

[DOI: 10.20472/BMC.2020.011.004](https://doi.org/10.20472/BMC.2020.011.004)

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HUMAN CAPITAL AND ECONOMIC GROWTH IN EGYPT

Abstract:

The role that human capital plays in the economic growth of the countries has been an ongoing debate through the last two decades and has shown various empirical results over this period. This study aims to analyze and investigate the magnitude of relationship between human capital and the economic growth in Egypt since the Egyptian population has exceeded 96 million which shows that human capital is one of the most important resources Egypt has. This raises an important question which is; how this high population can contribute in the economic development of the Egyptian economic system and achieve the desired economic growth?. To investigate this question, two models are examined; a macroeconomics model in addition to a microeconomics model. The results of this study help evaluating the government education and health expenditure policies, giving recommendations for successful social policies, and providing a direction for the needed investments in Egypt.

Keywords:

Economic Development, Economic Growth, Education, Egypt, Experience, Health, Human Capital Earnings Model, Human Capital, Income Distribution, Solow Growth Model

JEL Classification: D04, I25, J24

Introduction

Human capital has been a very important factor in the economic development field since the human resource is one of the most available resources in the developing countries. A very expressive opinion emphasizing on the importance of human capital is what Lowell Milken said: "There is something inherently optimistic about the fact that we can create and foster what our society most needs in order to flourish. And in this age of uncertainty, it's a good thing to know that far from being finite and nonrenewable, the world's most important resource - human capital- is limitless and generative. It is up to each of us to make the most of this opportunity." (Milken, 2017). Likewise, Egypt is one of the ancient civilizations known for its increasing stock of humans which can benefit the country if it is viewed as capital and correctly directed and invested in.

However, the relationship between human capital health and education and the economic growth of the countries has been a continuous and ongoing debate between researchers since during the time horizon different researches have concluded different inconsistent results when the relationship between the human capital formation and the economic growth was studied in the different developed and developing countries using different proxies and data sets to study the relation. Theoretically, human capital has been argued to have a very important role in the growth of the countries, while empirically, researches in this area have shown contradicting different results.

In this research, the aim to investigate the impact of human capital investments (such as the educational and health investments) on the economic growth in Egypt and the magnitude of the relationship using recent data sets that represents the situation in the Egyptian economy especially after the 25th of January revolution in 2011 in order to give a clear picture that describes the effectiveness of the currently used economic policies and highlight the needed investments in the country in order to achieve the needed economic growth. To accomplish this aim the following research question will be examined: "What is the effect of human capital on economic growth in Egypt?", and the following research hypothesis will be investigated:

- H0: Investing on human capital leads to economic growth in Egypt.
- H1: Investing on human capital does not lead to economic growth in Egypt.

In order to investigate the relationship between investing on human capital health and education and the economic growth in Egypt, two models are used; a macroeconomic foundation model which studies the relationship from a broad country wide view by comparing the growth performance of the country throughout the years, and a microeconomic foundation model which studies the relationship from a narrower view by studying the income received by the individuals in the economy.

The macroeconomics model is the augmented form of Solow Growth Model which examines that economic growth in countries as a function of its labor force, physical capital, human capital and technology. In this model, both human capital education and health proxies will be regressed as representatives for the human capital status in the economy. As for the microeconomics model, the relation will be studied through Mincer's Human Capital Earning Function which studies the variation in the wage levels received by households in the economy as a function of their education level and experience. In addition, the human capital health factor will be added to the microeconomic model with consideration to its probable biases in order to consider the health aspect of human capital as well.

Literature Review

Human capital has become a term that is used in most of the economists' common language. According to Oxford Dictionary of English, Human capital is defined as "The skills, knowledge, and experience possessed by an individual or population, viewed in terms of their value or cost to an organization or country" (Stevenson, 2010), this is the from the macroeconomic perspective. However, the microeconomic perspective defines human capital as the intangible resource owned by companies through its possessed stock of information by individuals who form the companies' joint competencies, skills, abilities and knowledge which is embodied in the companies' workers (Bontis, 1999; Edvinsson & Malone, 1997; Davenport & Prusak, 1998; Kumar, 2006).

