADERSHIP STYLE OF PROJECT MANAGERS ASSOCIATED WITH PROJECT SUCCESS IN COMMERCIAL CONSTRUCTION**<br>*COLLINS MUDENDA* | 9 |
| 4. | **PERFORMANCE OF MGNREGA SCHEME IN PURULIA AND BIRBHUM DISTRICTS: AN EMPIRICAL ANALYSIS**<br>*DR. DHANANJOY RAKSHIT* | 14 |
| 5. | **VENDOR DEVELOPMENT PROCESS: AN EMPIRICAL STUDY**<br>*DR. R. K. KUSHWAHA, SHYAM SUNDER PARASHAR & DR. ALOK SINGH* | 23 |
| 6. | **A STUDY ON CUSTOMERS' PERCEPTION TOWARDS HOME LOANS PROVIDED BY HDFC BANK IN COIMBATORE CITY**<br>*DR. ESWARI. M & DR. MEERA.C* | 30 |
| 7. | **PROBLEMS AND MARKETING STRATEGY OF HANDLOOM SECTOR**<br>*R. VINAYAGAMOORTHY & DR. B. BASKARAN* | 34 |
| 8. | **A STUDY ON TYPE OF POLICY-HOLDING AND POLICY HOLDERS SATISFACTION ON THE POLICIES OF SELECTED PRIVATE LIFE INSURANCE COMPANIES**<br>*D. INDHUMATHI & DR. B. SEKAR* | 36 |
| 9. | **A STUDY OF PERCEPTION OF CUSTOMER TOWARDS PLASTIC MONEY WITH SPECIAL REFERENCE TO HDFC BANK**<br>*ANAND TRIVEDI, NAND KISHORE SHARMA & VANDANA SHARMA* | 40 |
| 10. | **PRODUCTION FUNCTION ANALYSIS OF MEMBERS DAIRY COOPERATIVE SOCIETY FOR MILCH BUFFALO IN DISTRICT ETAWAH, INDIA**<br>*ASHISH CHANDRA & DR. ARUN BAHADAURIA* | 48 |
| 11. | **ROLE OF GROWTH IN MONEY MARKET WITH CONTEXT TO INDIAN ECONOMY**<br>*M. SUGANYA & R. BHUVANESHWARI* | 52 |
| 12. | **SOCIAL MEDIA IMPACT ON CONSUMER PURCHASING DECISION: STUDY OF AMU CENTER MURSHIDABAD**<br>*MONIRUL ISLAM* | 54 |
| 13. | **SKILL DEVELOPMENT: THE KEY TO ECONOMIC PROSPERITY**<br>*ANJALI JAIN* | 62 |
| 14. | **A CONCEPTUAL STUDY ON PRADHAN MANTRI JAN-DHAN YOJANA: A TOOL FOR FINANCIAL INCLUSION (THE SUCCESS RATES AND AN OVERVIEW OF PEOPLES ACCEPTANCE)**<br>*SINDU AKILESH* | 64 |
| 15. | **STANDARDIZATION OF PERCEIVED PROFESSIONAL SUCCESS SCALE FOR POLICE PERSONNEL**<br>*RASMITA DAS SWAIN & SHIV MANGAL SINGH* | 69 |
| 16. | **REDEFINING MANAGEMENT PRINCIPLES FOR THE 'DIGICAL' GENERATION**<br>*DR. DEEPIKA DABKE* | 73 |
| 17. | **QUALITY OF WORK LIFE AND EMPLOYEE PERFORMANCE: A THEORETICAL FRAMEWORK**<br>*SHAHNEYAZ A BHAT, SUHAIL A BHAT & MUNEER A KHAN* | 79 |
| 18. | **TECHNICAL ANALYSIS OF BONUS ISSUES: A STUDY OF INDIAN STOCK MARKET**<br>*NEHA ROHRA & SHWETA JAIN* | 83 |
| 19. | **ON THE NEOCLASSICAL AND KALDORIAN PERSPECTIVES**<br>*MERTER MERT* | 94 |
| 20. | **PUNJAB Vs. HARYANA: EMPIRICAL EVIDENCE ON ECONOMIC GROWTH & DEVELOPMENT**<br>*SHILPI SALWAN* | 99 |
| | **REQUEST FOR FEEDBACK & DISCLAIMER** | 103 |

