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Female Labour Force Participation in Saudi Arabia and its Determinants

Abstract: Saudi Arabia's Vision 2030 recognized female labor force participation as an important component for economic growth. This study investigates the relationship between female labor force participation rate, female tertiary school enrolment, female life expectancy and per capita income measured quarterly between 1991 and 2017. The study employs traditional unit root tests of Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) complemented by Zivot and Andrews (ZA) test. Furthermore, for robustness check, combined cointegration test as prescribed by Bayer and Hanck (2013) and Pesaran ARDL bound tests were performed. Toda-Yamamoto causality test examined the causality flow among the variables. The result posits all independent variables have positive significant effect on female labor force participation rate within Saudi Arabia; rendering a policy recommendation: higher female labor participation can be achieved through investment in female education, health sector and achieving economic growth.

Keywords: economic growth, labour force, female labour force participation

JEL Codes: J21, O11

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Udział kobiet w rynku pracy w Arabii Saudyjskiej i jego determinanty

Streszczenie: W programie Wizja 2030 przyjętym w Arabii Saudyjskiej udział kobiet w rynku pracy uznano za ważny element wzrostu gospodarczego. Niniejsze badanie miało na celu określenie związku między udziałem kobiet wśród pracujących, udziałem kobiet wśród przyjętych na studia, oczekiwaną długością życia kobiet oraz dochodem na mieszkańca mierzonym kwartalnie w latach 1991–2017. W badaniu zastosowano tradycyjne testy pierwiastka jednostkowego Dickeya-Fullera (ADF), Phillipsa-Perrona (PP) oraz Kwiatkowskiego-Phillipsa-Schmidta-Shina (KPSS) uzupełnione testem pierwiastka jednostkowego Zivota i Andrewsa (ZA). Ponadto, przeprowadzono test kointegracji Bayera i Hancka (2013) oraz testy ograniczeń zgodnie z modelem autoregresyjnych rozkładów opóźnień ARDL Pesarana. Za pomocą testu Toda-Yamamoto zbadano przepływ przyczynowości między zmiennymi. Wynik wskazuje, że wszystkie zmienne niezależne wykazują dodatni, znaczący związek z udziałem kobiet wśród pracujących w Arabii Saudyjskiej. Sformułowano zalecenie w kwestii polityki: wyższy udział kobiet w rynku pracy można osiągnąć poprzez inwestowanie w edukację kobiet, sektor zdrowia oraz stymulowanie wzrostu gospodarczego.

Słowa kluczowe: wzrost gospodarczy, siła robocza, udział kobiet w sile roboczej

Kody klasyfikacji JEL: J21, O11

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Introduction

An increase in female labour force participation is one of the major goals of Saudi Arabia's Vision 2030 long-term strategy [KSA Vision 2030, 2017]. As the authorities strive to achieve this goal, it is necessary to understand the determinants of the female labour force participation rate in this Middle Eastern country. In 2018, although women accounted for 49% of the nation's population, only 23.4% were within the labour force. However, that was still an improvement over 1990, 2000 and 2015 when the participation rates were 14.2%, 16% and 20.2% respectively.

A 2018 report by the International Monetary Fund (IMF) showed an increase in the global female labour force participation rate [IMF, 2018]. The increase was attributed to both male and female children being valued equally in family budgets for education, nutrition, and healthcare [Huq et al., 2009]. Similarly, governments and private institutions have contributed to improving the education, training, and health status of girls and women [Becker, 1994].

The unemployment rate is another significant reason for women entering the labour force, although there is conflicting evidence on the impact of unemployment on female labour force participation. One school of thought argues that the global increase in female labour force participation is attributable to the added worker effect: as the unemployment rate increases, additional members of the household are forced to enter the labour market to support

family income [Ambreen, Humera, 2009]. Others posit that, at a time of high unemployment, the chances of a woman getting a job are low, discouraging women from entering the labour market [Morikawa, 2015].

A 2013 World Bank report on gender equality in the Middle East and North Africa (MENA) region found that, compared to other parts of the world, female labour force participation is low while the gap between male and female labour force participation is the highest. Similarly, in 2019, the female labour force participation rate in the MENA region was just 20.2% of the workforce, considerably low compared to the global figure of 47.7%. Saudi Arabia, which is one of the countries in the region, has outlined its Vision 2030 [KSA Vision 2030, 2017] goal to provide women with more freedom and opportunity to contribute to the economy. As a result, the country's unemployment rate is expected to fall to 7% by 2030 from 11.6% and female labour force participation is expected to increase to 30%.