Looking more broadly, the resource of human beings has 2 main aspects; the quantitative aspect as well as the qualitative aspect. First, the quantitative aspect which is the amount of labor in the workforce and the amount of working hours they work. On the other hand, the qualitative aspect which is the part related to the quality of the work delivered which is embodied in the workers' abilities, understanding and any other element that can cause the productivity of the employees to be enhanced. Investing on the natural resource of human beings and their capabilities increases the quality of the production in a country and leads to positive returns to investment on the individuals' level as well as on the country's level (Goujon et al., 2007; Clark, 1960; Schultz, 1961).

Furthermore, the investment expenditure in human capital was mixed with the term of consumption expenditure in many aspects such as the expenditure on schooling, the expenditure on health, the expenditure on job trainings and internal movement from work to another better one. Besides, investment on human capital can be indirect such as investing on human capital through investing by the individuals' time to enhance the

personal abilities and skills which will accordingly enhance the person's productivity (Schultz, 1961; Goldin, 2016).

The role that human capital plays in the economic growth of the countries has been an ongoing issue through the last two decades and its perspective has changed at least three times over this period. First, Lucas in 1988 and Romer in 1990 have initiated the literature that introduced the idea that human capital can cause durable economic growth. After that, Mankiw, Romer and Weil in 1992 have developed a neo-classical model which considered human capital as a regular input to economic growth which cannot solely cause endogenous growth. Then came the studies of a new revisionist perspective which was based on the neo-classical approach following the research of Benhabib and Spiegel in 1994, Pritchett in 2001, and Bils and Klenow in 2000, which have enormously emphasized on the important role that human capital represent in economic growth. Hence, most of the economists concerned with studying the economic growth of the countries count human capital accumulation as one of the main factors that can cause economic growth (Cohen & Soto, 2007; El-Matrawy & Semmler, 2006).

Generally, human capital is found to impact countries' economic growth through the following four aspects; the first aspect is that human capital can be considered one of the resources used in the production so it is an input to production that affects the productivity of the countries (Mankiw et al., 1992). Secondly, building human capital stock produces other constructive external factors that affect the productivity and positively reflected on the economic growth (Lucas, 1988). The third aspect is that the owned stock of human capital creates creative entrepreneurial ideas and helps producing better R&D in the different countries which positively affects their production and economic growth (Romer, 1990). The fourth and least aspect is that the human capital creation might be reflected on physical capital attraction and accumulation which is another factor that influences the economic growth (Benhabib & Spiegel, 1994).

However, empirical cross-sectional studies that examine the relation between building human capital and economic growth in different countries haven't been able to confirm the causality in the relationship between the human capital and economic growth in the countries since the results of the studies in this area are mixed, some researchers conclude positive significant relation and other conclude negative relationship when they use different or wider sample of countries. An example that can clarify this is the study held by Temple in year 1999 which used cross-country data to study and relation concluded clear significant positive relation between human capital education and economic growth in developing and developed countries. On the other hand, the study held by BenHabib & Speigel in year 1994 which applied similar set of data using aggregate cross-country sample but used more number of nations and concluded that

human capital education has no strong relation with the growth of the countries (Kumar, 2006; El-Mattarawy & Semmler, 2006; Temple, 1999; Benhabib & Spiegel, 1994).

Moving to the Human Capital in Egypt, The Egyptian economy has been facing a continuous phase of fluctuations due to the 25th of January revolution which occurred in 2011. In the revolution, Egyptians were calling for their minimum right of open government that is responsive to the people and clear from corruption, the right of being treated with equity and fairness, and for the right of having higher living standards. Those rights emphasizes on the importance of the government efficiency, awareness and capability of offering public facilities and services with high quality to the Egyptian community (Wafa, 2015).

The transformation of the economy into the desired changes builds number of challenges that faces Egypt in addition to a number of countries in the region who have faced similar conditions in the latest periods, those challenges are related to the need for better education systems and the programs that offer trainings to skills demanded in the labor market. Generally, right economic policies are the key to individuals' acceptance and to the success of any political force in the region. More specifically, government spending on education can play a very important part in the political, social and economic advancements in Egypt and in the region (Brennan et al., 2004; Wafa, 2015).