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# ON THE NEOCLASSICAL AND KALDORIAN PERSPECTIVES

*MERTER MERT*
*RESEARCH SCHOLAR*
*GAZI UNIVERSITY*
*FACULTY OF ECONOMIC & ADMINISTRATIVE SCIENCES*
*DEPARTMENT OF ECONOMICS*
*ANKARA*

## ABSTRACT
*This study proposes a testing procedure for neoclassical and Kaldorian perspectives to analyze sources of growth. If the Solow model is valid, then supply-side implications will be important. However, if the Kaldor model is valid, then it means that both supply-side and demand-side explanations matter. Besides, Kaldorian perspective also points out analyzing the endogeneity of the natural rate of growth and its sources. This analysis implies demand-side macroeconomic policies in order to influence or control possible relations among technological progress, labour force and labour productivity.*

## KEYWORDS
Sources of growth, endogeneity of natural rate of growth. Solow, Kaldor.

## JEL CODE
O40, O49.

## INTRODUCTION
Analyzing sources of economic growth based on Solow (1957) gives an explanation about the possible supply-side sources, namely *productivity* and *capital accumulation*, from neoclassical perspective. Solow (1957) uses a production function which shows a relation from inputs; that is capital and labor, to output. Solow (1957) motivates numerous studies on the sources of growth literature. However, Kaldor (1957) can also be used for sources of growth analysis from a different perspective. By using Kaldor (1957), firstly, sources of economic growth can be disentangled as contribution of *technical dynamism* and *growth of per labor capital*. Secondly, technical change is endogenous rather than exogenous as in Solow (1956) and Solow (1957). Thirdly, technical progress function gives an opportunity to estimate long-run rate of economic growth. Fourthly, this framework also gives an opportunity to analyze demand-side explanation of convergence or divergence mechanism from equilibrium, increasing returns to scale and the endogeneity of the natural rate of growth which are important Post-Keynesian postulates. Finally, if Kaldorian framework matters, then it will be important to investigate *sources of endogeneity of natural rate of growth*.

The natural rate of growth is the ceiling of the actual rate of growth. Harrod defines the natural rate of growth as "the maximum rate of growth allowed by the increase of population, accumulation of capital, technological improvement and the work/leisure preference schedule, supposing that there is always full employment in some sense." (Harrod 1939, 30) Thus Harrod (1939) described the natural rate of growth as a maximum rate of growth which is determined by exogenous factors such as population growth, etc. Therefore, the natural rate of growth simply implies long-run rate of growth and *it is exogenous*. Solow's (1956) main critique on the Harrod's growth model is based on the issue of the substitution of capital and labour. On the other hand, Solow did not deal with the exogenously given natural rate of growth. Thus, the natural rate of growth *is again exogenous*. *As a consequence, the natural rate of growth is exogenous both for the Harrod and neoclassical growth models*. Moreover, the endogenous growth models based on neoclassical paradigm (Romer 1986; Lucas 1988) also do not deal with endogeneity of the natural rate of growth. Note that, endogenous growth models based on neoclassical paradigm can give supply-side explanations for the technological progress which determines long-run rate of growth. Herein, it is concluded that, since examining sources of endogeneity of the natural rate of growth gives possible relations among technological progress, labour force and labour productivity, it gives an opportunity to analyze relationship between demand-side macroeconomic policies and technological progress.

Thus, as a beginning point, it is important to decide for neoclassical or Kaldorian perspective while analyzing sources of growth. Then, it will become possible to work on with Post-Keynesian arguments which are listed above. This study attempts to build a simple procedure in order to decide.

