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The Impact of Human Capital Underutilization on Productivity and Economic Growth in Egypt

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Abstract

This study estimates the effects of human capital underutilization on economic growth and productivity. This paper investigated the relationship between underutilization of human capital and economic growth using a variety of econometric tests like the Augmented Dickey Fuller test, the Johansen Integration test, and the ARDL model. The results indicate that, there is a negative relationship between human capital underutilization and economic growth. The results indicate that underutilization of human capital has a greater long-term impact on economic growth than it does in the short run. Reforms to education and training systems are required in order to maximise human capital utilisation and thus increase productivity and economic growth.

Keywords: Egypt, Human capital, Underutilization

1. Introduction

One of the most problems facing developing countries and hinder economic growth is the underutilization of human capital. Human capital underutilization indicates that resources are not being used efficiently. So, better utilization of human capital is considered as one of the most important targets of any country's economic plan. Several economic literatures assesses the validity of Okun's law, which indicates that there is a strong relationship between economic growth and unemployment. Okun's law proved that unemployment is inversely related to economic growth (IMF, 2012: 4).

However, avoiding unemployment is not sufficient; there are other types of labour underutilization. Human capital underutilization refers to the mismatch between labour supply and labour demand. Unemployment is commonly used as the only indicator of labour underutilization, but this only provides a partial picture of labour underutilization. There are other types of labour underutilization, such as time-related underemployment, which includes employees who want to work more hours or have worked less than a specified number of hours during a short reference period (ILO, 2018: 2). In addition, there is labour underutilization in qualitative terms, which means that workers are overqualified for the jobs they have. In addition to those outside the labour force who stop their job search or who are not immediately available but want a job in the future.

In many developing countries, a sizable proportion of the population is unemployed or working in jobs that do not allow them to fully utilise their skills to increase productivity. As a result, underutilization of human capital has an impact on productivity and economic growth (Steven Pennings, 2020: 3-4). Most studies concentrated on the relationship between unemployment and economic growth, ignoring other types of underutilization. As a result, in this study, we examine the relationship between different types of human capital underutilization and economic growth.

2. Literature Review

Several studies tried to examine the empirical relationship between economic growth (output) and unemployment. There are two points of views, first one found that economic growth has a significant negative impact on unemployment in Egypt (validity of Okun's law) as in (Khaliq s. petal, 2014). This study examines the relationship between unemployment and GDP growth in nine Arab countries [Algeria, Egypt, Tunisia, Sudan, Morocco, Lebanon, Palestine, Syria, and Jordan] using pooled EGLS over 16 years old (from 1994-2010).

The result of this study found that economic growth has a negative and significant impact on the unemployment rate, with a 1% increase in economic growth resulting in a 0.16 percent decrease in the unemployment rate. Hany Elshamy (2013) This paper examined Okun's coefficient in Egypt from 1970 to 2010 by using co-integration analysis to estimate Okun's coefficient in the long run and the error correction mechanism (ECM) in the short run. This study found that Okun's law in Egypt had a statistically significant coefficient with the expected sign in both the long and short run (World Bank, 2014). This study assesses the relationship between economic growth and unemployment in Egypt using quarterly data from 2003 q1 to 2013 q1. This study found significant negative correction between GDP growth rate and unemployment rate for all labours, but especially for women.

The relationship is no longer statistically significant when the sample is limited to men; however, the results show that a 1% increase in year-to-year GDP growth is associated with a 5.8 percent decrease in female unemployment.

On the other hand there are other studies that found the invalidity of Okun's law in the Egyptian economy like Moosa (2008), This paper investigated the validity of Okun's law in four Arab Countries (Egypt, Morocco, Algeria and Tunisia) for the period (1990 – 2005).

The study found that the Okun's coefficient is -0.011 in Algeria, 0.001 in Egypt, -0.00009 in Morocco, and 0.001 in Tunisia. As a result of the findings of this study, which indicate that unemployment and output are unrelated in the four countries. Also (Fouzia Mohamed et al, 2015), this study assessed the relationship between unemployment and growth rate in Egypt from 2006 Q1 to 2013 Q2 using the ADF unit root test, the standard Granger Causality test and the Johansen Co-integration test. The findings indicated that there was no co-integration relationship between output (GDP) and unemployment, which indicates that there is no long-term relationship between the economic growth and unemployment rate. From the above we noticed that previous studies concentrated on the relationship between economic growth and unemployment through examine the validity of Okun's law. But in this paper, we examine the relationship between different forms of human capital underutilization and economic growth.

