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Approaches for Measuring Human Capital and Its Effect on Economic Growth in (MENA) Region: A Panel Data Analysis

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Abstract:

Human capital is a key factor for growth process and competitiveness. This link operates through multiple pathways at the individual, firm and national level. The human capital (education, health) has effects on economic growth through at least three channels: first, it increases in the labor productivity, which leads to increase the output; second, the increase in the productivity leads to high demand for labor therefor output rises because of the number of employed workers increases; third, it leads to an increase in human capital stock attracts physical capital from other countries (foreign investment).

Therefore, the main objective of this article is to highlight the approaches of human capital measures and examine the relationship between human capital and GDP per capita (constant 2010 $) in a panel of 15 countries in the MENA region covering from 2008 to 2016. In this context, *our hypothesis* is that there is a positive effect of human capital on GDP per capita (constant 2010 $) rises. Findings of panel unit root show that all the variables are stationary of the level and first order, while the Co-integration tests prove that there is a long run relationship between human capital and GDP per capita (constant 2010 $). Specifically, the school enrollment tertiary education, labor market participation, the unemployment rate, mortality rate and life expectancy significantly influence GDP per capita (constant 2010 $) in the long run.

Keywords*: human capital indicators, Measuring human capital. Human Capital, Panel Data Analysis, MENA region.*

JEL: *B55, D24, E24, F23, J24, N30, O12, O49.*

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1. Introduction:

There is a large body of literature, that has revealed that human capital is one of the most important factors of growth process, based on cross section data [like, (Nelson & Phelps, 1966), (Barro, 1991), (Mankiw et al., 1992), (Mauro, 1995), (Easterly and Levine, 1997), (Temple & Wöbmann, 2006), (Qadri & Waheed, 2013), (De la Fuente & Doménech (2000, 2006), (Funke & Strulik 2000)], Panel data [like, Dreher (2006), (Batten & Vo, 2009), (Data Fabro & Aixalá, 2012), (Moral-Benito, 2012), (Iqbal and Daly, 2014), (Pelinescu, 2015) [6], (Sedat & Mesut, 2016) [18]; also there are a various studies [like, (Bassanini & Scarpetta, 2001), (Bundell et al., 1999), (Griliches 1997)] investigated human capital-economic growth linkages through using Time series data.

The literature found the human capital has effects on economic growth through at least three channels: first, it increases in the labor productivity, which leads to increase the output [13]; second, the increase in the productivity leads to high in demand for labor therefor output rises because of number of employed workers increases; third, it leads to increase in human capital stock attracts physical capital from other countries (foreign investment).

Based on the literature review, the human capital`s effect on the economic growth has been debated since 1980 in the endogenous growth models which developed by Romer, Lucas and Barro. From this time until now, the economists have carried out series of empirical studies (See, Mankiw, Romer, and Weil1, 1992; Barro and Sala-I-Martin, 1992; Islam, 1995; Appleton and Teal, 1996 [2]; Erich, 1996 [11]; Revenga, 1997; Schultz, 1999; Barro, Sala-i-Martin, (2003) [3]; Pavcnik, 2003;, Psacharopoulos & Patrinos, 2004; Fajnzylber & Fernandes, 2004; Bidirici et al., 2005 [6]; Makdisi et al., 2007; World Bank, 2008; Salehi-Isfahani et al., 2009; Dae-Bong, 2009; Kern, 2009; Dae-Bong, 2009; World Bank, 2010; Ndulu, 2010; Omojimite, 2011; Angel-Urdinola & Tanabe, 2012; Almeida, 2012; Asaju et al., 2013 suggest that human capital plays a positive and significant role

towards economic process and that large education gaps indicate negative long-run impacts. Similarly, Schultz (1999) studied health and schooling investments in Africa, this study deduced there was not a relationship between investments in human capital and regional economic growth from inter country regressions. Another (Bidirici, Orcan, Sunal and Aykac, 2005) analyze the linkage between human capital, growth, and brain drain in 77 countries using panel data [6]. They observed that generally slows down growth in less developed countries including those in Africa. The result also shows that a positively related to human capital in virtually all the 77 countries. However, Erich (1996) suggested an empirical study should allow other important determinants of human capital such as the quality of education, the experience of the workforce, and the health of the population [11].

The main objective of this study is to highlight the role of human capital (education, health, labor market) on GDP per capita (constant 2010 $) in MENA region countries through 2008 to 2016 by using Panel data model. This paper is organized as follows: The next section presents a literature review for human capital; Section 3 presents the empirical literature of human capital; Section 4 estimates the Impact of Human Capital on GDP per capita (constant 2010 $) in MENA region; Section 4 concludes.