The Egyptian labor force has been offered some public training programs through the government and through other private entities in the market; those programs were designed to decrease the gap between the required abilities and skills in the labor market and the skills that the public education system offers. Those training programs are offered in the market because of the awareness of the importance of the building human capital and the consciousness of the role it plays in the institutional performance in the public sector as well as the private sector (Goleman, 1995; Wafa, 2015).

However, the Egyptian government is facing difficulties in organizing the previously discussed training programs to the public especially during the recent changes that the economy is going through. Those difficulties are related to the problem of funding such programs in the recent declining Egyptian economy, and the problem of decreasing the private investments on training companies' employees as most of the companies are following cost reduction strategies (El Baradei & Newcomer, 2008).

Talking numbers, the Egyptian population is facing endless growth and it has reached 95,688,681 Egyptian in 2016 and the labor force number has been growing too and has reached 30,468,789 in 2016. This shows the Egyptian position in the MENA region since it includes about 22% of the MENA region's population and 20.7% of the region's labor force. However, Egypt has become a major exporter for its labor force, after it was a historical importer for emigrants. In addition, most of those immigrants are found to be

from the Egyptians with tertiary education level, for example, Egypt has exported 2,399,251 of its labor force in 2005, which are 3.2% of its total residents ((Docquier & Marfouk, 2004; Mehrez & Hamdy, 2010; World Bank, 2017; Zohry & Harrell-Bond, 2003).

Historically, Egypt was one of the developing countries that was able to benefit from offering equitable education system which led to economic growth in country since Egypt have survived the challenging economic condition after its wars through the government public investments in schooling while assuring equitable school entrance to all citizens. This led to a fairly moderate equal income distribution in the country in the time period between 1975 and 1990 due to the extended public policy followed in Gamal Abdel-Nasser's days which aimed to reach income equality through ensuring equitable access to schooling and all the other public services (Birdsall & O'Connell, 1999).

However, the study conducted by Birdsall & O'Connell (1999) which was concerned with studying the relationship between human capital education and the productivity in the Egyptian economy in the recent years found that that the returns to public and private investments on education have been increasingly decreasing in the recent period of times, in addition, the expenditure on education in Egypt have been increasing the gap in income distribution in the economy. This phenomenon have been appearing due to several reasons; first of all, the very quick expansion that happened in the Egyptian education system have been reached without giving equal attention to the quality of the education offered which resulted in low quality equitable education system. Second of all, this low quality of education offered in public schools and universities have caused the private education classes and systems to appear and to be accompanied with receiving the high quality needed education which caused the needed educational attainment to be unequally available for people and resulted in unequal educational distribution. Consequently, this unequal high quality education distribution has explained the declining returns to education investments and caused the income distribution in the country to become relatively unequal and the supply of the needed skilled labor to be less than the demanded in the market.

A research held by Pissarides (2000) have examined the relation in Egypt using microeconomic data from year 1988 in order to study the relationship between the wage received by individuals and their educational levels, occupations and experience levels. The research concluded that individuals with higher levels of schooling are found to be preferred to the ones with lower levels of schooling in some (relatively higher wage) occupations. In addition, the study found that the returns to education vary depending on the level of education received and returns to education to lower levels of education

are minor while returns to higher educational levels are higher. Furthermore, the study concluded that the returns to education also depends on the sector that the employee is working in, since returns to education in the private sector is way more than the returns to education in the public sector in the Egyptian economy.

In addition, the most recent study about human capital and economic growth in Egypt is the PhD thesis made by El-Matrawy (2006) which was concerned with studying the total factor productivity growth in Egypt. The study concluded a positive relation between human capital abilities and awareness and the countries productivity as it stated in its conclusion that “knowledge stock and human capital took part of the capital share of the Egyptian GDP due to the skills and knowledge embodied in the workers during work hours.” (El-Matrawy, 2006).

However, this research used the basic form of Solow Growth Model which considers human capital and physical capital one factor (capital) in studying the growth and production of the countries without given attention to human capital as one of the independent factors that can cause endogenous economic growth solely. In addition, it only considered the educational aspect of the human capital accumulation without giving attention to health and experience as important factors that affect the performance of the economy’s human capital stock, additionally, the data set used in the research is not up to date as it used data till 2002 only. Yet, more up to date data is needed to examine this important relation in Egypt especially after the Egyptian revolution in 2011 as the Egyptian economy has faced lots of rapid deviations after the 25th of January revolution. Those are the main problems that this research will overcome through fulfilling the gap to come up with better results about the relation between human capital and economic growth in Egypt using more recent data set in two different models; the augmented form of Solow Growth Model which includes human capital as an individual factor that affects output levels in order to study the relation from a macroeconomic perspective using both educational and health proxies to represent human capital, and Mincer’s Human Capital Earning Function which examines the relation from a microeconomic perspective using human capital education, health and experience as representatives for the human capital stock in the economy.