For Saudi Arabia, this study investigates the relationship between female labour force participation and health (proxied by life expectancy), female education (proxied by female tertiary enrolment) and economic growth (proxied by gross domestic product per capita). Although extensive research has been carried out globally on the determinants of female labour participation, to the best of this author's knowledge, despite studies carried out on the MENA region, little research has been conducted for most Gulf Cooperation Council (GCC) countries and Saudi Arabia in particular[2]. This study focuses on Saudi Arabia given its high economic potential and recent development under the government's Vision 2030 strategy. The study hopes to contribute to existing literature given the scarcity of research for Saudi Arabia.

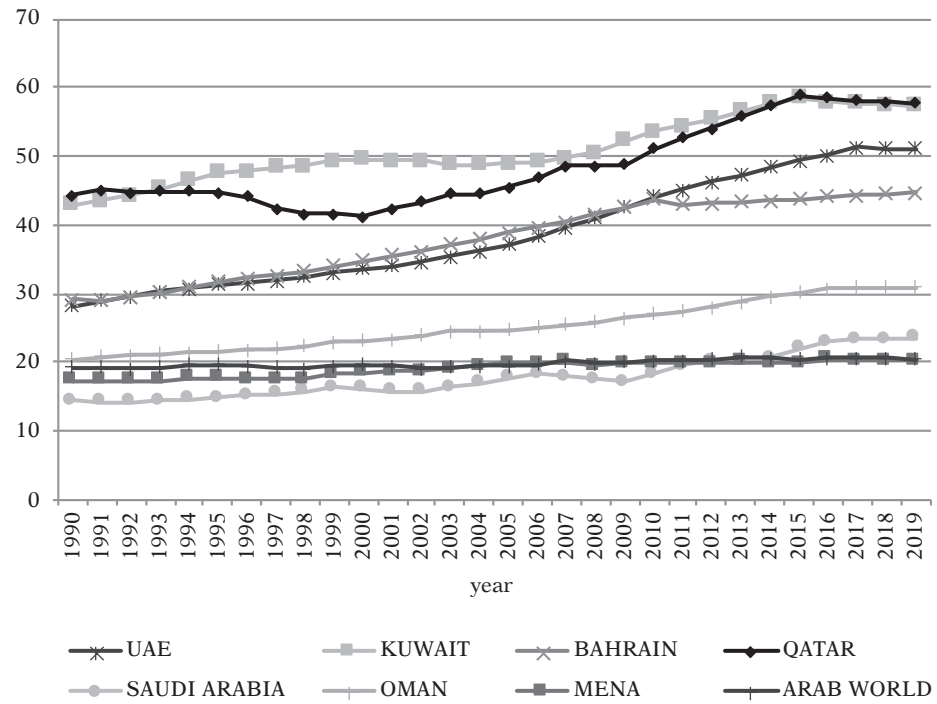
The remaining part of this study is organised as follows: section 2 gives a summary of the female labour force participation trend in Saudi Arabia; section 3 provides a review of literature; section 4 offers the data and methodological procedure; and sections 5 and 6 conclude, summarise the findings and provide policy directions.

Female labour force participation in Saudi Arabia

Figure 1 shows a comparison of female labour force participation in 1990–2018 for GCC (Gulf Cooperation Council) and MENA (Middle East and North African) countries. The graph shows an improvement in the female force participation rate for most GCC countries and, although Saudi Arabia shows the least improvement, it is still better off than its peers in the MENA region.

[2] See Naseem and Dhruva [2017] on the topic of challenges faced by Saudi female labour force participation and the role of the Vision 2030 strategy.

Figure 1. Female labour force participation rate in 1990–2018 (share of female population, in percentage points)



Source: Author's compilation from World Bank data base modelled on International Labour Organization (ILO) estimate.

Over the last 50 years, female labour force participation has been one of the driving forces of the Saudi labour market [Asmari, 2008] and the last decade has seen a great global improvement in the lives of women. However, gender disparities are still largely present [World Bank, 2018]. The World Economic Forum in 2018 reported that, with a 0.59 gender parity index, Saudi Arabia ranks 141 among 149 countries examined in the global gender gap measurement. Despite a high level of female education and a falling fertility rate in the country, women still represent untapped potential for economic development [IMF, 2013]. In the second quarter of 2018, the female labour force participation rate rose to 19.6%, from 17.4% a year earlier, reflecting an increased eagerness on the part of women to join the labour force.