2. Literature Review:

The human capital concepts have an ancient history - can be started in the 18th century - in the economics literature. This concept returned to at least Adam Smith. There are many definitions of human capital used in the literature. *The Oxford English Dictionary (1984)* defined human capital as "the skills, capabilities and abilities possessed by an individual which enable him to gain income", this definition which emphasizes the improvement of people's economic situation due to human capital investment [5]; World Bank (2006) [23] similarly defined human capital as "the productive capacity embodied in individuals, with

special focus on its contribution to economic production"; OECD (1998) [15], "the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity". UNESCO, (1962) [22]," inventory owned by the state of the population is healthy, educated and qualified producers, which is a major factor to consider in estimating the potential in terms of economic growth and promote Human Development".

Measuring human capital has been a severe challenge for economists, this is because the main variable of interest is intangible and not directly observable [7]. four main approaches have been used in the economic literature to measure the stock. The *cost-based approach* typically estimates by summing direct expenditures on schools (including the opportunity cost associated with going to school). *The output-based approach* measures the output of the educational system, while the *income-based approach* considers the returns individuals receive from the labor market. *The Human Capital Index* is a new measurement for identifying and tracking the state of human capital for all countries [24]. preparing by WEF.

1. *The cost-based approach to human capital measurement:*

This approach primarily measures human capital by considering it as the cost of production. therefore, this method is regularly indicated to the sum of the depreciated value of past investment by individuals, households, firms, organizations, and governments, so it is called "backward-looking" approach [13]. It also includes all of costs or expenses incurred as human capital has been produced. Thus, this method includes monetary outlays by the agents previously mentioned, also involves non-market inputs such as time spent to education by students and other related persons. [16] The bright side, this approach provides a measure of the current flow of resources invested in the education and other human capital related sectors. However, this approach is not immune from drawbacks to the method for more details about drawbacks see [4], [9], [13], [17].

2. The income-based approach to human capital measurement:

This model is to value the human capital embodied in individuals as the total income that could be generated in the labor market over their lifetime [21]. This method calculated the present value of an individual's future earnings using a discount rate of five percent [22]. Therefore, this method is said to be 'forward-looking' (prospective) because it focuses on expected returns to investment, as opposed to the 'backward-looking' (retrospective) method whose focus is on the historical costs of production. However, this approach is not free from drawbacks for more details see [10], [19], [21], [22].

3. The Output-Based Approach (The indicators-based approach):

This approach measures human capital of its output through several indicators that can sufficiently represent the stock of human capital or at least as a group might be employed as the proxy. The output-based measure has several drawbacks for more details about advantages and disadvantages see [11], [18], [23].

All the above the traditional measurement of human capital method has many drawbacks: first, some of the indicators can be considered as incomplete indicator to measure the human capital. (e.g. proxies such as income and productivity); second, it is necessary to link between human capital and economic performance when we measure human capital

4. The Human Capital Index:

The Human Capital Index is a new measurement for identifying and tracking the state of human capital for all countries. WEF Prepared first edition in the Global Human Capital Report 2017 [24]. This index has many advantages: *First*, the Index measures a wide set of indicators that have a several dimensional. *Second*, the Index involves a long-term approach of human capital measures. In addition to providing facts about state of a country's human capital and consequences of a country's past policies [12]. *Third*, the Index aims to take into

consideration the individual life track. So, the Index reflects the extent to which investments made in earlier years through lifelong learning and training [20].

To sum up, all approaches to measuring human capital have their pros and cons. One approach's disadvantage might be the other approach's advantage. There are also complementary among these approaches. Depending upon this conclusion, different approaches may be used, either individually or jointly with others. Arguably, to address issues related to growth accounting, monitoring sustainability and measuring the productivity performance of the human capital.

3. Methods:

1. Model Specification and Data Sources:

In methodological terms, we apply the latest panel data techniques based on the Ordinary Least Squares (OLS), there many studies use the same variables such as, Fabro and Aixalá (2012), through 1976–2005 applied in 79 countries, using Panel Data estimation, where GDP growth rate per capita, Human Capital: Primary and Secondary enrollment rate, Physical Capital: Investment in physical capital (% GDP) Institutions: Economic Freedom index, Political Rights and Civil Liberties index. Also, Mauro (1995) through the period (1960–1985), applied in 58 countries excluding oil exporters, he used Cross-section approach, the proxy of GDP per capita growth (1960–1985), and Human Capital: Primary and Secondary enrollment rates (1960) PIB Initial GDP: Real GDP per capita real in 1960, Physical Capital: Investment in physical capital (% GDP), Public Expenditures: Real public consumption (%GDP), Institutions: Corruption Index; Bureaucratic Efficiency Ratio; Political Instability Index [3].