Based on this research gap, the research question that this research will attempt to answer is: “What is the effect of human capital on economic growth in Egypt?”. As for the hypothesis that this research will investigate, they are the following:

- H0: Investing on human capital leads to economic growth in Egypt.
- H1: Investing on human capital does not lead to economic growth in Egypt.

Answering this research question and hypothesis will benefit in highlighting the effect of education and health policies followed by the Egyptian government on the economic growth in Egypt. Thus, providing a picture of how successful the government public

expenditure on health and education and accordingly giving recommendations and suggestions for the necessary social policies and the needed forms of investments in Egypt in order to reach the aimed economic growth.

Data and Methodology

The macroeconomics model used to study the relationship between human capital and economic growth in this paper is Solow Growth Model, which is considered one of the most important contributions in the macroeconomic field, since it has become the standard model studying the economic growth in the countries as it provides more realistic assumption on production and it has enabled economists to describe the growth patterns in recent economies (Acemoglu, 2008; Cartier, 2011).

Solow-Swan Model is a nonlinear economic model that studies the economic growth in the long-run in neoclassical economics framework. It earned its name from two well-known economists who are Robert Bob Solow and Trevor Swan as it was first presented by them in two important researches which were published in year 1956. The model provides an inspirational contribution to the neoclassical theory of growth and later earned Robert Solow the Nobel Prize in economics. The model is described as simple because it focuses on one side among different countries which may differ from a country to another or may change during the time in one century. This side is the amount of physical capital that each employee works with and how capital used by each worker affects output (Acemoglu, 2008; Todaro & Smith, 2010; Weil, 2004).

The standard form of the neoclassical Solow growth model is the following:

$$Y(t) = K(t)^\alpha (A(t)L(t))^{1-\alpha}$$

Where Y (the output level) is function of K (the human & physical capital), L (the labor force) and A (the labor productivity based on the level of technology used, which increases in an exogenous rate). As for α , it is the elasticity of output with regards to capital; the percentage change in the gross domestic product caused by a 1% increase in human and physical capital, where ($0 < \alpha < 1$) (Todaro & Smith, 2010; *Mankiw et al.*, 1992; Solow, 1956; Swan, 1956).

However, economists have always considered human capital an essential factor for the growth of the countries. Accordingly, in 1992 an augmented version of Solow growth model was created by David Romer, David Weil and Mankiw. This augmented version is mainly about adding human capital to the growth model, it describes the reason behind the failure of global investment to occur in poor countries. In this augmented

model, output (Y) and marginal product of capital (MPK) are shown to be less in poor countries as poor countries were proved to have less human capital than rich countries (Mankiw et al., 1992).

The augmented Solow-Swan model which studies economic growth is the following:

$$Y(t) = K(t)^\alpha H(t)^\beta (A(t)L(t))^{1-\alpha-\beta}$$

In this model; Y (t) which is the economic growth in a certain time period is function of; H (t) denoting the human capital stock at the same time period, K (t) denoting the physical stock in the time period, L (t) is the labor force available in the market along the same time period, A (t) representing the labor productivity based on the technology used, α is the elasticity of output with regards to physical capital, and β is the elasticity of output with regards to human capital. In this model, A and L are expected to grow in an exogenous rate (Gundlach, 1995; *Mankiw et al.*, 1992).

In order to regress this model, the database used in this research is following the time series approach to apply the augmented form of Solow Growth model in Egypt covering the time period from 1970 to 2015. Those years are particularly chosen as it is the longest period of available data for Egypt which starts from year 1975 in most of the measures till the most current available data which is year 2015. The indexes for economic growth, physical capital and human capital education and health are retrieved from the World Bank. As for the Labor force data, it is observed from the Central Agency for Public Mobilization and Statistics (CAPMAS) labor annual reports since 1975 until 2015.