3. Okun's law and its validity

3.1 Okun's law

Okun's law explains the relationship between output and unemployment. Shifts in aggregate demand, according to Okun's law, causing output to fluctuate around potential. These outputs causing firms to hire and fire employees, causing the employment rate to shift in the opposite direction. These connections can be expressed as

$$E_t - E_t^* = \gamma(y_t - y_t^*) + \phi_t, \gamma > 0 \quad (1)$$

$$U_t - U_t^* = \sigma(E_t - E_t^*) + \mu_t, \sigma > 0 \quad (2)$$

Where: -

E_t log of employment

y_t log of output

U_t unemployment rate

Then substitute (1) into (2)

$$U_t - U_t^* = \beta(y_t - y_t^*) + \varepsilon_t, \beta < 0 \quad (3)$$

Okun's law can be estimated in two ways.

First way:

To estimate the changes in unemployment based on the changes in log real GDP, where beta can be considered as a simple correction for changes in unemployment and output, do the following.

$$\Delta U_t = \alpha^d + \beta^d \Delta y_t + e_t^d \quad (4)$$

Second Way:

The output gap and model deviations from full employment (IMF,2012:3-4)

$$U_t = \alpha^g + \beta^g(y_t - y_t^*)$$

3.2 Validity of Okun's law in developed and developing countries:

Some studies, such as (Zidong An et al., 2017), (ILO, 2019), and (IMF, 2017), investigated the validity of Okun's law in developing countries and discovered that Okun's law is less valid in developing countries, particularly low-income countries, than in developed countries. There are some factors that can explain why developing countries have lower Okun's coefficient values than developed countries.

3.2.1 Economic structure: An important factor in determining the validity of Okun's law is economic structure. The inverse relationship between economic growth and unemployment is more pronounced in the service sector. Large movements in employment would be observed in the service sector or a service-oriented economy. While economies that rely largely on agriculture and have a higher rate of self-employment would see more price adjustment than employment growth (ILO, 2019: 32).

3.2.2 Informal sector: The size of the informal sector is another variable that could influence how labour markets respond to economic growth. The magnitude of Okun's coefficient decreases as the share of informal employment increases (Zidong An, 2017:18).

3.2.3 Labor market flexibility: Countries with more flexible labour markets are more likely to have more responsive labour markets (An, Zidong, 2017). Increased business regulation slows the hiring and firing process, reducing the labour market's responsiveness to fluctuations in output. As a result, higher levels of business regulation are associated with weaker labor market responses (IMF, 2017:22).

4. Measurements of Human Capital

4.1 Human Capital Index (HCI)

The HCI is intended to assess how current health conditions and education outcomes influence the next generation's labour productivity.

4.1.1 Components of Human Capital Index

- 1) Survival till school age, which measured by under 5 years mortality rates.
 - 2) Expected years of schooling adjusted by measurements for the quantity and quality of education.
- **The quantity of education** Based on the current pattern of enrollment rates across grades, the number of school years a child can expect to end by the age of 18 is measured.
 - **The quality of education** is measured according to the World Bank's efforts to harmonize test scores for the major international student accomplishment testing programs.

The adjusted years of schooling (LAYS)

$$LAYS_c = S_c \times R_c^n$$

Where: -

S_c : a measure of the average number of years of schooling obtained by a relevant cohort of country C's population

R_c^n : Learning assessment using a numeraire for a relevant cohort of students in Country c (or benchmark)

$$LAYS_c = EYS_c \times \frac{HTS}{625}$$

- 3) Health: measured by two indicators; Adult survival rates (represent by 15 years old who survive for age 60 and the stunting rate of children under 5 years

4.1.2 Aggregation methodology of HCI

The HCI components are combined into a single index after they have been converted into productivity contributions relative to a guidelines of complete education and complete health

$$HCI = \text{Survival} \times \text{School} \times \text{Health}$$

$$\text{Survival} = \frac{1 - \text{under 5 mortality rate}}{1}$$

$$\text{School} = e^{\theta} (\text{expected years of school} \times \frac{\text{Harmonized test score}}{625} - 14)$$

$$\text{Health} = e^{(\gamma_{ASR} \times (\text{Adult survival rate} - 1) + \gamma_{stunting} \times (\text{not stunded rate} - 1))/2}$$

