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Gender, Education Levels and Economic Growth in the Middle East

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Abstract

This study primarily aims to examine the effect of three education levels namely primary, secondary and tertiary on economic growth in the Middle East countries. Furthermore, the education levels disaggregate by gender to examine their influences on the countries' economic growth. Accordingly, the study employs the static panel data models namely pooled ordinary least squares model, random effects model, and fixed effects model on ten Middle East countries, for the years 1996 to 2018. Based on the findings, secondary and tertiary education both have significant and positive influence on the economic growth. Analysis by gender reveals that the female education levels are highly positively related to the economic growth compared to the male education levels. The result is in tandem with the policies by the governments towards the enhancement of the involvement of women in the economy by the intensification of the participation of females in the labor force. These findings confirm that governments need to encourage education enrollment rates for both males and females to achieve economic growth. Briefly, the most important policy recommendation to the government is to position human capital development at the center of its development strategy.

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ملخص

تهدف هذه الورقة في المقام الأول إلى دراسة تأثير ثلاثة مستويات تعليمية، أي الابتدائي والثانوي والعالي على النمو الاقتصادي في دول الشرق الأوسط، بالإضافة إلى تصنيف مستويات التعليم حسب النوع الاجتماعي لدراسة تأثيرها على النمو الاقتصادي للبلدان. وبناء على ذلك، استخدمت الورقة نماذج بيانات اللوحة الثابتة وهي نموذج المربعات الصغرى العادية المجمعة، ونموذج التأثيرات العشوائية، ونموذج التأثيرات الثابتة في عشر دول من الشرق الأوسط، للأعوام من 1996 إلى 2018.واستنادا إلى النتائج، فإن لدى التعليم الثانوي والعالي تأثيرا كبيرا وإيجابيا على النمو الاقتصادي. ويكشف التحليل حسب النوع الاجتماعي أن مستويات تعليم الإناث مرتبطة بشكل إيجابي للغاية بالنمو الاقتصادي بالمقارنة مع مستويات تعليم الذكور. والنتيجة تتماشى مع سياسات الحكومات الهادفة إلى تعزيز مشاركة المرأة في الاقتصاد من خلال تكثيف مشاركة الإناث في القوى العاملة. وتؤكد هذه النتائج أن الحكومات بحاجة إلى تشجيع معدلات الالتحاق بالتعليم لكل من الذكور والإناث لتحقيق النمو الاقتصادي. وباختصار، تتمثل أهم توصية سياسية للحكومات في وضع تنمية رأس المال البشري في قلب إستراتيجيتها التنموية.

ABSTRAITE

Cette étude vise principalement à examiner l'effet de trois niveaux d'éducation, à savoir le primaire, le secondaire et le tertiaire, sur la croissance économique des pays du Moyen-Orient. En outre, les niveaux d'éducation sont ventilés par sexe afin d'examiner leurs influences sur la croissance économique des pays. En conséquence, l'étude utilise les modèles de données de panel statiques, à savoir le modèle des moindres carrés ordinaires regroupés, le modèle à effets aléatoires et le modèle à effets fixes sur dix pays du Moyen-Orient, pour les années 1996 à 2018. D'après les résultats, l'enseignement secondaire et l'enseignement supérieur ont tous les deux une influence significative et positive sur la croissance économique. L'analyse par sexe révèle que les niveaux d'éducation des femmes sont fortement liés à la croissance économique par rapport aux niveaux d'éducation des hommes. Ce résultat va de pair avec les politiques des gouvernements visant à améliorer l'implication des femmes dans l'économie par l'intensification de la participation des femmes à la population active. Ces résultats confirment que les gouvernements doivent encourager les taux de scolarisation des hommes et des femmes pour atteindre la croissance économique. En bref, la recommandation politique la plus importante pour le gouvernement est de placer le développement du capital humain au centre de sa stratégie de développement.

Keywords: Gender, Education levels, Economic growth, Middle East, Panel data.

JEL Classification: C33, I21, I25, O1, O4

1 Introduction

The attention of economists began to focus on human capital since the 1960s (Schultz 1961, Becker 1964, Bowman 1966, Denison 1967). Schultz (1961) reported that the growth in human capital led to a great increase in American per capita income in the early decades of the 20th century. In the late 1960s, Denison (1967) revealed that two-thirds of growth is due to advances in educational attainment and knowledge in the economies of the United States and Western Europe.

The fast growth in East Asia economies has led to considerable attention on human capital and education. Economies, such as Singapore, Korea, Taiwan, and Hong Kong, have attained unmatched economic growth rates while making great investments in education. Education can contribute to economic growth through its impact on research expansion, enhancing knowledge, skills, technological progress, and productivity (Romer 1989). Moreover, many studies have confirmed the importance of education in boosting human capital, which can be considered by many as the future necessary condition for development (Benhabib and Spiegel 1994, Stevens and Weale 2004). Wolff and Gittleman (1993) noted that education in developing countries is one of the leading sectors for investment to boost economic growth and sustain poverty alleviation. Accordingly, investment in education is vital to produce a high quality and productive workforce that contributes towards economic growth.

The present study is unique in that it minimizes the gap in literature among studies dedicated to examining the effects of male and female education on economic growth in the Middle East countries. Most studies are done at the aggregate levels of education without much consideration of the relative effects of male and female education. Therefore, it will be interesting to examine the influence of male and female education on economic growth as well as to see whether males or females will significantly contribute to the growth. This study may be helpful for the policymakers in the Middle East countries to realign their budget strategy towards education for better educational attainment in an attempt to attain higher levels of economic growth. The study also contributes to relevant literature, pertaining to Middle East countries.