The degree of urbanisation has also been identified as one of the major factors that affect female labour participation [King, 1978]. For Saudi Arabia, the female labour force participation rate is higher in urban areas, possibly because of more paid employment opportunities there than in rural areas [Naseem, Dhruva, 2017]. However, Saudi Arabia still lags behind when compared to other GCC countries; in 2018, according to a World Bank database, female labour force participation was 57.8% for Qatar, 57.5% for Kuwait, 51.2%

for UAE, 44.5% for Bahrain, 30.9% for Oman, and 22.3% for Saudi Arabia. In 2019, the rate for Saudi Arabia did not change much, with just 23.5% of women participating in the labour market. However, when compared to its MENA peers, Saudi Arabia appeared to be doing slightly better in 2018, with the average female labour force participation rate in the region at just 20.2%.

Literature Review

Diverse factors have been identified in the literature as the main drivers of female labour force participation. Mujahid and Zafar [2012] examined factors that affect women's participation in the labour force in Pakistan and concluded that an increased level of education and economic dynamics tend to increase women's labour force participation in the later stages of economic growth. A similar study by Khadim and Akram [2013] concluded that education for women could be the main policy available for greater female participation in Pakistan's labour force.

Although Dayıoğlu and Kirdar [2010] posit a decline in female labour force participation in Turkey and a difference between rural and urban female labour participation in that country. Kizilgol [2012] reports that the level of education, household income, the age of women, dependency ratios and ownership of residence are important factors for female labour participation in Turkey. An earlier study by Güven-Lisaniler and Bhatti [2005] established that education was a main driver of female job participation in North Cyprus. In a similar study from Ghana, Sackey [2005], using the probit model, investigated the determinants of female labour force participation and concluded that improvements in female educational status were an important determinant.

For the Roma population in Bucharest, Andrei et al. [2016], using logit and probit models, observed that education is the main determinant of female labour force participation, and that the tertiary level of education has more influence on woman's participation in the job market than primary-level education. A similar result was observed for Pakistan, as Ambreen and Humera [2009] concluded that skill-based education programmes enhance the absorption of females into the formal labour market. The study further recommends labour market improvements and decreased unemployment for improved female labour force participation.

For Cameroon, Njimanted and Mukete [2016] found that the dependency ratio, the fertility rate, per capita income and male labour force participation all influence female labour force participation. A similar result was reported for Saudi Arabia by Naseem and Dhruva [2017], revealing that the unemployment rate, the fertility rate and urban population are statistically significant in explaining female labour force participation, while higher education is not statistically significant. However, the study could be flawed by not testing the stationarity of the time-series data set employed, possibly yielding spurious regression results.

With the exception of Saudi Arabia, all the literature considered above mentioned education as the key factor in explaining female labour force participation. One can conclude that, of all investment, education remains an important determinant in explaining female labour force participation. The higher the level of education, the more likely the woman will not only remain active, but also enter the labour force. This study aims to identify and analyse the impact of some of the variables as suggested in the literature in explaining female labour force participation in Saudi Arabia. The explanatory variables represent education, economic growth, and female life expectancy.

Data and Methodology

This section provides a description of the data and econometric approach employed in the study using yearly data for the period 1991 to 2019. The data on female life expectancy (*LE*), gross domestic product per capita at constant 2010 US$ (*GDPC*), and female tertiary school enrolment (*EN*) were all sourced from World Development indicators. For the female labour force participation rate (*FLFP*), an indicator for employment opportunities among female members of society was used as reflected in Tansel's [2002] studies. Life expectancy (*LE*) is proxied for the health status of a nation as reflected in studies by Kambiz et al. [2011] and Mahumud et al. [2013]. Gross domestic product per capita (*GDPC*) captures the standard of living, and female tertiary school enrolment (*EN*) captures education attainment among women within the study area. Table 1 provides a brief description of the variables included in the study.