The resulting index has a value between 0 and 1. So, a score of 0.70 indicates that a child born today's productivity as a future worker is 30% lower than what could have been accomplished by complete education and total health. (world Bank,2020:2-6)

4.2 The utilization adjusts Human Capital Index (UHCI)

The HCI (Human Capital Index) indicates the amount of human capital that a child can be expected to accumulate by the age of 18, taken into consideration the risks of poor health and education in his country. As a result, it assesses how changes in health and education affect the next generation of workers' productivity. HCI assumes that when today's child grows up and becomes a future worker, he will be able to find work. which may

not be correct, particularly in developing countries. In many developing countries, a sizable proportion of the population is unemployed or working in jobs that do not allow them to fully utilise their skills. Human capital underutilization is a problem in developing countries (World Bank, 2020: 109). The utilization adjusted human capital index (UHCI) correct the HCI labour market underutilization of human capital according to the proportion of the working-age population employed or in jobs where their skills and abilities can be better used to increase productivity. So, The UHCIs are intended to supplement the HCI.

$$\text{UHCI (basic or full)} = \text{utilization rate (basic or full)} \times \text{HCI}$$

- **Basic UHCI** : Captures the income gains from employing all potential [unemployed] workers.
- **Full UHCI**: Gains from increased employment rates + Gains from relocating workers to locations where they can better utilization of their human capital to increase productivity [better employment].

$$\text{Utilization (basic measure)} = \frac{\text{Employment}}{\text{Working Age population}}$$

$$\text{Utilization (Full measure)} = \text{BER} \times 1 + (1 - \text{BER}) \times \frac{\text{minimum HCI}}{\text{HCI}}$$

BER (Better employment rate)

$$= \frac{\text{non agriculture wage employees} + \text{employers}}{\text{population working age}}$$

Better employment rate: as the proportion of the working-age population in better employment

UHCI (full measure)

$$= \text{BER} \times \text{HCI} + (1 - \text{BER}) \times (\text{minimum HCI})$$

The world bank examined utilization measures for more than 160 countries and found that GDP per Capital will be $\frac{1}{\text{UHCI}}$ higher in a world of full utilization total health and complete education (Steven Pennings, 2020: 3-4).

5. Human capital underutilization in Egypt

5.1 Human Capital in Egypt

Between 2010 to 202, the HCI value for Egypt increased from 0.48 to 0.49.

Table 1: HCI in Egypt 2020

	Boys	Girls	Overall
HCI	0.48	0.51	0.49
Survival to Age	0.98	0.98	0.98
Expected years of school	11.4	11.6	11.5
Harmonized test scores	344	368	356
Learning adjust years of school	6.3	6.8	6.5
Adult survival rate	0.82	0.90	0.86
Not stunted rate	0.76	0.79	0.78
HCI Ratio (Richest/ poorest 20 percent)			1.27

Source: World Bank Database

The value 0.49 indicates that a child born in Egypt today will be only 49% as productive when he reaches the age of 18 as he could be if he received a good education and was in full health.

5.2 Problems Facing human capital in Egypt

5.2.1 Unemployment in Egypt

Table 2: unemployment in Egypt (2004 – 2019) unit 000

Indicator	2004	2009	2014	2019
Labor Force				
Total	20871	25353	27944	28348
Males	15879	19410	21315	23255
Females	4992	5943	6629	2093
Employed				
Total	18718	22975	24299	26123
Males	14937	18397	19264	22133
Females	3781	4578	5035	3990
Unemployed				
Total	2154	2378	3646	2226
Males	934	1013	2052	1122
Females	1211	1365	1594	1103
Unemployment rate (%)				
Total	10.3	9.4	13	7.9
Males	5.9	5.2	9.6	4.8
Females	24.3	23.0	24.0	21.7