Therefore, the objective of this article is to investigate the impact of three main education levels –primary, secondary, and tertiary – on economic growth. This study also focuses on the investigation of the effects of male and female

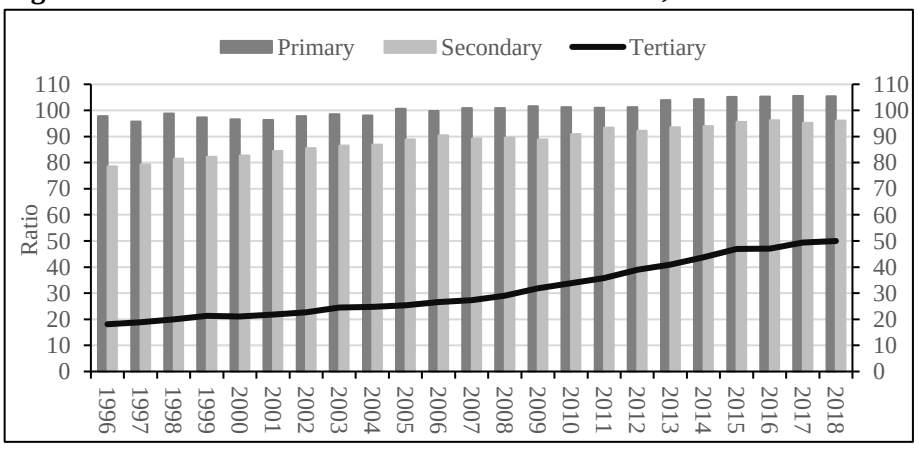
education on the Middle East countries' economic growth. The structure of the study is determined as follows. The next section presents overview of gross enrollment ratio. Section 3 reviews the extant literature. Model specifications, estimation approach, variables, with sources of data provided in Section 4, and the results presented in Section 5, while the last section presents the conclusions.

2 Overview of gross enrollment ratio

The UNESCO definition of the gross enrollment ratio is described as the number of enrolled students in a specific education level, notwithstanding the age, over the age group population corresponding to the education level. In some cases, the enrollment ratio can exceed 100%, which means that it includes the enrollment of those students whose ages do not match suitable levels.

Under this section, the gross enrollment ratio evolution is analyzed in the education levels examined. Such ratio is depicted in Figure 1 in the context of the Middle East for years spanning from 1996 to 2018. Overall, the gross enrollment ratio for all levels of education has increased over the years. A small disparity is displayed by the figure between the primary and secondary enrollment ratio. Meanwhile, there is a significant disparity between the secondary and tertiary enrollment ratio. The difference has remained fairly constant during the period. This indicates that tertiary education is substantially lagging behind other education levels in the Middle East countries.

Figure 1: Gross enrollment ratio for education levels, 1996-2018

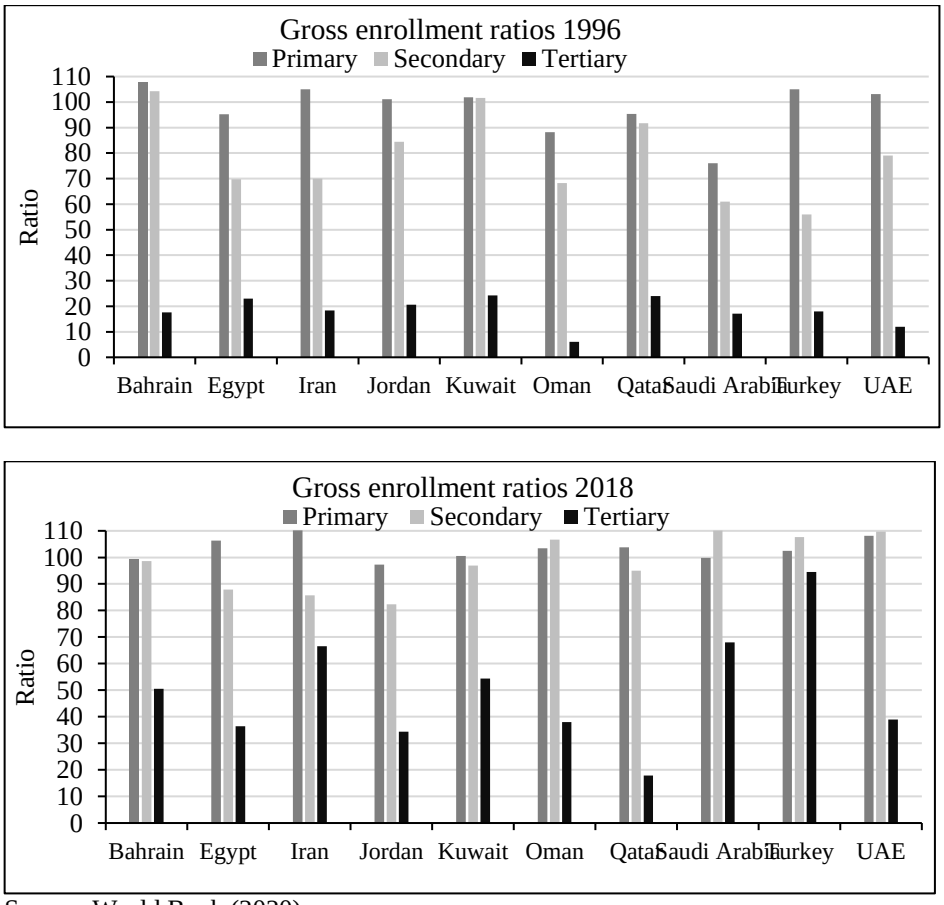


Source: World Bank (2020).

Figure 2 presents gross enrollment ratio by country. In the primary level, the gross enrollment ratio in the Middle East states raised by 7.70% from 1996 to

2018. This performance, however, hides disparities between countries (Figure 2). For some countries, the primary enrollment ratio rose more than the average. This is essentially the case for Saudi Arabia, Oman, Egypt, and Qatar, where the primary enrollment ratio increased by 76% to 100%, from 88% to 103%, from 95% to 106%, and 95% to 104% respectively. Other countries saw their enrollment ratio rise less than the average. For example, in the United Arab Emirates, the ratio rose from 103% in 1996 to 108% in 2018. The enrollment ratio of Iran increased from 105% to 110% during the same period. Meanwhile, other countries – Bahrain, Jordan, Kuwait, and Turkey – saw their enrollment ratio decrease during the period 1996-2018.

Figure 2: Gross enrollment ratios for education levels by country, 1996 and 2018



Source: World Bank (2020).