Concerning used the database; the GDP annual growth rate is the index measuring economic growth, the gross capital formation as a percentage of the GDP is the index used to measure the physical capital, the life expectancy at birth in years is the index representing human capital health, the gross school enrolment in primary and secondary school in form of ratio and the gross enrolment ratio in secondary school for both sexes in form of percentage are the indexes representing the human capital education, and finally the number of the people in the labor force from the total population is the index for the labor force.

As for studying the relationship micro-economically, Mincer Human Capital Earning Function is used. Mincer's human capital earnings function is named after the famous economist Jacob Mincer, a Poland economist who was born in the 1920s. Mincer gained his fame through creating the successful log-linear model in 1974 that describes the individuals earning lifecycle in the economy as a function of their level of education

and their experience in their current jobs. He first introduced the human capital earning function in his famous book (Schooling, experience and earnings). Jacob Mincer is considered the first economist to form an empirical model that explains the individuals' earnings lifecycle in the economy (Rosen, 1992; Polachek, 2008; Lemieux, 2006; Willis, 1986).

Jacob Mincer human capital earning function has become one of the most important models in the empirical economics as it has become the most commonly applied microeconomic model to study the income level empirically because of its accuracy and ability to describe the real variance of the wage levels received by individuals in the economy. The function earned its importance from its successful ability of interpreting the variance in earnings levels in thousands of studies that studied the relation in different historical time periods in different countries using different proxies, that's why the function is said to be "an almost universal reference" Rosen (1992) (Polachek, 2008; Lemieux, 2006; Willis, 1986; Rosen,1992).

The human capital earning function shows that individuals log earnings (earnings growth) is a function of the years of schooling the person receives and is a concave (quadratic) function of the individual's experience level. The standard form of the model is as following:

$$\ln y = \beta_0 + \beta_1 s + \beta_2 x + \beta_3 x^2 + u.$$

Where $\ln(y)$ is the log value of the wage received by the worker, B_0 is the constant value which represents the income received by worker with zero experience and zero education, S is the education level represented by the number of years of schooling received by the worker, X is the worker's experience in the labor market, X squared is the value of the potential experience squared, and u is the residual value (Polachek, 2008; Lemieux, 2006; Willis, 1986).

In the previous function; B_1 denotes the education coefficient which shows the returns to the schooling years of the individual. B_2 and B_3 denotes the experience coefficients which shows that there is a concave relation between the experience level and the level of earning received by the individuals as the coefficients of the quadratic experience values are positive (B_1) than negative (B_2) (Polachek, 2008; Lemieux, 2006; Willis, 1986).

The database used to estimate the human capital earning function in Egypt is collected from the Labor Force Surveys distributed by Economic Research Forum (ERF) in year 2014 in Egypt (all of the governorates are included). The number of the respondents to the survey is 353,350 individual. However, the number of effective responses is 44,394

responses as the other respondents didn't specify their monthly wage, which is the dependent variable that represents individuals' earnings in the human capital earning function.

In order to estimate the labor force earnings in Egypt, numerous independent variables are used in the model. Firstly, the total monthly wage received by the individual from their regular main job is used as an index for the individuals' earning level. Secondly, the number of effective years of schooling is used as a proxy for education. Additionally, 5 dummy variables are added to test the relationship between the last educational level attained by the individual and the level of earning, those dummy variables are: primary education level, secondary education level, post-secondary studies level, university level, post-graduate studies level. Thirdly, the tenure in the main job is used as a proxy for experience. Finally, in order to study the relationship between the human capital health and the level of earning, a dummy variable is added to the model which is health insurance ownership demonstrating the health status of the respondents.