Table 1. Description of Major Data Nomenclature

Variable	Label	Description
Female labour force participation	*FLFP*	Labour force participation rate, female population (% of female population ages 15+)
Gross domestic product per capita	*GDPC*	GDP per capita (constant 2010 US$)
Female life expectancy at birth	*LE*	Life expectancy at birth, female (in years)
Female tertiary enrolment	*EN*	School enrolment, tertiary, female (% of gross enrolment)

Source:

Model Specification

In line with the paper by Tansel [2002],[3] which is based on the theory of allocation of time, a woman's decision to participate in the labour market is a function of personal decision and economic conditions. Therefore, the model

[3] See Mincer [1962], Becker [1965], and Heckman [1978].

aiming to examine the determinants of female labour participation in Saudi Arabia includes:

- two explanatory variables representing personal and household characteristics: female life expectancy (LE_t), and female tertiary school enrolment (EN_t),
- one explanatory variable capturing labour market conditions: gross domestic product per capita ($GDPC_t$).

Thus:

$$FLFP_t = f\left(LE_t, EN_t, GDPC_t, u_t\right) \tag{1}$$

where u_t is the error term and index t refers to the observation year

We propose further to examine the following natural log form of the model:

$$LNFLFP_t = \beta_0 + \beta_1 LNGDPC_t + \beta_2 LNLE_t + \beta_3 LNEN_t + \varepsilon_t \tag{2}$$

where β_0 denotes the intercept; β_1, β_2, and β_3 are the elasticity coefficients for gross domestic product, female life expectancy and female tertiary school enrolment respectively; ε_t is the error term, and t denotes the time period.

Unit Root Test

Pre-testing of data for unit root may not be so important according to Pesaran *et al*. (2001), but, in this study, a unit root test was performed on all the data to fully understand their statistical properties with respect to their orders of integration and to avoid spurious regression results. Therefore, ADF, PP and KPSS unit root tests were applied, as well as the Zivot-Andrews test on all the variables: female labour force participation, female life expectancy, female tertiary school enrolment, and gross domestic product for the period 1991 to 2019.

Cointegration Test

Bayer and Hanck

The need to examine the long-run relationships among the variables is important since most macro models exhibit such a relationship. Bayer and Hanck's [2013] combined cointegration test is performed here. It offers a more robust and reliable result for long-run relationships among variables as compared to the existing cointegration tests, such as the Engle-Granger test, as proposed by Engle and Granger [1987], Philips and Ouliaris [1990], and the system of equation cointegration test of Johansen and Juselius [1990] and Johansen [1991]. The test is based on Engle and Granger [1987], Johansen [1991], Boswijk [1995], and Banerjee et al. [1998] tests.

The Bayer and Hanck [2013] cointegration test was employed to establish the existence of long-run relationships among female labour force participation, female life expectancy, female tertiary school enrolment, and gross domestic product for the period 1991 to 2019.

ARDL

The bounds test approach to cointegration is also used in order to observe the long-run and short-run relationship among the variables of interest and to complement the Bayer Hanck test. The autoregressive distributive lag (ARDL) approach, as suggested by Pesaran et al. [2001], is the most suitable for variables used in this study as it accommodates the mixed order of integration.

This study applies the ARDL cointegration test to establish the existence of long-run and short-run relationships among female labour force participation, female life expectancy, female tertiary school enrolment, and gross domestic product for the period 1991 to 2019.

Granger Causality Test

Also, the Toda and Yamamoto [1995] causality approach was performed to examine the relationship of time precedence ("causality") between female labour force participation, female life expectancy, female tertiary school enrolment, and gross domestic product for the period 1991 to 2019 as well as the direction of such relationships. Where a mixed order of integration exists, compared to the conventional Granger causality test and the Wald test, this approach is more efficient and consistent.

The Toda and Yamamoto model makes use of the K and dmax in the vector autoregressive (VAR) framework, where K+dmax represents the optimal order and maximum order of the VAR respectively. The lag lengths of the variables in the causal models are set according to the Akaike Information Criterion (AIC). The lagged dependent variables in each causality equation is aimed at purging serial correlation among the error terms.

Results and Discussion

The study begins with a visual inspection of underlying time series. Figures 2, 3, 4 and 5 reveal that the female labour force participation rate, income per capita and female secondary school enrolment include structural break dates that typify important economic policy episodes and events. For example, decreased female labour participation around 2000 could be contributed to the establishment of tertiary institution scholarship opportunities abroad for both male and female citizens of Saudi Arabia.

Table 2 presents descriptive statistics for the variables in natural logarithm forms. All the variables are negatively skewed except for the female labour force participation rate. The statistics also reveal that all the series are

normally distributed, as reported by the Jarque-Bera probability value, with a failure to reject the null hypothesis of normality.