With regard to secondary education, the gross enrollment ratio in the Middle East states raised by 22.33% from 1996 to 2018. The performance of each country was different. The four countries that recorded the lowest ratio of enrollment in secondary education in 1996 were Turkey with 56% of the gross enrollment ratio, Saudi Arabia with 61%, Oman with 68%, and Egypt with 69%. In 2018, the enrollment ratio for secondary education was highest in Saudi Arabia with 110%, followed by UAE and Turkey with 109% and 107%, respectively. For tertiary education, the gross enrollment ratio in the Middle East countries rose by 176% between 1996 and 2018. When analyzing the enrollment ratio for tertiary education, Kuwait and Qatar were the only countries whose enrollment ratio reached 24% in 1996. By 2018, the situation had greatly improved. However, the improvement is still considered to be insufficient, especially in some countries like Qatar, Jordan, and Egypt. The countries with the largest enrollment ratio were Turkey, Saudi Arabia, and Iran with, respectively, 95%, 68%, and 67% (Figure 2).

3 Literature Review

Prior literature dedicated to the influence of education levels on economic growth showed mixed outcomes. To begin with cross-sectional studies, Murphy et al. (1991) showed that primary education positively influenced growth in 91 countries from1970 to 1985. In a study done by Barro (1996) in around 100 countries during 1960 to 1990, it was shown that primary education was an important factor to promote the growth rate. Panel data have become common due to the complete and available data. Agiomirgianakis et al. (2002) used panel data, which included 93 nations from1960 to 1987. Based on their findings, education levels expansion resulted in higher growth of the economy, indicating that governments need to boost higher education expansion for greater development in their economies.

For secondary education, Benos and Karagiannis (2010) revealed the significant influence of secondary education on growth in 51 Greek regions for 1981 to 2003. A similar result showing a robust correlation between economic growth and human capital that was proxy by the secondary enrollment ratio was also found in 79 nations between1960and2001 (Suri et al. 2011). For tertiary education, Gyimah-Brempong et al. (2006) showed that the tertiary education significantly affected the per capita income growth in 34 African countries for the period 1960 to 2000.

In relation to the above studies, Awad et al. (2013) showed that secondary and tertiary education levels significantly affected the economic growth of Arab countries for the years spanning from 1990 to 2010. Also, in other studies like Lutz et al. (2008) and Lee and Kim (2009), the authors supported the role of secondary and tertiary education as top determinants of economic growth. Similarly, Tsai et al. (2010) showed that secondary and tertiary education in 60 (developed and developing) nations for the years 1996 and 2006 contributed to the growth of the economies. Along the same line of study, attaining education positively related with the European countries' economic growth (Sterlacchini 2008). Human capital (proxied by school enrollment ratio) was found to be significantly related to the Arab countries' economic growth for the years 1974 to 2013 (Edrees 2016).

Time series data are the least usual kind of analysis. However, Shaihani et al. (2011) revealed a positive relationship between secondary education and the short-term growth of the economy, while a positive relationship between tertiary education and the long-term growth of the economy. Pegkas (2014) supported the positive role of secondary and tertiary education on the growth of the economies. In the context of this study focused on Greece, primary education also had not significant contribution to the country's economy. On the other hand, all levels of education were found to positively influence the economic growth of Pakistan in the research done by Jalil and Idrees (2013). For MENA countries, Heyneman (1997) reported that the MENA countries should increase the level of educational quality by encouraging participation in higher education to achieve a prosperous economy. Akkari (2004) suggested that the MENA countries must increase their investment in education as well as in economic sectors where the skills acquired through knowledge can promote more economic growth.

Deniz and Dogruel (2008) concluded that the invested efforts and costs in all education levels could bring about the MENA countries' economic development. According to the outcome of the estimation tests, education quality in both primary and secondary education had long-term influence on the Turkish economic growth. Meanwhile, primary and secondary level of education enrollment positively affected the middle-income nations' economies, whereas higher education positively affected the higher-income nations' economies (Amaghouss and Ibourk 2013). Also, in the long-run, Latif et al. (2011) showed that primary, secondary and tertiary education had a significant relationship with

economic growth in the Malaysian context. The positive significant sign of tertiary enrollment and secondary enrollment in the long run demonstrate that these variables are very important for Malaysia's economic development. Lawanson (2017) revealed that the effects of primary enrollment rate and tertiary enrollment rate on economic development were positively significant. Secondary enrollment rate showed negative and insignificant effect on economic development in Nigeria. The authors suggested the suitable capital expenditure appropriation towards education for the promotion of the country's economic growth.

Added to the above studies, a consistent long-run relationship was found in Ethiopia between real GDP per capita and secondary school enrollment (Gebrehiwot 2016). Bayraktar-Sağlam (2016) contended that in the higher education levels, advanced knowledge and skills are developed, which thereafter functions as significant determinants of the growth of the country's economy. This indicates that economic growth is promoted by tertiary education through the facilitation of innovation new technologies diffusion and adoption.

For sub-Saharan African (SSA) countries, Ogundari and Awokuse (2018) revealed that a 10% increase in the enrollment to primary, secondary, and tertiary schools, would lead to percentage increases in per capita GDP growth 0.82%, 0.46% and 0.01%, respectively. Kyophilavong et al. (2018) found that educational promotion at the entire levels leads to increased growth, while growth in turn, reinforces the development of education.

Limited previous studies concentrated on the effects of gender in education levels on the growth of the country's economy. One such study, however, is Barro (2001) who showed that the school attainment years at secondary and tertiary significantly affected economic growth in the case of males, while, for females, school attainment years insignificantly affected economic growth for around 100 countries from1965 to 1995. According to Kalaitzidakis et al. (2001), growth was influenced by the completion of education by males and females in 93 economies between 1960 and 1990. In addition, Knowles et al. (2002) produced a model of neoclassical growth that involved male and female education as variables. The results reported the strong effect of female education on labor productivity in 73 countries for 1960 to 1990.

In India, Self and Grabowski (2004) reported that all female education levels are potential contributors to the economic growth, while the male's contribution to

economic growth only appeared at the primary level. Shalini et al. (2012) revealed that females with high school as their highest education level, significantly contributed towards the economic growth, contributing approximately 3.35%. However, the results also point out that the male secondary school graduates contributed to the countries' development more significantly as compared to the female, whereby the formers' contribution towards the economic development is approximately 5%.

The research conducted by Tansel and Güngör (2012) showed that female education significantly influenced labor productivity in Turkey, whereas the male education insignificantly affected labor productivity. For the Asia Pacific region, Oztunc et al. (2015) highlighted the significance of female primary education on income per capita growth. The same was highlighted by Khan (2016) in the Pakistani context in that a positive relationship was supported between female human capital and long-term economic growth.