Furthermore, In order to overcome the possible biases stated by Jäckle & Himmler (2010) and Cai (2009) in measuring the relationship between the wages received by individuals and the health status as one of the independent variables some techniques are followed: First, using Mincer's 1974 human capital earnings function overcomes the reverse relationship bias as the earnings in the function is represented by the log value of the wage which is the wage growth rate not the wage itself. In addition, the correlation between the variables will be tested for before the regression and will be fixed in case of any available correlation. Secondly, the sample used to study the individual earnings is a randomly distributed on the Egyptian population in all of the different governorates which overcomes the nonrandom sample selection bias. Thirdly, the chosen proxy to represent the health status of the individuals overcomes the unobserved heterogeneity in the health status measures as owning health insurance cannot be affected by other hidden factors like the inherited genes. Besides, choosing the health insurance ownership proxy overcomes the self-reporting bias, as people cannot have wrong or different understandings for the health insurance ownership question, it is a yes or no question which represents the ownership of something, so it doesn't support the self-reporting bias. Furthermore, several correction and testing procedures will be followed to test for auto-correlation, multi-collinearity and normality of the data, in addition to testing for heteroscedasticity among the errors. If any of the previously mentioned errors appeared to be available, it will be corrected.

Empirical Findings

The macroeconomic examination of the relationship between human capital and economic growth in Egypt using the augmented form of Solow Growth Model has found a highly significant positive relation between the economic growth and the gross capital formation in Egypt. This means that as physical capital increases it has a direct effect on the economic growth of the country. In addition, the model showed a significant but negative relation between the economic growth in Egypt and the education given to its human capital in contrast to what was expected. This means that the Egyptian education doesn't give the needed qualifications. This is why the education is not adding to Egypt's economic growth.

Additionally, human capital health showed a strong positive significant relation with the economic growth when regressed in Solow's model as expected before running the regression. But when it is tested alone with the GDP, it still had a positive relation but insignificant. This means that the health is an important factor that can affect the growth of the country but it needs to be improved and given more care by the government and the private investors in order to increase its significance and benefit.

Concerning the labor force, the results showed that the relation between the number of the people in the labor force in Egypt and the economic growth is negative and insignificant. This means that no more labor force is needed as the marginal productivity of labor is now in the diminishing phase.

This goes in line with the conclusion of El-Mattarawy & Semmler (2006) who studied the relation between educating the human capital and the economic growth in middle income countries; Egypt in specific. They found that the education is not showing the best result in the Egyptian growth as it is supposed to and this is because of the misdirecting policies that don't give chance to the country to benefit from its knowledgeable and creative people. Likewise, the study investigated the problems in the Egyptian education and concluded that it should be more efficient in order to have more capable labor force and achieve economic growth.

As for the microeconomic examination of the relation, Mincer Human Capital Earning Function have showed that there is a positive significant relation between the growth rates of earnings received by the workers in Egypt and their education. Looking at the education from the number of effective years of schooling received, the higher the number of years a worker goes to school, the higher the wage he/she will likely receive. While looking at the education from side of the highest attained level received, there are positive significant relations between the different levels of education received and the growth in the monthly wage of employees as well. Additionally, it is found that the highest the level of education attained, the highest the monthly wage received by

workers in Egypt. This goes along with the results of the research held by Nakamura in 2013 that studied returns to education along the different income levels in Japan since it found that the higher the educational level attained, the higher the returns to education (Nakamura, 2013).

As for the human capital health, it is found to have positive significant relation on the level of earning, as owning health insurance is affecting the growth in the workers' monthly wage positively. So the better the workers' health in Egypt, the more they will be able to work and produce, and accordingly the more wages they will possibly receive.

Finally, the relationship between the experience and growth of individuals' earnings in Egypt is found to be positive and significant. So the higher the individual has experience in his/her current job, the higher the wage he/she will receive. However, in the long run when the experience is doubles, the relation between the doubled experience and the earning level is negative significant relation. This shows that the relationship between the experience of the workers and their earnings is concave relation.

Discussion and Conclusion

In conclusion, the macroeconomic foundation model used to examine the relation in Egypt concluded an important direct relation between the owned stock of physical capital and investment on human capital health and the country's economic growth. However, it concluded a negative relation between investment on human capital education and the economic growth. This negative return to investment on schooling in the country is recommended to be due to the insufficient quality of the public education affordable by low and middle income people as it doesn't build well-educated workers and it doesn't offer the demanded skills in the market which decreases the returns to education and increases the income inequality in addition to the high rates of Egyptian labor force migration. Moreover, the model shows a negative relation between the labor force number in Egypt and the economic growth which stresses on the need to improve the quality of the labor force and the need for more physical capital to make use of the available stock of workers.