The paper is organized as follows. In the following sections, sources of exogenous growth and then sources of endogeneity of the natural rate of growth are briefly discussed. Then, sources of growth according to Solow model and Kaldor model are discussed, respectively. Following section gives an offer to decide. Finally, the paper is concluded.

## SOURCES OF EXOGENOUS GROWTH
Natural rate of growth is simply sum of *growth rate of technology* and *growth rate of labour*. Solow did not deal with the *exogenously given labour or population growth*. *Growth rate of technology is also exogenous*. Thus, since growth rate of technology and growth rate of labour are exogenous in the neoclassical model, natural rate of growth is also exogenous. This explanation can be based on sources of growth debate.

The debate is whether the sources of economic growth stem from technological progress or capital accumulation, and this debate is built on growth accounting. As an example, "East Asian Tigers" grew rapidly over three decades from the mid-1960s to the early 1990s. Their achievement on fast economic growth has triggered a debate over whether it stems from capital accumulation or technological progress. For example, Collins and Bosworth (1996) show that East Asian economies are distinguished by the magnitude of their capital accumulation and that the contribution of productivity is quite ordinary. On the contrary, Klenow and Rodríguez-Clare (1997) show that technological progress account for the most growth in output per worker in Hong Kong, the Republic of Korea, and Taiwan. Although steady state conditions impose assuming the nature of technological progress as Harrod-neutral (see Uzawa 1961, Allen 1967) rather than Hicks-neutral traditional sources of growth studies assume the nature of technological progress to be Hicks-neutral (for example, Solow 1957: 312; Senhadji 2000: 132; Altug, Filiztekin and Pamuk 2008: 403; van der Eng 2010: 295).

Since Uzawa (1961) proved, the nature of technological progress consistent with steady state conditions is Harrod-neutral. Note that, steady state indicates a long-run equilibrium relationship. As a consequence, if long-run equilibrium relationships are analyzed the nature of technological progress should be assumed to be Harrod-neutral rather than Hicks-neutral, i.e., the production function should be assumed as

$$Y = F(K, AL) = K^{\alpha}(AL)^{1-\alpha} \tag{1}$$

rather than

$$Y = F(AK, AL) = AK^{\alpha}L^{1-\alpha} \tag{2}$$

where *Y*, *L* and *K* indicate the level of output, labour and capital stock, respectively, and *A* indicates the level of technology. Furthermore, the time series econometrics analysis is generally based on testing whether there is a long-run equilibrium relationship among the non-stationary variables. If so, sources of growth studies should assume the nature of technological progress as Harrod-neutral.

However, it was also shown by Acikgoz and Mert (2015) that if it is assumed that the nature of technological progress is the Hicks-neutral, then the level of technology should be constant for stability; i.e. the level of technology cannot change over time.

In the long-run, the growth rate of output per labour is equal to the growth rate of technological progress, and this justifies the steady state conditions; i.e. the growth rate of *output per labour* and *capital per labour* are equal to the growth rate of technological progress, and this is compatible with the neoclassical growth model and long-run economic growth.

If the sources of economic growth are analysed based on time series econometrics, which generally examines long-run relationships among variables, one should assume that the nature of technological progress is Harrod-neutral. However, the sources of growth method assume short-run relations. To solve this problem, it can be initially estimated the long-term coefficients based on a Harrod-neutral identifying assumption. Then the short-term coefficients which are obtained from the long-term relationship can be used. Thus the contradiction between the econometric and economic theories for growth accounting can be solved.

Acikgoz and Mert (2014) finds evidence that approximately all per labour output growth stems from technological progress *in the short-run* for the East Asian economies, when assuming the nature of technological progress as Harrod-neutral. According to their identifying assumption (Harrod-neutrality), per labour output growth also equals the growth rate of technology *in the long-run*. As a consequence, the main source of economic growth is technological progress both in the short-run and long-run.