Source: CAMPAS

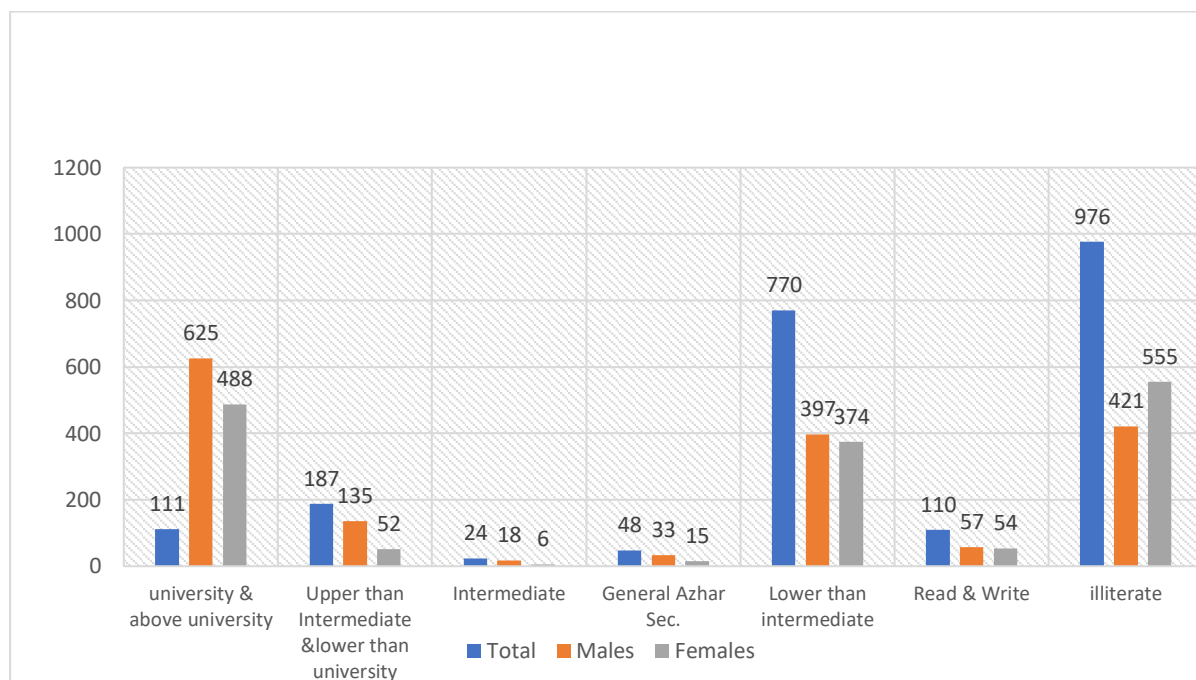


Figure 1: Distribution of unemployed by Educational status & sex in Egypt 2019

Source: CAMPAS

From above, we found that:

- In Egypt, unemployed rate increased from 10.3% in 2004 to 13% in 2014 and then decreased to 7.9 in 2019.
- The majority of unemployed people are young people aged 15 to 29, who are new entrants to the labour

market and are looking for work for the first time.

- Female unemployment is approximately five times that of male unemployment. The unemployment rate in 2019 was 7.9 percent [4.8 percent for men and 21.7 percent for women].
- The main problem facing Egypt's labour market is a mismatch between the educational system and the labour market. This is reflected in the relatively high unemployment rates among graduates of higher education.
- In 2019, the unemployment rate for those with a bachelor's degree or higher was 16.7 percent [10.5 percent for males and 29.9 percent for females], while it was 2.2 percent (15 percent for males and 5.2 percent for females) among illiterates.
- For the distribution of employment by economic activity, we observed that construction had the highest percentage increase in employment, reaching 26.8 percent in 2019. While employment in the agriculture sector fell by 2.8 percent. In 2019, the sector employed 23.2 percent of the workforce.
- About the geographic distribution of unemployment. There are significant disparities between urban and rural areas, with urban areas accounting for a greater proportion of unemployed people than rural areas.
- The most governorates have high unemployment rate in 2019 was: Damietta 21.1%, North Sinai 15.6% Red sea 14.8% and port said 12.7%. While the governorates that has low unemployment, rate was fayom 3.5%, Menia 4.6%, Qena 4.8%, Suhag 5.1% and Beniseuf 5.2%.

5.2.2 Underutilization in Egypt

- The unemployment rate focuses on a very specific population (the unemployed) while ignoring those who are employed or are not in the labour force.
- The unemployment rate is only one component of labour underutilization; there is also unused labour supply among those who are employed (but would like to work more hours than they do) and those who are not employed (Having given up on the job search or not being immediately available but desiring a job in the future). There is also qualitative labour underutilization caused by a skills mismatch, in which employees are overqualified for the jobs they have.