Moreover, Orisadare et al. (2018) reported that male secondary education and female tertiary education positively influenced Nigeria's economic growth in both the short and the long run. However, female secondary education and male tertiary education negatively influenced economic growth in the short and long run. Similarly, the empirical analysis done by Singh et al. (2018) found that, in Malaysia, male education seemed to be more significant for long run growth than female education. Meanwhile, female education seemed to be more significant to growth than the male education in the short run. The recent study by Raifu (2019) evidenced that both genders' educational achievements positively affect the growth of the economy, with male achievements having more weight. This indicates that African governments should to focus on developing their citizens (male and female) by providing them with quality education. Also, they must focus on educating their female citizens as they are evidenced to be falling behind the male citizens when it comes to educational achievements.

Literature examined supported the key role of education in increasing the growth of the economies. Also, in literature dedicated to the Middle East countries, the relationship between education and economic growth, has not been extensively examined and empirical findings differ from one nation to the next, owing to the analysis methods variations and the level of economic development. More importantly, literature on disaggregated studies is still lacking. Therefore, the present study minimizes the literature gap by focusing on the influence of

primary, secondary and tertiary levels, through gender disaggregation, on the Middle East countries' economic growth.

4 Methodology

4.1 Theoretical economic modelling

To investigate the impact of education levels on the growth of the Middle East countries economies the model of growth of Mankiw et al. (1992) is adopted. Where an important factor of production is accommodated human capital. Based on the model, economic growth is determined by value of knowledge and labor is determined by the accumulation of skills, with the consideration that households' savings investments are in human capital:

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

Where, Y= output, K= physical capital, H= human capital, and L= labor force. If both sides of equation (1) are converted to logarithm:

$$log\ Y_t = \alpha\ log\ K_t + \beta\ log\ H_t + (1 - \alpha - \beta)\ log\ L_t \qquad (2)$$

Equation (2) above can be modified to accommodate other additional variables:

$$logY_{it} = \alpha_1 + \beta\ logEdu_{\ it} + \gamma\ logZ_{\ it} + e_{it} \quad (3)$$

Where Y_{it} is the real GDP per capital, Edu_{it} are variables of education and Z_{it} indicate the economic variables.

4.2 Model Specifications

The first step involved the study making use of annual panel data spanning from 1996 to 2018 to investigate the influence of the three education levels on the Middle East countries' economic growth. Secondly, the education levels were disaggregated by gender (male and female) to look into their influence on the growth of the economy and thus, the estimated model is represented in the following:

$$ln\ Y_{it} = \alpha_1 + \alpha_2\ TPE_{it} + \alpha_3\ TSE_{it} + \alpha_4\ TTE_{it} + \alpha_5\ EXP_{it} + \alpha_6\ PG_{it} + \alpha_7\ LFG_{it} + \alpha_8\ CS_{it} + \alpha_9\ TR_{it} + w_{it} \qquad (4)$$

Where Y_{it} is the log of real GDP per capita, TPE_{it} is primary enrollment for both sexes, TSE_{it} denotes secondary enrollment for both sexes, TTE_{it} shows tertiary

enrollment for both sexes, and EXP_{it} is government expenditure on education. Moreover, PG_{it} represents population growth, LFG_{it} shows labor force growth, CS_{it} is growth rate of capital stock, TR_{it} represents share of trade on GDP, RQ_{it} is regulatory quality, and w_{it} represents the error term. Following the empirical literature on economic growth that offers a variety of independent variables that must be included in the analysis in order to avoid misspecification, population growth, labor force growth, physical capital stock and share of trade on GDP were included in the model. In addition, the economic variables were included in the model to avoiding the omitted variable bias. In order to be reliable, indeed, the model must be proven as robust under a series of different specifications.

In the following models, the school enrollment variables are disaggregated based on gender. The first model contains the male enrollment variables and the other contains the female enrollment variables.

$$ln\, Y_{it} = \alpha_1 + \alpha_2\, MPE_{it} + \alpha_3\, MSE_{it} + \alpha_4\, MTE_{it} + \alpha_5\, EXP_{it} + \alpha_6\, PG_{it} + \alpha_7\, LFG_{it} + \alpha_8\, CS_{it} + \alpha_9\, TR_{it} + w_{it} \quad (5)$$

In model (5), the enrollment variables for both sexes are replaced by male enrollment variables, including MPE_{it}, which shows male primary enrollment, MSE_{it} that denotes male secondary enrollment, and MTE_{it}, which represents male tertiary enrollment.

$$ln\, Y_{it} = \alpha_1 + \alpha_2\, FPE_{it} + \alpha_3\, FSE_{it} + \alpha_4\, FTE_{it} + \alpha_5\, EXP_{it} + \alpha_6\, PG_{it} + \alpha_7\, LFG_{it} + \alpha_8\, CS_{it} + \alpha_9\, TR_{it} + w_{it} \quad (6)$$

In model (6), the male enrollment variables are replaced by FPE_{it}, which is female primary enrollment, FSE_{it}, which denotes female secondary enrollment, and FTE_{it}, which signifies female tertiary enrollment. In addition, the EXP_{it}, PG_{it}, LFG_{it}, CS_{it}, and TR_{it} variables are included in all the models.

4.3 Model estimation

This study employed static panel data models. Using panel data has numerous advantages, with a few of them being, being able to control individual heterogeneity, mitigate data multicollinearity issues, and acquiring accurate estimates of micro relationships. First, unit root tests have to be conducted for the series data to investigate their stationary. The second step entails the analysis of the influence of education levels on the economic growth with using panel data regression and with this, there are three alternative methods - pooled ordinary least square (OLS), fixed effect and random effects. But if heterogeneity bias is formed through pooled OLS forms as a result of which, it

is unable to reach inaccurate conclusions, random and fixed effects models are used to explain the units' individual features. Following the estimation of the pooled OLS and random effects models, the Breusch-Pagan LM test is used to confirm if inferences can be drawn based on the pooled OLS model or random effects model. If the random effects model is found to be suitable over the former, then the fixed effects model is estimated against the random one through the Hausman test to determine the most suitable.