Thus, the theory shows that the Solow model augmented with Harrod-neutral technological progress explains the long-run growth differences using the growth rate of technology. Since application results of Acikgoz and Mert (2014) justify this theoretical point in the short-run, then productivity differences are the major reason explaining the output per labour growth differences among countries, and the main source of economic growth is not physical capital accumulation but human capital accumulation and all of the other variables which have an impact on the level of technology.

As a result, neoclassical model explains both short-run and long-run rate of growth exogenously since i) the growth rate of labour is exogenous and ii) the growth rate of technology is exogenous.

## SOURCES OF ENDOGENEITY OF THE NATURAL RATE OF GROWTH

If the natural rate of growth is endogenous, there is no fixed full employment ceiling. This is an important interpretation and it emphasizes the demand-constrained growth. In other words, economic growth can be stopped due to demand constraints before reaching the full employment ceiling as Léon-Ledesma and Thirlwall (2002) indicated, because the full employment ceiling also increases.

Therefore, if the natural rate of growth is endogenous, one may consider the possibility of the demand constrained growth.

Kaldor (1957) and Kaldor (1961) emphasize the effects of the demand conditions on the economic growth process. These effects depend on Verdoorn's law (1949), where the natural rate of growth can be considered as endogenous rather than exogenous. The actual rate of growth exceeds the natural rate of growth in the boom periods, if demand conditions matter. The reasons for this situation may be as follows (Léon-Ledesma and Thirlwall, 2002, 442):

i) increase in labour force,

ii) increase in labour productivity in the boom periods.

Thus, in these periods, if the actual rate of growth is greater than the natural rate of growth, this means that the labour force and/or labour productivity have increased due to, for example, increase in participation rates, immigration of labourers, economies of scale, etc. (Léon-Ledesma and Thirlwall 2002, 442). Therefore, there are two major consequences of the endogeneity of the natural rate of growth:

i) Since the natural rate of growth is the ceiling of the full-employment, unemployment may still be a problem even in the boom periods.

ii) Demand constraints can be considered as the main determinant of the economic growth.

Acikgoz and Mert (2010) investigate the positive and negative effects of the endogeneity of the natural rate of growth based on causality tests. The results show that there is no causality relationship from the real GDP to the labour force or physical capital stock, i.e. there are neither positive nor negative effects of the endogeneity of the natural rate of growth. Hence, increases in participation rates, immigration, etc. are not the reasons for the endogeneity of the natural rate of growth since there is no causality relationship from the real GDP to labour force. Similarly, an increase in labour productivity stemming from the use of more capital intensive methods is not a reason for the endogeneity, since there is no causality relationship from the real GDP to physical capital stock.

Thus, if there is evidence indicating the endogeneity of the natural rate of growth but there are no directly relationship from output to labour and capital, this finding can be interpreted by using indirectly relationship from output to inputs. These results imply that the reason of the endogeneity may be total factor productivity in the sense that it embodies factor apart from labour force and physical capital stock. Human capital formation, growth of research sector, infrastructure investments etc. can be elements that have an impact on total factor productivity. As an example, if an *increase in demand* is expected or if a *new demand* is expected to reveal, then this may motivate research sector to meet this *increased* or *new* demand. Thus as research sector grows, there may be an increase in participation rates, immigration of labourers, economies of scale, so, natural rate of growth may increase. The possible relationship from productivity to demand and from demand to productivity is analyzed in the literature (for example; Schmookler, 1966; Setterfield, 1997; Seiter, 2003; Araujo, 2013).

Note that, Thirlwall (2013: 73, 74) criticizes the neoclassical production function approach to the measurement of the sources of growth as follows:

"The serious and fatal criticism of this approach, however, is that the growth of capital and labour are treated as exogenous, whereas, in fact, they are largely endogenous to the growth of output itself."

The neoclassical production function approach to the measurement of the sources of growth is at best a 'growth- accounting' exercise without any deep analysis of the 'drivers' of growth to which investment and labour have responded."