Other than the unemployment rate, we have more indicators to measure underutilization.

$$LU2 = \frac{\text{unemployd} + \text{Time Related underemployment}}{\text{labor force}}$$

People in Time Related Underemployment can defined as all employees who wanted to work more hours during a short reference period, whose total Working hours was less than a specified number of hours , and who were willing to work more hours if given the opportunity.

$$LU3 = \frac{\text{unemployd} + \text{potential labor force}}{\text{labor force} + \text{potential labor force}}$$

The potential labour force consists of two categories first people of working age who are actively looking for work, who were not available to start work immediately but will be available soon, second, who were not actively looking for work but wanted to work and were available soon (available potential jobseekers) (ILO,2020:6).

LU4

$$= \frac{\text{unemployd} + \text{potential labor force} + \text{time related underemployment}}{\text{labor force} + \text{potential labor force}}$$

Table 3: Underutilization in Egypt (2010 – 2019)

Year	LU2	LU3	LU4
2010	10.2	17.5	18.7
2011	13.4	21	22.4
2012	14.2	21.7	23.2

2013	14.9	22.3	23.8
2014	14.8	22.2	23.8
2015	14.7	22.4	23.9
2016	14.1	21.7	23.2
2017	13.4	21.2	22.7
2018	10.9	19.2	20.2
2019	10.8	19.1	20.1

Source: ILO Stat.

- For LU2, we found that the youth labor underutilization (15 – 24) LU2 was high 32.1% in 2019. It increased between 2010 and 2019 (From 29.4 to 32.1 percent). Youth labour underutilization was particularly high among young women. In 2019, female labour underutilization LU2 was 54.5 percent. Despite the fact that it was 25.1 percent among males.
- In 2019, youth labour underutilization (15–25) was 45 percent for LU3. It grew between 2010 and 2019. (40.3 to 45 percent)..Female youth labour underutilization (LU3) was more than double that of males.
- In 2019, females had a LU2 of 75.3 percent, while males had a LU2 of 29.9 percent. We also discovered that the LU3 rate was low in the high age group (+25), with 10.3 percent in 2010 and 14 percent in 2019.
- The composite rate of labour underutilization in LU4 increased from 18.7 percent in 2010 to 20.1 percent in 2019. In terms of geographical distribution disparities in labour underutilization, the rate in urban areas is higher than in rural areas. 39.7 percent live in cities, while 23.7 percent live in rural areas.In 2019, the youth labour underutilization rate (15–24) LU4was 49.2 percent [75.9 percent for females and 35.8 percent for males].
- LU4 for females was 41.4 percent in 2019 [49.2 percent in urban & 33.9 percent in rural] and increased to 75.9 percent for youth females [79.4 percent in urban & 72 percent in rural] and decreased to 31.4 percent for 25+ females [39.7 percent in urban & 23.7 percent in rural].

5.3 The Impacts of covid 19 on Human capital in Egypt

In 2020, 8.8 % of total working hours all over the world were lost compared to the fourth quarter of 2019. This translates into 225 million full-time positions. In 2020, working-hour losses will be roughly four times higher than they were in 2009, during the global financial crisis. Global employment fell by 114 million jobs in 2020 compared to 2019. In relative terms, women lost more jobs (5%) than men, and young workers (8.7%) lost more jobs than older workers. Total labour income all over the world is expected to fall by 8.3 percent in 2020, amounting to US\$ 3.7 trillion, or 4.4 percent of total GDP (ILO stat).

Table 4: The impact of covid 19 on employment in Egypt

	Second quarter 2019	Second quarter 2020	change
Employment rate (%)	38.8	35.1	↓
Number of unemployed (000)	2094	2574	↑
Labor force (000)	28069	26689	↓
Unemployment rate	7.5	9.6	↑
Males	4.2	8.5	↑
Females	22.3	16.2	↓

Source: CAMPAS

The employment rate fell from 38.8 percent in the second quarter of 2019 to 35.1 percent in the second quarter of 2020. As a result of the crisis, the unemployment rate increased to 9.6 % in the second quarter of 2020. Unemployment rates by gender, we can see that the gender disparity in the unemployed has downsized from five

to one. This could be attributed to a high proportion of female participation in essential services such as education and health care.