Following the establishment of a convenient model, the diagnostic tests are used for analysis, with the following sequence of steps. First, the Variance Inflation Factor (VIF) is used to examine the presence of multicollinearity. With mean VIF mean value less than 10, confirms the absence of multicollinearity. Second, the detection of heteroskedasticity will be performed if the fixed effects model is chosen as appropriate. Heteroskedasticity becomes an issue if the probability value for the Modified Wald test is lower than 0.05. Thirdly, the Wooldridge test for autocorrelation in the panel data is run to inspect for serial correlation. When the probability value is lower than 0.05, it indicates that the problem of correlation exists, and the parameters are inefficient.

4.4 Variable construction and data

This study comprises the annual panel data for ten Middle East countries, namely Saudi Arabia, Qatar, Kuwait, Oman, Bahrain, Turkey, Iran, Egypt, Jordan, and the United Arab Emirates, covering the period 1996 to 2018. Owing to data limitation in the examined study period for the Middle East countries, the present study limits the data by focusing on ten selected countries. The data are taken from the World Development Indicators and Worldwide Governance Indicators.

Table1 presents the result of the descriptive statistics of variables. Once the data was tabulated in the STATA Software, can start looking at summary statistics. The "sum" command in STATA is used to obtain the descriptive statistics of variables. Where: observations is the number of valid observations for the variable, mean is the sum of a variable's values divided by the total number of values and it is the most widely used measure of central tendency, standard deviation (St. Dev.) is the square root of the variance and it measures the spread of a set of observations, minimum (Min.) is the smallest value of the variable, and maximum (Max.) is the largest value of the variable.

Table 1: Descriptive statistics of variables

Variables	Observations	Mean	St. Dev.	Min.	Max.
Real GDP per capita	206	10.23	0.94	8.48	11.77
Primary enrolment	210	100.13	8.67	67	118.4
Secondary enrolment	210	88.14	10.75	56	110.46
Tertiary enrolment	210	29.55	15.15	6.02	94.73
Expenditure on education	210	4.11	1.42	1	8.33
Population growth	210	3.69	3.04	0.09	16.33
Labor force growth	210	0.05	0.04	- 0.04	0.23
Growth rate of capital stock	210	10.57	8.19	-16.64	40.71
Trade openness	205	88.46	37.54	29.23	191.88

5 Empirical Results

5.1 Unit root test

The estimation starts by testing unit roots of the panel. The primary reason behind carrying out the unit root tests is to investigate the series stationary or otherwise. STATA provides a few panel data unit root tests. Levin, Lin and Chu's (LLC) test being the tests that have been extensively utilized, where the null is the unit root, the alternative to it being the common stationary root. An alternative step involves using Fisher (1932) results to run tests combining p-values from individual unit root tests. Such a test was introduced by Maddala and Wu (1999) and Choi (2001), where the null hypothesis is that panels have a unit root and as such, the alternative is that, the panels have no unit root. The test may be described as asymptotically Chi-square distribution, having 2N degrees of freedom. The test top advantage is its handling of unbalanced panels. Moreover, the lag lengths differ in terms of individual ADF tests. The results of the panel unit root tests, Levin, Lin Chu test and ADF-Fisher Chi-square are tabulated in Table 2. Based on the results, the tests were statistically significant at the level of 5%, indicating that unit root is absent and there is stationary data, allowing the running of regressions to analyze the empirical results.

Table 2: Panel nit root test for variables

Variables	Levin, Lin & Chu	ADF - Fisher Chi-square	Final result
Real GDP per capita	-13.696 (0.000)	29.629 (0.041)	I (0)
Primary enrolment	-1.689 (0.046)	33.927 (0.027)	I (0)
Secondary enrolment	-6.339 (0.000)	74.420 (0.000)	I (0)
Tertiary enrolment	-1.885 (0.030)	58.713 (0.000)	I (0)
Education expenditures	-3.059 (0.001)	58.709 (0.000)	I (0)
Population growth	-2.500 (0.006)	46.536 (0.001)	I (0)
labor force growth	-3.147 (0.001)	34.661 (0.022)	I (0)
Growth rate of capital stock	-2.509 (0.006)	55.324 (0.000)	I (0)
Trade openness	-5.515 (0.000)	33.321 (0.015)	I (0)

Notes: Values in parentheses refer to the probability of the test statistics. The null hypothesis of Levin, Lin & Chu t-test assumes common unit root process, while the ADF - Fisher Chi-square assumes individual unit root process.

5.2 Static panel data models

The panel data techniques namely pooled OLS, random effects and fixed effects models were conducted to check for the outcome's accuracy and robustness. Table 3, Table 4, and Table 5 present the estimation results for the three models that are expressed in equations 4, 5, and 6.

The three alternative model's estimation outcomes regarding the influence of education levels on economic growth are presented in Table 3. Based on the results produced by the Breusch-Pagan LM test, F-test and Hausman test, the following conclusions were reached; specifically, the Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (P-value in Hausman test is lower than 0.01).

Table 3: The Impact of education levels on economic growth

Variables	Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary enrolment, both sexes	-0.042	-0.008	-0.003	-0.003
	(-6.28) ***	(-2.46) **	(-1.58)	(-0.81)
Secondary enrolment, both sexes	0.066	0.012	0.005	0.005
	(10.14) ***	(3.58) ***	(2.24) **	(1.90) *
Tertiary enrolment, both sexes	-0.018	0.008	0.011	0.011
	(-5.42) ***	(4.62) ***	(10.48) ***	(4.45) ***
Education expenditures	-0.178	-0.081	-0.062	-0.062
	(-5.07) ***	(-3.62) ***	(-4.08) ***	(-1.62)
Population growth	0.057	0.025	0.014	0.014
	(2.79) ***	(2.92) ***	(2.42) **	(2.00) *
Growth rate of labor force	2.840	-0.725	-0.763	-0.763
	(1.90) *	(-1.17)	(-1.89) *	(-2.48) **
Growth rate of capital stock	-0.009	-0.001	-0.001	-0.001
	(-1.71) *	(-0.22)	(-0.03)	(-0.01)
Trade openness	-0.003	0.002	-0.001	-0.001
	(-2.16) **	(1.77) *	(-0.07)	(-0.04)
Constant	9.884	9.883	10.022	10.022
	(17.24) ***	(36.55) ***	(59.26) ***	(51.63) ***
Breusch-Pagan LM test	461.78			
	(0.000) ***			
F-test (fixed effects)			345.70	
			(0.000) ***	
Hausman test		115.77		
		(0.000) ***		
R-squared	0.597	0.535	0.596	0.596
Observations	201	201	201	201
Multicollinearity (Mean VIF)	1.82			
Heteroscedasticity (χ2 – stat)			476.79	
			(0.000) ***	
Serial Correlation (F-stat)			161.745	
			(0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

Moreover, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

The robust fixed effects findings in Table 3 showed primary education has no effect on economic growth. The most important reason might be that the returns to primary education are very low especially in case of the agriculture sector.