Therefore, Thirlwall (2013) criticizes the one-way relationship from inputs to output. According to him capital and labour are largely endogenous to the growth of output itself. However, Kaldor (1957) explains both supply-side and demand-side based on his technical progress function. Kaldor (1957) can be interpreted as a model which examines economic growth from both supply-side and demand-side. Indeed, Kaldor (1957) "is based on Keynesian techniques of analysis" (Kaldor, 1957: 593) although it assumes that "in a growing economy the general level of output at any one time is limited by available resources, and not by effective demand" (Kaldor, 1957: 593). However, "the specifically Keynesian hypothesis that equilibrium between savings and investment is secured through a movement of prices and/or incomes, rather than through changes in the rate of interest" (Kaldor, 1957: 595-596).

There can be an objection to the "total factor productivity" since it is a neoclassical concept. However, remember that cumulative causation (Kaldor, 1966), which is a Post-Keynesian concept, explains a *mutual* relationship between demand and productivity; that is, as productivity increases real income and demand growth rises, besides, as growth rate of demand rises productivity growth might increase again. Thus here "total factor productivity" is not an unambiguous technical progress but it is motivated by demand conditions. In other words, if there is an increase in demand then there may be a rise in total factor productivity and this may raise the labour force and/or labour productivity. Thus rise in total factor productivity ***motivated by demand*** may increase the labour force and/or labour productivity because of an increase in demand but not "manna from heaven".

Acikgoz and Mert (2010) discusses that if total factor productivity is the main reason for endogeneity, it means that, theoretically, an increase in the total factor productivity may cause an increase in the labour force and/or labour productivity. Since an increase in total factor productivity means a rise in the level of technology, the exact nature of the technological progress is an important subject that should be examined. Therefore, as it is emphasized in Acikgoz and Mert (2010: 466) [holding physical capital stock (*K*) constant]

i) if an increase in total factor productivity causes an increase in labour force (*L*) but does not cause an increase in the labour productivity (*Y/L*), this means that the technological progress must be Solow-neutral,

ii) if an increase in total factor productivity causes an increase in labour productivity (*Y/L*) but does not cause an increase in labour force (*L*), this means that the technological progress must be Hicks-neutral and

iii) if an increase in total factor productivity causes an increase in labour force (*L*) and labour productivity (*Y/L*) together, this means that the technological progress must be Harrod-labour using. Note that "the endogeneity of the natural rate of growth implies automatic convergence of the actual rate to the steady-state equilibrium cannot be expected" (Vogel 2009, 49) neither can it be expected that the nature of technological progress is Harrod-neutral since steady-state growth can only occur if the nature of the technological progress is Harrod-neutral.

## SOURCES OF GROWTH ACCORDING TO THE SOLOW MODEL

According to the basic Solow model, long-run growth rate of per labor output equals to zero. According to Solow model augmented with Harrod-neutral technological progress, long-run growth rate of per labor output equals to growth rate of technology which is assumed as exogenous. Thus, Solow model cannot give an endogenous explanation to a positive value of long-run per labor output growth contrary to endogenous growth theories.

Solow (1956) is a supply-side model which gives a relation from inputs to output based on a Cobb-Douglas form of production function assuming constant returns to scale. If the nature of technology is assumed as Harrod-neutral rather than Hicks-neutral in order to guarantee long-run equilibrium since Harrod-neutral specification of technological progress is compatible with stability (Uzawa, 1961), Cobb-Douglas form of production function assuming constant returns to scale is written by:

$$Y = K^{\gamma}(AL)^{1-\gamma} \qquad (3)$$

where $Y$, $K$, $A$ and $L$ are output, capital, level of technology and labor respectively. $\gamma$ is elasticity of output with respect to capital.

If (1) is rearranged by rate of growth:

$$G_{Y/L} = (1-\gamma)G_A + \gamma G_{K/L} \qquad (4)$$

where $G_{Y/L}$, $G_A$ and $G_{K/L}$ are growth rate of per labor output, growth rate of technology and growth rate of per labor capital, respectively. Using (4) sources of per labor output growth can be analyzed.