According to ILO estimates, working hours lost in Egypt as a result of the Covid 19 crisis will be 9.5 percent in 2020. (total weekly hours worked of employed decreased from 1222641.3 in 2019 to 1126411.2 in 2020). In terms of full-time jobs, the loss is 2972 thousand jobs based on 40 hours per week and 2476.7 thousands jobs based on 48 hours per week (ILO estimate stat).

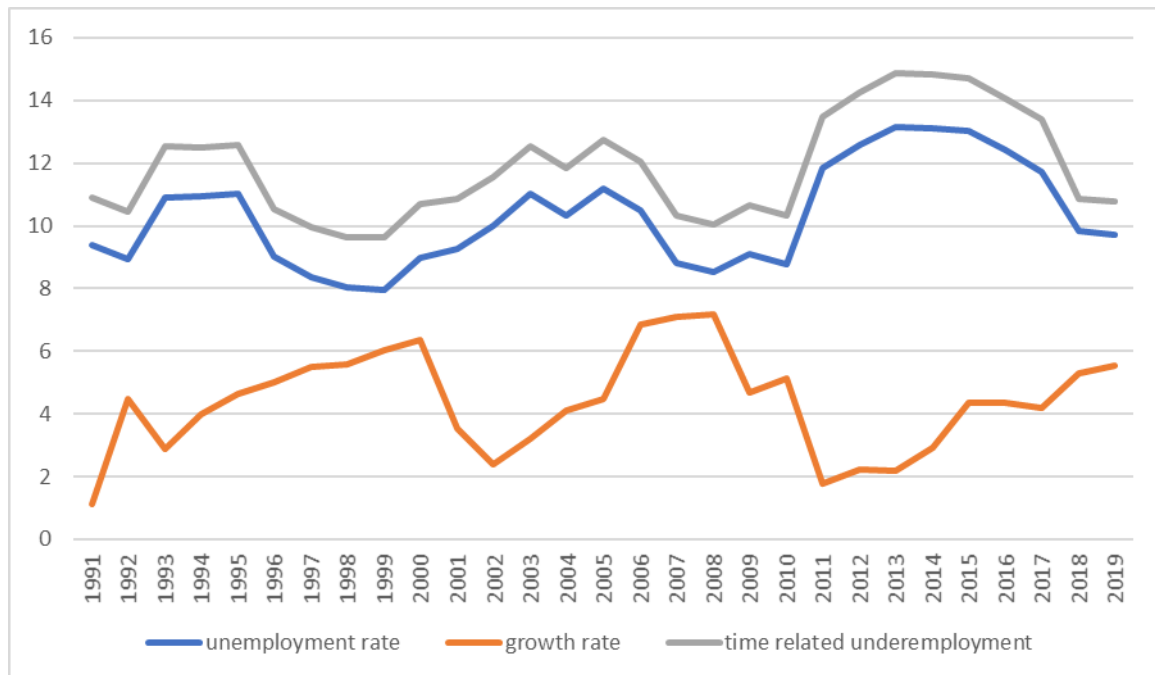


Figure 2: Relationship between underutilization and Economic growth in Egypt (1991-2019)

Source: CAMPAS & world bank database

It should be noted that The rate of real economic growth fluctuates a lot. between 1991 and 2011. This can be due to local and global economic and political changes. The annual rate of economic growth has risen from 1.13 percent in 1991 to 5.56 percent in 2019. The global financial crisis has had a negative impact on the Egyptian economy, causing the GDP growth rate to fall from 7.16 percent in 2008 to 4.67 percent in 2009. This was offset by an increase in the unemployment rate, which rose from 8.52 percent in 2008 to 9.09 percent in 2009. In 2011, Political instability in Egypt resulted in a significant decrease in GDP growth rate in 2011, from 5.15 percent in 2010 to 1.76 percent However, this was offset by an increase in the unemployment rate from 8.76 percent in 2010 to 11.85 percent in 2011.