The most methodological problem is to choose the proxy indicator used to measure human capital since the amount of influence is affected by the indicator chosen for this purpose [6]. The paper applies the latest panel data techniques based on the Ordinary Least Squares (OLS), *Our hypothesis* is that there is a (*positive*) effect for education which use a proxy for human capital on economic

growth, Also, there a significant effect for health in the GDP per capita, we assume that labor market highly correlation with GDP per capita.

2. Estimation Model:

We examine the empirical relationship between human capital and real GDP per capita in a panel of the 15 MENA countries covers 2008 through 2016. Specifically, we consider the following empirical model: or which can be formulated as follows:

$$Y_{it} = \beta_{i1} + \beta_{it}\mathrm{SEP}_{it} + \beta_{it}\mathrm{SEP}_{it} + \beta_{it}\mathrm{SET}_{it} - \beta_{it}\mathrm{MR}_{it} - \beta_{it}LEB_{it} + \beta_{it}LPR_{it} + \beta_{it}UNR_{it} - \beta_{it}HTR_{it} + \beta_{it}CPGDP_{it} - \beta_{it}FCGDP_{it} + \varepsilon_{it}$$

Where, Y is GDP per capita (constant 2010 US$), which is indicator reflecting regional price levels as a proxy for economic growth. SEP is Registration in primary or School enrollment, primary (% gross), SEP is Registration in secondary or School enrollment, secondary (%gross), SET is Registration in territory or School enrollment, tertiary (% gross); where SEP, SEP, SET as a proxy for education. MR is Mortality rate, infant (per 1,000 live births), LEB is Life expectancy at birth, total (years) as a proxy for health. LPR is Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate), UNR is Unemployment, total (% of total labor force) (modeled ILO estimate), HTR is High-technology exports (% of manufactured exports) as a proxy for labor market. CPGDP is Gross capital formation (% of GDP), FCGDP is Final consumption expenditure (% of GDP) as a proxy for Physical Capital. Source of all variables: World Development Indicators database, Education Statistics, UNESCO Statistics, WEF Reports, and ILO estimates.

3. The Model and Its Results:

The statistical methods utilized are the latest panel data techniques based on the Ordinary Least Squares (OLS), and the Granger causality test. Before

applying, standard tests such as unit root and co-integration were performed as well. And the coefficients for the fixed-effects model are the following Equation:

$$
\begin{aligned}
&Y_{\mathrm{i}\,t} \\
&= 10.095 + 0.001\ \mathrm{SEP}_{\mathrm{i}\,t} + 0.0004\ \mathrm{SEP}_{\mathrm{i}\,t} + 0.003\ \mathrm{SET}_{\mathrm{i}\,t} - 0.012\ \mathrm{MR}_{\mathrm{i}\,t} \\
&- 0.014\ LEB_{\mathrm{i}\,t} + 0.006\ LPR_{\mathrm{i}\,t} + 0.0002\ UNR_{\mathrm{i}\,t} - 0.032\ HTR_{\mathrm{i}\,t} \\
&+ 0.006\ CPGDP_{\mathrm{i}\,t} - 0.005\ FCGDP_{\mathrm{i}t} + \varepsilon_{\mathrm{i}\,t}
\end{aligned}
$$

For our analysis, educational attainment (primary, secondary, tertiary) in the MENA region have several deficiencies, whereas no other reliable sources of data on educational attainment exist. We find that the use of for educational attainment rather questionable.

Regarding the *impact of education on GDP per capita (*constant 2010 $), we find that school enrollment primary, and secondary are positive effect on real GDP per capita, but they are not significant. As a contract, we find the registration in tertiary or higher education has a positive sign and signified. It appears in a positive sign for coefficients SEP, SES, SET, which are 53.22, 5.78, and 79.82 respectively.

For *Labor market,* have big problem about the data on the labor market for wages and efficiency of labor market, so we use labor market participation, the unemployment rate as a proxy to the labor which is one of components of human capital. the parameters appear a negative signal. There is an opposite relationship between the participation of labor, and high unemployment in the hand, and other hand real GDP per capita, where an increase in labor market participation leads to increase in real GPD per capita and a decrease in unemployment rate leads to rise in real GDP per capita. But these parameters not significantly. Also, for high-technology exports as a proxy of efficiency of labor market we find opposite relation between real GDP per capita and high-tech, but it's in our model not signing.