We need to emphasize that Solow model explains convergence to the steady state automatically based on a supply-side view. In other words, during the short-run the economy is in transition to the steady state and this transition occurs thanks to the supply-side changes (Solow 1956, 73). Hence, if there is steady-state equilibrium, the neoclassical model shows the stability based on the idea that relative factor proportions are monotonically and inversely related to the ratio of factor returns. If there is disequilibrium, there is a mismatch between the supply of and demand for labor and capital. Thus, real wages and rental cost of capital change and the equilibrium occurs between the supply of and demand for labor, and capital.

## SOURCES OF GROWTH ACCORDING TO THE KALDOR MODEL

Kaldor (1957) "is based on Keynesian techniques of analysis" (Kaldor, 1957: 593) although it assumes that "in a growing economy the general level of output at any one time is limited by available resources, and not by effective demand" (Kaldor, 1957: 593). However, "the specifically Keynesian hypothesis that equilibrium between savings and investment is secured through a movement of prices and/or incomes, rather than through changes in the rate of interest" (Kaldor, 1957: 595-596). Thus, using the Kaldor's technical progress function one can explain moving toward or moving away from equilibrium based on a demand-side view since convergence or divergence mechanism depends on movements of prices and/or incomes, rather than on changes in the rate of interest. From this perspective, Kaldor model can be interpreted as a model which examines economic growth from both supply-side and demand-side.

Technical progress function is represented in a non-linear form at Kaldor (1957: 597) whereas it is assumed linear at Kaldor (1957: 609). If it is linear it can be specified as:

$$G_{Y/L} = \alpha + \beta G_{K/L} \qquad (5)$$

where $\alpha$ and $\beta$ are parameters.

Since in the long run, growth rate of per labor output and growth rate of per labor capital are equal ($G_{Y/L} = G_{K/L}$); long run equilibrium growth rate of per labor output, (5) will be expressed by:

$$G_{Y/L} = \frac{\alpha}{1-\beta} \qquad (6)$$

Indeed, according to the equilibrium point on the figure which represents technical progress function at Kaldor (1957: 598), $G_{Y/L}$ is long-run equilibrium rate of growth. Therefore, if these parameters ($\alpha$ and $\beta$) are estimated, it can be possible to calculate the long run equilibrium per labor output growth. However, it should be emphasized that although our simple analysis is based on equilibrium, Kaldorian and Post-Keynesian analysis has also non-equilibrium and historical interpretations (see; Setterfield, 1997).

In the literature, endogenous growth can be explained by a Kaldorian view (see; for example, Seiter, 2003; Roberts and Setterfield, 2007). At this perspective, it is possible to estimate Kaldor's technical progress function in order to estimate and analyze long-run growth, so, endogenous growth, since Kaldor's technical progress function gives an opportunity i) to estimate long-run equilibrium growth, ii) to disentangle the sources of long-run equilibrium growth as contribution of ii-a) technical dynamism (which will be explained below) and ii-b) growth rate of per labor capital stock.

Technical dynamism is a society's "ability to invent and introduce new techniques of production" Kaldor (1957, 595). Indeed, as Kaldor (1957, 595) said;

"Hence the speed with which a society can "absorb" capital (i.e., it can increase its stock of man-made equipment, relatively to labor) depends on its technical dynamism, its ability to invent and introduce new techniques of production. A society where technical change and adaptation proceed slowly, where producers are reluctant to abandon traditional methods and to adopt new techniques is necessarily one where the rate of capital accumulation is small."

The height of the technical progress function represents of a society's technical dynamism. Indeed, Kaldor (1957, 596) said;

"In an unprogressive economy, with a low capacity to absorb technical change the height of the TT' curve[1] will be relatively low ..., whilst important new discoveries (such as the invention of the internal combustion engine or atomic energy) are likely to raise the position of the curve considerably for some time."