Secondary and tertiary education positively influence economic growth. This shows the importance of investing in the education of both sexes and development of their skills as both have potential to contribute to the economy substantially. Although education levels are indispensable to Middle East economies, it is apparent that tertiary education attainment has highest effects on economic growth. This finding corroborates the saying that the importance of tertiary education is obviously undeniable in terms of generating highly skilled workers who drive toward growth and achieving a high-income economy.

The growth rate of the population positively and significantly influences economic growth, establishing the optimist's approach, which states that the rate of population growth positively affects the growth of the economy. The positive sign in the case of the Middle East can be explained by the rising ratios of primary and secondary school enrollment in the region, thus leading to a greater proportion of educated workforce when entering the working age. As for the labor force growth rate negatively influence the economic growth, which could be related to the unskilled workforce in the region Pissarides and Véganzonès-Varoudakis (2006), and the low productive jobs of stemming from the unskilled workers that do not contribute to the economic growth. According to Amir et al. (2015), an increase in illiterate labor force has negative impact on economic growth. The result postulated that unqualified and unskilled labor forces retard economic growth in Pakistan. Another possibility is that this result could be as a result of high rate of unemployment in the Middle East countries. In the study by Orisadare et al. (2018) showed that the rate of labor force participation significantly and negatively affected Nigeria's economic growth, which may be attributed to the high rate of unemployment and under-employment rate in the country. Government education expenditure, growth rate of capital stock, and trade openness have no effect on economic growth since the coefficients are insignificant.

Table 4 presents the estimation results of the three alternative models for the influence of male's education levels on economic growth. The Breusch-Pagan LM test, F-test, and Hausman test statistics are display in the same table. The Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for the LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (p-value in Hausman test remained lower than 0.01). Then, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of

multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

Table 4: The impact of male's education levels on economic growth

Variables	Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary enrolment, male	-0.030 (-4.58) ***	-0.002 (-0.58)	-0.001 (-0.12)	-0.001 (-0.12)
Secondary enrolment, male	0.044 (8.87) ***	0.001 (0.16)	-0.001 (-0.61)	-0.001 (-0.69)
Tertiary enrolment, male	-0.018 (-5.74) ***	0.013 (10.34) ***	0.014 (13.49) ***	0.014 (5.44) ***
Education expenditures	-0.116 (-3.34) ***	-0.057 (-3.17) ***	-0.052 (-3.41) ***	-0.052 (-1.43)
Population growth	0.066 (3.11) ***	0.023 (3.34) ***	0.019 (3.34) ***	0.019 (3.08) **
Growth rate of labor force	3.099 (2.01) **	-0.685 (-1.40)	-0.703 (-1.71) *	-0.703 (-1.89) *
Growth rate of capital stock	-0.003 (-0.53)	-0.001 (-0.16)	-0.001 (-0.20)	-0.001 (-0.09)
Trade openness	-0.001 (-0.50)	0.002 (1.59)	0.001 (0.69)	0.001 (0.33)
Constant	9.949 (16.92) ***	10.100 (42.64) ***	10.096 (59.51) ***	10.096 (49.36) ***
Breusch-Pagan LM test	352.28 (0.000) ***			
F-test (fixed effects)			355.92 (0.000) ***	
Hausman test		63.78 (0.000) ***		
R-squared	0.573	0.575	0.583	0.583
Observations	201	201	201	201
Multicollinearity (Mean VIF)	1.69			
Heteroscedasticity ($\chi 2$ – stat)			305.57 (0.000) ***	
Serial Correlation (F-stat)			113.186 (0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

Table 4 tabulates the robust fixed effects model's results and from the table, it is evident that male primary education and male secondary education had insignificant influence on the economic growth, but the male tertiary education had a positive influence on the economic growth – indicating that increasing male tertiary education could boost economic growth. Also, the population growth rate coefficient had a positive influence on the growth of the economy, while that of labor force had a negative influence on such growth. Moreover, government expenditure on education, growth rate of capital stock, and trade openness have no effect on economic growth since the coefficients are insignificant.

The three alternative model's estimation outcomes concerning the influence of female's education levels on economic growth are presented in Table 5. Based on the results produced by the Breusch-Pagan LM test, F-test and Hausman test, the following conclusions were reached; specifically, the Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for the LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (p-value in Hausman test remained lower than 0.01). Then, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

Table 5: The impact of female's education levels on economic growth

Variables	Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary enrolment, female	-0.044 (-6.92) ***	-0.005 (-2.77) ***	-0.004 (-2.45) **	-0.004 (-1.06)
Secondary enrolment, female	0.065 (10.94) ***	0.011 (4.91) ***	0.009 (4.58) ***	0.009 (2.54) **
Tertiary enrolment, female	-0.005 (-1.38)	0.010 (8.98) ***	0.010 (10.35) ***	0.010 (4.30) ***
Education expenditures	-0.178 (-5.36) ***	-0.090 (-5.67) ***	-0.084 (-5.76) ***	-0.084 (-2.67) **
Population growth	0.047 (2.34) **	0.019 (3.29) ***	0.017 (3.25) ***	0.017 (2.30) **
Growth rate of labor force	3.656 (2.54) **	-0.832 (-2.09) **	-0.843 (-2.32) **	-0.843 (-3.36) ***
Growth rate of capital stock	-0.011 (-2.08) **	-0.001 (-0.38)	-0.001 (-0.26)	-0.001 (-0.14)
Trade openness	-0.003 (-2.47) **	-0.001 (-0.62)	-0.001 (-1.30)	-0.001 (-0.73)
Constant	9.964 (19.62) ***	9.940 (48.54) ***	9.935 (68.83) ***	9.935 (36.58) ***
Breusch-Pagan LM test	681.20 (0.000) ***			
F-test (fixed effects)			396.25 (0.000) ***	
Hausman test		39.64 (0.000) ***		
R-squared	0.622	0.665	0.667	0.667
Observations	201	201	201	201
Multicollinearity (Mean VIF)	1.96			
Heteroscedasticity ($\chi 2$ – stat)			230.80 (0.000) ***	
Serial Correlation (F-stat)			111.461 (0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