Finally, for health, we use mortality rate (MR), life expectancy (LEB) as a proxy for the health of population, our results show that, there are inverse

relationship between health of population and real GDP per capita, which according with economic theory and applied studies. also, our results confirm that there is an opposite relationship between final consumption as a percentage of GDP(CPGDP), and formation capital as percentage of GDP (FCGDP).

4. Diagnostic Tests:

1. Panel Unit Root Test:

For stationary of variables we have adopted unit root test. As we can conclude all unit root tests for all variables might be stationary at level for variables (Y, SEP, MR, LEB, LPR, UNR, HTR, CPGDP) stationary at level, and stationary in first difference for variables (SES, SET, FCGDP) that show the decision according to T-statistics shows that we cannot reject the null hypothesis of a unit root at 5% level of significance, where The null that there is a unit root assumes a common unit root process for Im, Pesaran and Shin (IPS) test and ADF - Fisher Chi-square, and assumes individual unit root process for the Levin, Lin and Chu (LLC) technique. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. All the statistical significance of the variables at 1%, 5% and 10% respectively.

2. Trace Test using Johansen Co-integration Technique

To check whether there is a long run relation among the variables of interest, we used Johansen Integration techniques. The results of co-integration between GDP per capita (constant 2010$) and human capital (Education: school enrollment primary, secondary, tertiary; Labor: labor market participation, unemployment rate, High-technology exports; Health: Life expectancy at birth, Mortality rate; and physical capital: Gross capital formation, Final consumption expenditure). In case of Co-integration, the null hypothesis is that there is no co-integration between real GGDP per capita and human and physical capital, while the alternative hypothesis is that there is a long run association between the above

variables. Therefore, we can say that there is Co-integration between real GGDP per capita and human and physical capital.

4. Results:

1. The traditional measurement of human capital method has many drawbacks: first, some of the indicators can be considered as incomplete indicator to measure the human capital. (e.g. proxies such as income and productivity); second, it is necessary to link between human capital and economic performance when we measure human capital.
2. The Human Capital Index is a new measurement for determining and tracking the state of human capital for all countries. WEF prepared the first edition in the Global Human Capital Report 2017. It has a wide set of indicators for several dimensional. Also, it involves a long-term approach of human capital measures.
3. All approaches to measuring human capital have their pros and cons. One approach's disadvantage might be the other approach's advantage and there are also complementary among these approaches. So, different approaches may be used, either individually or jointly with others.
4. The most methodological problem is to choose the proxy indicator used to measure human capital since the amount of influence is affected by the indicator chosen for this purpose.
5. The model results for MENA region appear that the school enrollment tertiary education is a positive effect on real GDP per capita. labor market participation and the unemployment rate are a negative signal. The mortality rate and the life expectancy appear inverse relationship between the health of population and real GDP per capita. So, Human capital has a wide range of potential benefits.

5. Summary:

The paper aims to review the approaches of human capital measures and examine the role of human capital in the economic growth of MENA countries. Human capital is identified as one of the main determinants of economic process. We applied model (Mauro,1995) and (Fabro and Aixalá, 2012). We assume that there is a positive effect of human capital on real GDP per capita rises. This paper is organized as follows: *The next section* review of the human capital literature; *Section 3* presents the empirical literature of human capital; *Section 4* estimates the Impact of Human Capital on GDP per capita (constant 2010 $) in MENA region; *Section 4* concludes.

The study examines the relationship between human capital and economic growth by using a Panel Data Analysis of 15 countries in the MENA region covering from 2008 to 2016. Results of panel unit root show that all the variables are integrated of the level and first order while the Co-integration tests show that there is a long run relationship between human capital and GDP per capita (constant 2010 $). Specifically, the school enrollment tertiary education, labor market participation, the unemployment rate, mortality rate and life expectancy significantly influence GDP per capita (constant 2010 $) in the long run.

6. Conclusions:

The concept of human capital indicates to the abilities and skills of population of countries, while investment of human capital refers to the process of acquiring and increasing the number of people who have the skills, good health, education and experience that are critical for economic growth. Thus, investment in education, health, and labor market are considered as human capital components. In this study, we are attempting to examine the impact of human capital components (education and health separately) on real GDP per capita (constant 2010 $) in a panel of 15countries from the MENA region countries which their data are available covering the period from 2008to 2016. For this purpose, the

statistical methods utilized are the Ordinary Least Squares Method (OLS) and the Granger causality test. Also, carry out standard tests such as unit root and co-integration were performed as well. Eventually, education and health have a wide range of potential benefits. There is no doubt that one of the greatest benefits of education and health in MENA region is GDP per capita (constant 2010 $).

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