Since the height of the technical progress function; that is the constant term ($\alpha$), represents of a society's technical dynamism, estimation of technical progress function makes it possible to compare the economies' technical dynamism, and to calculate its contribution to the long run equilibrium per labor output growth.

Thus, once $\alpha$ and $\beta$ are estimated, it becomes possible to disentangle the long-run equilibrium per labor output growth to its sources. Indeed, according to technical progress function in linear form, growth rate of per labor output is the sum of $\alpha$ and $\beta(k-l)$ where they represent contribution of technical dynamism ($\alpha$) and contribution of growth rate of per labor capital ($\beta(k-l)$), respectively.

[1] The curve which represents technical progress function.

There are two major studies tested the shape of Kaldor's technical progress function: Bairam (1995) and Hansen (1996). Bairam (1995), examined Kaldor's technical progress function and find that technical progress function is not linear but convex upwards. Hansen (1996), reexamined the shape of Kaldor's technical progress function, and contrary to Bairam (1995) find evidence that technical progress function is a linear equation.
We need to emphasize that Bairam (1995: 302, 303, 304) and Hansen (1996: 731) defines technical dynamism as an exogenous technical change, meaning that technical change which is not embodied in capital stock. However, according to Kaldor (1957), as it is cited above, technical dynamism is society's technical dynamism and embodied not in capital stock but in society. Hence, we adopt technical dynamism as a source of the endogenous growth. In other words, if a society's ability to invent and introduce new techniques of production increases thanks to educational improvements, it means that its long-run rate of growth rises. Thus, a society can increase its long-run rate of growth; that is long-run rate of growth is endogenous, not exogenous. Besides, contribution of growth rate of per labor capital to the long-run rate of growth is also endogenous to that society; that is investment decisions of that society determines contribution of growth rate of per labor capital to the long-run rate of growth.

## A PROCEDURE TO DECIDE

One can clearly understand that (4) and (5) are seemingly similar. However, as it is emphasized above, while (4) gives a supply side explanation, (5) has different implications with regard to Post-Keynesian theory. But which one is an appropriate relation? In order to test this, we offer a simple test based on the following explanations:
Let us rewrite (3):

$$Y = K^{\gamma}(AL)^{\mu} \tag{7}$$

Both side of (7) is multiplied by $\frac{1}{L}$, and its right hand side is multiplied by $L^{\gamma}$ and $L^{-\gamma}$, and then it is rearranged by rate of growth $(G)$:

$$G_{Y/L} = \mu G_A + (\mu+\gamma-1)G_L + \gamma G_{K/L} \tag{8}$$

First derivative of $G_{Y/L}$ with respect to $G_{K/L}$ is written by:

$$\frac{dG_{Y/L}}{dG_{K/L}} = \mu\frac{dG_A}{dG_{K/L}} + (\mu+\gamma-1)\frac{dG_L}{dG_{K/L}} + \gamma\frac{dG_{K/L}}{dG_{K/L}} \tag{9}$$

According to the Solow model there are constant returns to scale $(\mu+\gamma=1)$ and growth rate of labor and technology are exogenous; that is they do not depend on growth rate of capital per labor $\left(\frac{dG_A}{dG_{K/L}}=0; \frac{dG_L}{dG_{K/L}}=0\right)$. Thus, when the Solow model is valid, then (9) can be rewritten by

$$\frac{dG_{Y/L}}{dG_{K/L}} = \gamma \tag{10}$$

On the other hand, Kaldor's growth theory explains cumulative causation (Kaldor, 1966; Kaldor, 1972; Kaldor, 1981) which implies there are increasing returns to scale $(\mu+\gamma>1)$. Indeed, cumulative causation simply implies that as productivity increases real income and demand growth rises, besides, as growth rate of demand rises productivity growth might increase again. Simply, relation from productivity growth to demand growth, has five dimensions (Seiter 2003, 33-35): i) When productivity rises real wages might increase and growth rate of demand rises, ii) productivity growth might change households' behavior according to Engel's law, iii) productivity growth might lead to product innovations; that is new goods will influence the consumption pattern of the consumers, iv) productivity growth might increase profits and this might result in an increase in investments, v) besides, if there is an expectation that demand will increase, then entrepreneurs raise investment in order to decrease capacity constraints. Moreover, demand growth might have an influence on productivity growth; that is as demand grows and preference structure changes, firms might seek to invest in research and development.