6. Estimate the relationship between underutilization of human capital and economic growth in Egypt

6.1 Augmented Dickey fuller & Johansen Integration Tests

The aim of this study is to see if there is a link between underutilization of human capital, productivity, and economic growth in Egypt using a diverse range of econometric tests like the Augmented Dickey Fuller test, the Johansen Integration test, and the ARDL model. The first step is to determine if time series are stationary or non-stationary. There are several tests, one of the most important and widely used being the Augmented Dickey Fuller test (ADF)

Table 5: Results of Augmented Dickey Fuller Test

Variable	Level			First Difference		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-3.56	-3.5	-0.36	-6.1	-5.97	-6.27

	(0.014)**	(0.05)*	(0.54)	(0.000)***	(0.000)***	(0.000)***
UR	-2.82 (0.07)*	-4.54 (0.06)*	-0.2 (0.6)	-4.3 (0.002)***	-4.3 (0.017)**	-4.4 (0.000)***
EAG	-1.046 (0.72)	-1.6 (0.76)	-1.79 (0.07)*	-5.04 (0.004)***	-4.95 (0.002)***	-4.7 (0.000)***
LP	2.4 (0.9)	0.26 (0.9)	6.6 (1.00)	-4.3 (0.002)***	-5.1 (0.001)***	-2.2 (0.02)**
TU	-2.8 (0.05)*	-4.3 (0.01)**	-0.26 (0.5)	-4.37 (0.00)***	-4.37 (0.00)***	-4.46 (0.00)***

From Table (5) we can say that with using 5% significance level GDP stationary at level while all other variables are stationary at first difference.

Table 6: Johansen Integration Test (Trace Eigenvalue Statistic)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.791176	97.84039	60.06141	0.0000
At most 1 *	0.697726	57.11755	40.17493	0.0005
At most 2 *	0.563983	26.01061	24.27596	0.0299
At most 3	0.144330	4.428674	12.32090	0.6489
At most 4	0.014359	0.376053	4.129906	0.6028

Table (7): Johansen Integration Test (Maximum Eigenvalue Test)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.791176	40.72284	30.43961	0.0019
At most 1 *	0.697726	31.10693	24.15921	0.0049
At most 2 *	0.563983	21.58194	17.79730	0.0128
At most 3	0.144330	4.052622	11.22480	0.6200
At most 4	0.014359	0.376053	4.129906	0.6028

Tables (6) and (7) show the results of the Johansen Method for the Trace and Maximum Eigenvalue tests indicate that at the 0.05 level of significance there is three cointegrating egn(s). Thus, these findings confirm the presence of a long term relationship between those variables.

6.2 ARDL model

Because some variables are stationary in level and others are stationary in first difference. Then, we can utilize ARDL model

6.2.1 First: the impacts of underutilization of human capital on economic growth.

Table 8: ARDL model estimates for GDP

Variable	Coefficient	t-Statistic	Prob.*
GDP(-1)	0.782138	2.359929	0.0361
GDP(-2)	-0.298271	-1.113961	0.2871
EAG	-0.024542	-0.224048	0.8265
EAG(-1)	-0.118102	-1.236348	0.2400

EAG(-2)	0.138269	1.857163	0.0880
LP	0.260306	0.125817	0.9020
LP(-2)	6.391586	2.521801	0.0268
TU	-0.686881	-0.437029	0.6699
UR	-0.197042	-0.109118	0.9149
UR(-2)	-0.922091	-2.453603	0.0304
C	3.989925	1.096089	0.2946
R-squared	0.874776		
Adjusted R-squared	0.739117		
S.E. of regression	0.777159		
Sum squared resid	7.247706		
Log likelihood	-20.28605		
F-statistic	6.448350		
Prob(F-statistic)	0.001368		

ARDL estimates indicate that GDP is significantly positively affected by the second lag of employment in agriculture sector, the first and second lag of labor productivity. Unemployment rate. Table (8) indicates that if over the long run, if Unemployment decrease by 1% GDP will significantly increase with 0.92%. Also, if time related unemployment decrease by 1% GDP will increase with 0.68%. in addition, if employment in agriculture decrease by 1% and labor go for industry or service sector will increase GDP by 0.12% (but this insignificant)