Figure 2. First Difference natural logarithm of GDP

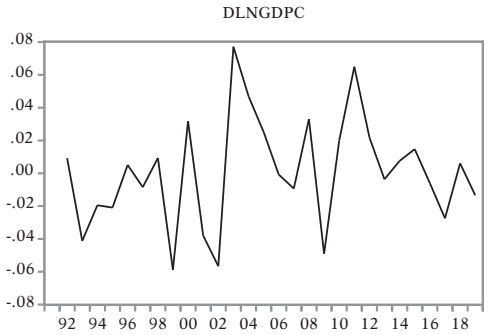


Figure 3. First Difference natural logarithm of LE

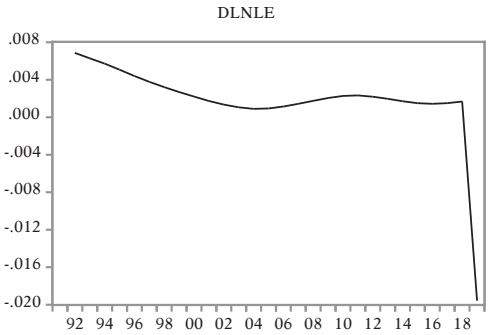


Figure 4. First Difference natural logarithm of FLFP

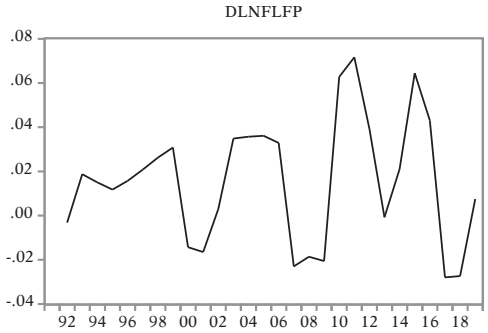


Figure 5. First Difference natural logarithm of EN

Source: Author's computation.

Table 2. Descriptive statistics

Panel A	*LNFLFP*	*LNEN*	*LNGDPC*	*LNLE*
Mean	2.864931	3.428305	9.87511	4.308693
Median	2.840247	3.549747	9.868096	4.313534
Maximum	3.102432	4.299768	9.976178	4.338793
Minimum	2.654438	2.335399	9.718328	4.261905
Std. Dev.	0.149613	0.583369	0.065525	0.019539
Skewness	0.308885	–0.25399	–0.28466	–0.78695
Kurtosis	1.804983	2.046119	2.478139	2.954919
Jarque-Bera	2.186728	1.411253	0.720733	2.995673
Probability	0.335087	0.493799	0.697421	0.223613

Panel A	*LNFLFP*	*LNEN*	*LNGDPC*	*LNLE*
Sum	83.083	99.42083	286.3782	124.9521
Sum Sq.Dev.	0.626756	9.528933	0.12022	0.01069
Observations	29	29	29	29

Source: Author's computation.

Table 3. Unit root and stationarity test results

Variables	ADF	PP	KPSS
Level			
LNGDPC	–1.25235	–1.276	0.382829
LNLE	0.829546	–3.57722	0.649639
LNEN	–1.13213	–1.27679	0.683478
LNFLFP	0.016259	0.395988	0.134909**
Δ	ADF	PP	KPSS
LNGDPC	–5.05175***	–5.04934***	0.183366***
LNLE	–3.90611**	–27.7041**	0.241351***
LNEN	–6.08782***	–6.02054***	0.158888***
LNFLFP	–4.50793***	–3.34266***	0.168483*

Note: Superscripts ***, **, and * represent 1%, 5%, and 10% statistical significance rejection levels respectively. The level and difference are also reported, with Δ representing first difference for all variables.

Source: Author's computation.

Table 4. Zivot and Andrews non-stationarity test (with single structural break)

Variable Names	At level		At first difference	
	T-Stat.	Time break	T-Stat.	Time break
LNGDPC	–2.95338(4)	2011	–2.9202(4)*	2012
LNLE	–4.18559(4)	2002	–4.55201(3)**	2003
LNEN	–4.32221(4)***	2007	–4.59746(4)***	2008
LNFLFP	–5.9393(4)	2014	–5.01066(4)**	2014

Note: Superscripts ***, **, and * represent 0.01, 0.05, and 0.10 percent statistical rejection levels respectively. The numbers in bracket are the optimal lag lengths of the variables investigated.

Source: Author's computation.