In Table 5, the robust fixed effects model outcome is presented and from the table, it is evident that female primary education has no significant effect on economic growth, confirming the argument that primary educated individuals' skills are insufficient to acquire high productive positions. This outcome was supported by Hanif and Arshed (2016), who revealed a negative primary education-economic growth relationship in the context of SAARC countries. Both secondary and tertiary education of female positively and significantly influence economic growth, which shows that increasing such levels of education could boost the growth of the economy. The results are similar to previous studies showed that a positive relationship between female education and economic growth (El Alaoui 2016, Oztunc et al. 2015, Kaur and Letic 2012). El Alaoui (2016) found that female education has positive effect on economic growth of countries such as Morocco, Algeria, Tunisia and Egypt.

The results show the negative effect of government education expenditure on economic growth. This might be due to the allocated funds for education sector development not being properly utilized (Nurudeen and Usman 2010). In the study by Heyneman (1997), it was shown that the main reason behind the low-quality education in the Middle East and North Africa is not a scarcity of monetary resources but the inefficiency of managing the resources already allocated. The coefficient of labor force growth is negative and significant, whereas the coefficient of population growth is positive and significant. Growth rate of capital stock and trade openness have no effect on economic growth.

5.3 Discussion of findings

5.3.1 Main points of findings

In this section, the findings of the effects of education by levels and gender on economic growth were discussed under four main points. The first discussion point relates to the results indicating that the secondary and tertiary education are significant and contribute positively to economic growth. This confirms that the people who have completed secondary and tertiary education able to make their potential contribution to the economy, where secondary and tertiary education provides the labor market with people who have medium and higher skills to enhance their productivity and enable them to contribute to achieving a high-income economy. The results are similar to that obtained by Awad et al. (2013) who showed that both secondary and tertiary education significantly affected economic growth in Arab countries from 1990 to 2010. Based on the

research done by Lutz et al. (2008), together with Lee and Kim (2009), secondary and tertiary education were the main determinants of economic growth. Further, Tsai et al. (2010) who reported that the most important contributors to economic growth were secondary and tertiary education in 60 developed and developing countries between 1996 and 2006. These results are consistent with the recent studies such as Jamel et al. (2020) who confirmed the positive and significant impact of the education on economic growth in a sample of middle-income countries through panel data regressions. In Nigeria, Omodero and Nwangwa (2020) showed that education and economic growth have a long term cointegration. In addition, Laoufi et al. (2020) revealed that a strong positive relationship between education and economic growth and that economic growth occurs from during the development of human resources.

The second discussion point relates to the results indicating that the primary education has no effect on economic growth in the three specifications (both sexes, male and female). The most important reason might be that the skills of primary educated people are not enough to obtain high productive jobs. Production of primary educated workers tends to be concentrated in low value-added sectors that do not require high skills or education levels. Most of the primary educated workers are working in the agriculture sector. The returns to primary education are very low especially in case of the agriculture sector. This result is in line with studies such as Abbas (2001), Shaihani et al. (2011), Pegkas (2014), and Hanif and Arshed (2016) who found a negative impact of primary education on economic growth. As Romer (2001) noted, primary education might not show short run results in the economy, but has indirectly long-term effects on it. As primary is the first and basic level of education it is very important for the other two levels of education.

The third discussion point relates to the results indicating that the tertiary education contributed more to the economic growth compared to primary and secondary and education in the three specifications (both sexes, male and female). According to Masri and Wilkens (2011), tertiary education has an invaluable part in the community as it develops further prospects for progress and offers knowledge transfer for students and other interested parties, and encourages transformation, creativeness, innovativeness, and advancement. It is probably because in the past two decades there has been a proliferation of tertiary education institutions in the Middle East that has led to many of the graduates of tertiary education. The graduates of universities find jobs in the fields in which

they were trained due to market-oriented and cutting-edge programs. It is clear that higher education graduates possess the requisite knowledge and skills that are a good match for the needs of the labor market and the employers seem to find so valuable to employ them. According to Agasisti and Bertoletti (2020), an increase in number of universities is conducive to strong economic growth in the European regions. In Chongqing, Sun (2020) revealed that there is a long-term stable equilibrium relationship between higher education and economic growth.

The fourth discussion point relates to the results indicating that the female education levels are highly positively related to the economic growth compared to the male education levels. This result is consistent with the findings of Self and Grabowski (2008), Khan (2016), Sehrawat and Giri (2017), and Singh et al. (2018) who indicated that female education accounted more to the economic growth in comparison to males. In addition, in the study by Karimi et al. (2020) analyzed the role of women's education in economic development in 13 selected Islamic countries between 2000 and 2014. They found that women's education has had a positive and significant effect on GDP growth in these countries. The findings can be explained by the fact that females have multidimensional part to play in the community in comparison to their male counterparts. Thus, whatever policies that enhances and empower females, the outcomes are disseminated to the entire community, inclusive of the economic sector. The outcome is in tandem with the policies by the government towards the enhancement of the involvement of women in the economy by the intensification of the participation of females in the workforce.

Educating women is considered to be a crucial factor in intensifying the participation of females in the labor force, because intensifying female schooling will result in enhancing the skills and knowledge of educated women, enabling them to participate in the workforce, obtain professional occupations and secure higher incomes. Furthermore, enhanced female education can alter outdated conventional mindsets toward the part played by women in the workforce.

5.3.2 Countries income classification and education

According to the World Bank, the ten sampled countries were classified into low-middle income, upper-middle income and high income to understand if each country’s income level could be responsible for the education development (see Table 6).

Table 6: Income countries' classification (GNI per capita)

Classification	Country
Lower Middle Income	Egypt
Upper middle Income	Iran, Jordan, Turkey
High Income	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates

Source: World Bank (2020).