Table 9: ECM Regression for GDP

Variable	Coefficient	t-Statistic	Prob.	
D(GDP(-1))	0.298271	1.776834	0.1009	
D(EAG)	-0.024542	-0.358053	0.7265	
D(EAG(-1))	-0.138269	-2.459604	0.0301	
D(LP)	0.260306	0.254906	0.8031	
D(LP(-1))	-6.391586	-5.919368	0.0001	
D(UR)	-0.197042	-0.826421	0.4247	
D(UR(-1))	0.326771	1.742643	0.1069	
D(UR(-2))	-0.595320	-3.248634	0.0070	
CointEq(-1)*	-0.516134	-4.490898	0.0007	
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	2.372726	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The short run relationship shows that the relation is stable as the cointegration components equal to -0.516 then it is negative less than one and significant. The changes in GDP in significantly affected by changes in employment in agriculture sector, labor productivity and the second lag of unemployment rate. Moreover, F-Bound Test indicates that there is a level relationship at I(0) with significant level 10%. Table (9) indicates that if over the short run, if Unemployment decrease by 1% GDP will significantly increase with 0.595%. However, there is no significant effect for time related unemployment on GDP.

6.2.2 Second: the Impacts of underutilization of human capital on labor productivity

Table 10: ARDL model estimates for Labor productivity

Variable	Coefficient	t-Statistic	Prob.*
LP(-1)	0.158003	0.630628	0.5412
LP(-2)	1.022879	3.000812	0.0121
LP(-3)	-0.294420	-1.325583	0.2118
GDP	0.016320	0.558278	0.5878
GDP(-1)	0.117437	2.916714	0.0140
GDP(-2)	-0.002117	-0.059309	0.9538
GDP(-3)	0.050245	2.232124	0.0473
EAG	-0.036966	-3.796562	0.0030
EAG(-1)	0.012768	1.151896	0.2738
TU	-0.326034	-1.747973	0.1083
TU(-1)	0.030165	0.624520	0.5450
TU(-2)	-0.077871	-1.437482	0.1784
TU(-3)	0.130687	3.455189	0.0054
UR	0.472541	2.330039	0.0399
C	-0.811832	-1.617349	0.1341
R-squared	0.997950		
Adjusted R-squared	0.995341		
S.E. of regression	0.090222		
Sum squared resid	0.089540		
Log likelihood	36.83281		
F-statistic	382.4572		
Prob(F-statistic)	0.000000		

ARDL estimates show that labor productivity is significantly affected by, GDP, unemployment, and Time related unemployment. In long run , if unemployment decrease by 1% labor productivity will increase by 0.47%. also, if time related unemployment decrease by 1% labor productivity will increase by 0.078%

Table11: ECM Regression for Labor productivity

ECM Regression			
Case 2: Restricted Constant and No Trend			
Variable	Coefficient	t-Statistic	Prob.
D(LP(-1))	-0.728459	-4.173310	0.0016
D(LP(-2))	0.294420	2.104478	0.0591
D(GDP)	0.016320	0.966532	0.3545
D(GDP(-1))	-0.048129	-1.703738	0.1165
D(GDP(-2))	-0.050245	-3.246332	0.0078
D(EAG)	-0.036966	-4.966141	0.0004
D(TU)	-0.326034	-5.308559	0.0002
D(TU(-1))	-0.052816	-2.174709	0.0523
D(TU(-2))	-0.130687	-5.092222	0.0003
CointEq(-1)*	-0.113538	-7.389199	0.0000

* p-value incompatible with t-Bounds distribution.

F-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.256280	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The short run relationship shows that the relation is stable as the cointegration components equal to -0.11 then it is negative less than one and significant. The changes in labor productivity is significantly affected by changes in its lag, changes in GDP, changes in agriculture sector, time related unemployment.

7. Conclusion

This paper examines the effects of human capital underutilization on economic growth and productivity. The study relies on annual data from 1991 to 2019. According to the findings, there is a negative relationship between human capital underutilization and economic growth. In the short run, if unemployment falls by 1%, GDP rises by 0.595 percent, but in the long run, other forms of underutilization (such as time-related unemployment) will have an impact on economic growth.

As a result, the long-run effects of underutilization of human capital on economic growth exceed the short-run effects. People and their abilities are viewed as an important means and instrument for achieving economic, social, and political goals. As a result, better utilisation of human capital is regarded as one of the most important goals of any country's economic policy. The main challenge facing utilization of human capital in Egypt is the weak link between education outputs and labor markets needs. As a result, adequate and convenient education and training are required. In addition to some labour market flexibility in order to increase employment, which increases productivity and economic growth.

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