Besides, according to Kaldor's growth theory, growth rate of technology is not exogenous; that is depends on growth rate of capital per labor $\left(\frac{dG_A}{dG_{K/L}} \neq 0\right)$
Moreover, since Kaldor's growth theory is a Post-Keynesian theory, it is expected to assume growth rate of labor is not exogenous in the light of the endogeneity of the natural rate of growth literature (Leon-Ledesma and Thirlwall, 2002). Thus, growth rate of labor depends on growth rate of output per labor, so, capital per labor $\left(\frac{dG_L}{dG_{K/L}} \neq 0\right)$.
Thus we offer a simple procedure:
i) Estimate (6) which can be rearranged by

$$G_{Y/L} = a_0 + a_1 G_L + a_2 G_{K/L} + u$$

where $a_0 = \mu G_A$, $a_1 = \mu+\gamma-1$, $a_2 = \gamma$ and $u$ is error-term.

ii-a) If $a_1 > 0$ and it is statistically significant, and $a_0$, $a_2$ are statistically significant continue to iii.

ii-b) If $a_1 = 0$ or it is statistically insignificant, and $a_0$, $a_2$ are statistically significant Solow model is used in order to analyze sources of growth.
iii) Estimate following equations:

$$G_A = b_0 + b_1 G_{K/L} + u$$

$$G_L = c_0 + c_1 G_{K/L} + u$$

If $b_1 \neq 0$, $c_1 \neq 0$ and they are statistically significant then Kaldor model is used in order to analyze sources of growth.

## CONCLUSION

This paper simply offers a testing procedure in order to decide for neoclassical or Kaldorian perspective while analyzing sources of growth. If one finds evidence that Solow model is valid, then it means that economic growth can be explained by its supply-side implications. Although long-run growth can not be explained since it is exogenous in the Solow model, then endogenous growth theories within the neoclassical paradigm can explain long-run growth. However, if test results point out Kaldor model, then i) long-run rate of economic growth can be estimated since it is equal to $G_{Y/L} = \frac{\alpha}{1-\beta}$; that is, long-run rate of economic growth is not exogenous, it is endogenous, ii) contribution of the society's technical dynamism and growth rate of capital per labor to the long-run rate of economic growth can be calculated and compared among countries (In other words, sources of *long-run endogenous* economic growth can be analyzed.), iii) it will be shown that demand-side explanation of convergence or divergence mechanism from equilibrium, increasing returns to scale and the endogeneity of the natural rate of growth matter.

If endogeneity of the natural rate of growth matters then it will be important to analyze sources of endogeneity: i) If there is a relationship among technological progress, labour force and labour productivity as it is emphasized by Acikgoz and Mert (2010: 466), then there may be a significant connection between demand conditions and the nature of technological progress. ii) As an example, an increase in demand may cause an increase in the level of technology and this technological progress may raise labour productivity (for example, due to an increase in education level) but not capital and labour. This situation shows that increase in demand causes technological progress and the nature of technological progress is Hicks-neutral. Here the policy recommendation may be to raise incentives on educational attainment, education quality etc. However, an increase in demand may cause an increase in the level of technology and this technological progress may raise labour but not capital and labour productivity. This situation shows that increase in demand causes technological progress and the nature of technological progress is Solow-neutral. Here the policy recommendation may be to raise job opportunities for the new labour. iii) Sources of economic growth analysis only points out the importance of capital accumulation or technological progress for the economic growth process and Harrod-neutrality guarantees that the main source is technological progress. However, sources of endogeneity of the natural rate of growth points out demand-side macroeconomic policies in order to influence or control possible relations among technological progress, labour force and labour productivity.

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