As for the microeconomic foundation model showed that the households education level and health status have a positive relation with the growth of their monthly wage, so the higher their education level and the healthier they are the more monthly wage they will probably receive. In addition, the relationship between the households' experience level and the growth in their monthly wage is found to be concave, which again highlights the importance of providing numerous occupations that suits all employee levels by

stimulating the investments in the country in order to make use of the available skilled workers.

Hence, both the microeconomic and macroeconomic perspectives of the relation have concluded that investing on the right paths of the needed human capital leads to economic growth in Egypt and have not rejected the null hypothesis of the research.

This shows that several policy implications and investments on human capital are needed to help the Egyptian government achieve the anticipated economic growth and enhance the country's economic welfare are recommended. Human capital is one of the most important and available resources in the Egyptian market and since it is found in this study that investing on the country's human capital can be the key to rapid economic growth in Egypt, the first recommended policy for the government is to work on delivering high quality education in the public schools and universities, in addition to teaching students the needed abilities and skills which are highly demanded in the labor market in order to graduate capable, qualified, eligible and skilled workers who can benefit their country and who are able to build up productive industries that can safely carry Egypt through the tough transformation from a consuming into a producing country.

This can be done through three strategies; the first strategy can be done through 3 steps, the first step is developing a criteria for the desired education system, the second step is creating a systemized program to improve the public schools, this program should contain a schedule with a long-term time plan that includes all the Egyptian public schools to make sure that all the public schools follow the set criteria, and the third step is building a strong monitoring system that is capable of assuring that the schools are working according to the criteria developed. The second strategy is providing workshops and trainings through the schools that teach the students the needed skills and abilities in the labor market. The third strategy is that the government should work on overcoming the educational inequality in Egypt, by providing good quality public education with low fees that insures educational equality across the different income levels in Egypt in addition to providing financial assistance programs to those who are willing and eligible for education but cannot afford it.

In addition, the second policy the government should consider is paying more attention to the Egyptian human capital health through providing superior and up-to-date medical services in the country's public hospitals with low charges as the right to be healthy and treated is the most simple and basic right to any citizen or human.

This can be achieved by applying different five strategies; First, buying the latest technologies in the public hospitals. Second, developing a strong monitoring system that monitors the sanitization of the public hospitals and the level of service they deliver. Third, subsidize the medicines, the expensive treatments and the complex operations

needed by the citizens. Fourth, providing a fair social insurance system that provides equal health care to the Egyptian citizens who cannot afford being healthy. And finally, subsidize, facilitate and support the research and development in the medical areas by the pharmaceutical companies in order to provide national treatments to the most common diseases in Egypt.

Furthermore, the third policy that the government should follow is to open new organizations and factories, expand the existing production, invest in new industries, encourage national investment, attract the foreign investment and motivate and invest in the innovative business ideas and the creative productive activities introduced by the well-educated, the innovative and the experienced Egyptian entrepreneurial minds in Egypt instead of exporting them to other countries.

This can be attained through two possible strategies; the first strategy is facilitating the national and foreign investment in Egypt through decreasing the taxes imposed on the foreign investments from abroad in order to attract foreign investors to invest in Egypt and exempting the national investors temporarily from taxes for the first ten to fifteen years in order to stimulate national investment and increase the national production which will accordingly enhance the productivity of the country. The second strategy is through making a public national competition where all Egyptian entrepreneurs with new ideas present their innovative businesses, then choose five to ten projects to fund yearly. Following these strategies can help providing suitable vacancies to workers in different levels and fields which can decrease the unemployment and the underemployment in the country, help making use of the country's labor force internally, increase the country's production and productivity and increase the Egyptian industries infrastructure.

As for the limitations of this research, there are three limitations. The first limitation is the unavailability of the historical macroeconomic labor force data in Egypt. The second limitation is that the used macroeconomic model in the research does not follow the augmented Solow growth model's coefficient restrictions since the model variables have been changed in order to be able to account for different aspects of human capital. The third limitation is that neither of the two models used to study the Egyptian economic growth takes into account the political conditions in Egypt throughout the studied time period and their possible impact on the Egyptian economy. That is why it is recommended that future research interested in studying the economic growth in Egypt should focus on the relationship between the political fluctuations in the Egyptian account and its effect on the country's economic growth using historical data covering the periods of the Egyptian wars and recent data covering the period preceding the Egyptian revolution in 2011.

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