In the high-income group, free education is provided by the governments for all levels of education. Generally, the gross enrolment ratio for all levels of education as well as education expenditure have increased in the GCC countries over the years. For the GCC countries, Bahrain promotes the setting up and running of institutions of higher learning, deriving the pool of intake from expatriate talents, and from the cumulative pool of incoming homeward bound Bahrainis from abroad, possessing advanced degrees. Kuwait possesses the highest rate of literacy in the Arab world. Primary and intermediate level education is obligatory for all students within the age range of 6 years old up to14 years old. In Oman, there were only three formal schools that were available for the whole of Oman, with less than 1,000 pupils prior to the year 1970. Currently, high importance was placed for education by the government to enhance the domestic workforce, that the government deems a crucial factor in the development and growth of the economy and social aspects of the country. Qatar emplace a heavy budget educational expenditure; it has one of the exorbitantly high per-pupil expenditures globally. In Saudi Arabia, there was a rapid expansion in the higher education sector, with the establishment of great numbers of Universities and colleges, predominantly since 2000. The improvement of education and research are the core concerns for the UAE.

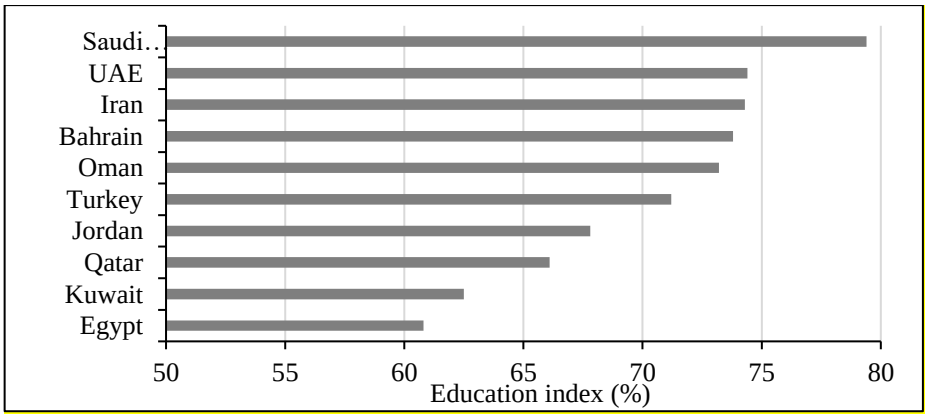
The second group is the upper middle-income group comprises Iran, Jordan and Turkey. On matters pertaining education in Iran, in 2018, the enrolment in primary schools was 110.71% due to the fact that primary education is obligatory. However, secondary school attendance is not obligatory. Consequently, due to the non-obligatory attendance for education beyond primary school, the enrolment rates are lesser—with approximately 86.31% enrolment for secondary schools and 68.12% for tertiary educational institutions in 2018. In Jordan, the rate of enrolment in education levels have increased in

recent years. The percentage of knowledgeable and skilled workers in Jordan is acknowledge to be amongst the greatest in number regionally, in the ICT and industrial sectors, resultant from a comparatively contemporary educational system. In the case of Turkey, the adult literacy rate is 96.15%. The rate of literacy for male is 98.82%, and the rate of literacy for females is 93.5% in 2018 (World Bank 2020).

The third group is the lower middle-income group comprises Egypt. Pertaining the education sector in Egypt, there was a decline in the illiteracy rate in year 1996 from 39.4% has declined to 25.8% in 2017. According to World Bank (2020), the literacy rate for Egyptian adults in the year 2017 was calculated to be 71.2 %.

Education is a key factor towards the attainment of well-being and is utilized in the gauging of the economic development, and in the quality of life, that entails the core aspect in ascertaining the degree of development that a country has reached, such as it being a developed, developing, or an underdeveloped country. A recent study by Atiq-ur-Rehman et al. (2020) revealed that the education supports the human capital formation and stimulate economic growth in emerging Asian economies. Dao and Trinh (2020) found that their final findings are supportive to the hypothesis made: education is critical factor of economic enhancement.

Figure 3: Education index, 2018



Source: UNDP (2018).

According to (UNDP (2018)), the education index was gauged through the combination of average adult years of schooling with the required years of schooling for children, for which each receive 50% weighting. Figure 3 shows

the education index in the Middle East countries. Education index in 2018 was highest in Saudi Arabia with 79.4%, followed by UAE and Iran with 74.4% and 74.3%, respectively. The four countries that recorded the lowest education index in 2018 were Egypt with 60.8% of the education index, Kuwait with 62.5%, Qatar with 66.1%, and Jordan with 67.8%.

Overall, it is crucial for the Middle Eastern countries to concentrate on the capacity building of their male and female citizens via the offering of quality education. It is imperative for intensified focus to be given in educating of female citizens who are left behind in comparison to their male counterparts. It is of the utmost importance that the availability of education must not only be according to theoretical learning only, but education must also include hands-on experiential learning that would ensure the establishment of relevant skills pertinent to fulfill and match the needs of all sectors of the economy after they finished their schooling. A holistic education approach should be provided, which would enhance their capacity building, knowledge and skills development, in addition to nurturing a regional long-term economic growth.

6 Conclusion

This study seeks to empirically examine the effect of three education levels (primary, secondary and tertiary) on the economic growth of the Middle East countries. An economic growth model was adopted for the disaggregated education levels by gender to investigate their influence on economic growth. Analysis of data was conducted through the use of static panel data models on ten Middle East countries, for the years 1996 to 2018.

The results found both secondary and tertiary education had significant and positive effects on the economic growth. With regards to gender, female secondary education and female tertiary education, and male tertiary education were found to have positive effects on the Middle East countries' economic growth.

Based on the results, primary education should be made compulsory for all in the Middle East countries as the impact is found to be insignificant to growth. This policy will increase the enrollment rate for secondary education that positively influences the Middle East countries' economic growth. In addition, this policy will lead to achieving faster economic growth, in line with previous studies that report that an increase in education promotes economic growth.

Besides, governments should formulate policies that will help reduce the gap between the graduate job skills and the skills needed in the workplace, especially for tertiary graduates. The importance of tertiary education is obviously undeniable in terms of generating highly skilled workers who drive toward growth and achieving a high-income economy. Briefly, the most important policy recommendation to the government is to position human capital development at the center of its development strategy.

Future studies can examine the influence of education levels on economic growth. They can focus on examining a more extensive sample size for their examination of potential associations, and they can disaggregate the samples using other criteria (e.g., income level).

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