Tables 3 and 4 report the stationarity and non-stationarity test results. After first differencing, the results of the traditional unit root tests ADF and PP revealed that all the variables become stationary. Also, the KPSS test with the opposite null hypothesis shows that the variables are stationary after the first difference. ADF and PP tests have been criticised in the literature to be plagued with problems of low power and size. Therefore, the Zivot-Andrews (ZA) unit root test was carried out to account for structural breaks and com-

plement the ADF, PP, and KPSS tests. The result from the Zivot-Andrews test also reveals stationarity after the first differencing for all the variables.

An in-depth examination of the ZA unit root tests reveals break dates that reflect important events in Saudi Arabia. For example, from 2002 to 2014, the country experienced a series of economic reforms that aimed to reduce the country's reliance on crude oil revenue, limit deregulation, and encourage foreign investment and privatisation.

Table 5. Lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	192.6024	NA	1.01E-11	–13.97054	–13.77857	–13.91346
1	276.6028	136.8896*	6.65E-14	–19.00762	–18.04774*	–18.72219
2	295.6963	25.45791	5.78e-14*	–19.23676*	–17.50898	–18.72300*

Note: * represent the lag order selected by the criterion. HQ: Hannan-Quinn information criterion. SC: Schwarz information criterion. AIC: Akaike information criterion. FPE: final prediction error. LR: sequence modified likelihood ratio test statistics. All tested at 5% level.
Source: Author's computation.

Table 5 reports the results of the lag selection applied in order to avoid a spurious regression trap. The study relies on the AIC criterion indicating a lag of two periods. The criterion is considered to be more parsimonious than other criteria, such as SC, HQ, and FPE. The chosen lag length is in line with a prior expectation of between one and two for yearly data.

Table 6. Results of the Bayer-Hanck test for cointegration

Estimated model	EG-JOH	EG-JOH-BO-BDM	Cointegration
LNLFP=f(LNGDPC,LNEN,LNLE)	16.61***	127.1293***	✓
LNGDPC=f(LNFLFP,LNEN,LNLE)	15.9997**	25.0914**	✓
LNEN=f(LNGDPC,LNFLFP,LNLE)	15.9373**	21.9867**	✓
LNLE=f(LNGDPC,LNEN,LNFLFP)	15.0204**	26.8076 ***	✓
1% critical value	16.259	31.169	
5% critical value	10.637	20.486	
10% critical value	8.363	16.097	

Source: Author's computation.

Table 6 reports the Bayer and Hanck [2013] long-run combined cointegration test using all variables as endogenous variables, one at a time. The result reveals that there exists a long-run equilibrium relationship for each of the models between female labour participation, female tertiary school enrolment, female life expectancy and gross domestic product per capita. This result is also validated by the autoregressive distributive lag ARDL bounds test, as reported in Table 7.

Table 7. ARDL bounds test for cointegration

Estimated model	Optimal lag length	F-statistics	Critical value	I(0)	I(1)
LNFLFP=f(LNLE,LNGDPC,LNEN)	2,2,4,2	6.432658***	1%	4.29	5.61
LNLE=f(LNFLFP,LNGDPC,LNEN)	4,1,0,4	11.82696***	5%	3.23	4.35
LNGDPC=f(LNFLFP,LNEN,LNLE)	3,4,4,4	5.746001***	10%	2.72	3.77
LNEN=f(LNFLFP,LNGDPC,LNLE)	4,4,4,4	6.928079***			

Note: *,**, and *** represent 10%, 5% and 1% significance rejection levels respectively.
Source: Author's computation.

Table 8. ARDL short-run and long-run results

Endogenous variable: *LNFLFP=f(LNGDPC,LNEN, LNLE)* (4,4,4,4) **Short-run coefficients**			
Independent variables	Coefficients	Standard error	t-Statistic
Δ*LNGDPC*	0.302007***	0.092798	3.254438
Δ*LNLE*	–0.374033	0.75967	–0.492363
Δ*LNEN*	0.105244***	0.05225	2.01424
ECM_{t-1}	–0.845105***	0.151191	–5.589664
R-square	0.847204		
Long-run coefficients			
Independent variables			
LNGDPC	0.82702***	0.191027	4.329326
LNLE	3.318122***	1.587761	2.089812
LNEN	0.124533***	0.054932	2.267035
CONSTANT	–16.93679***	6.650333	–2.546758
Diagnostic tests			
Test	F-Statistic	P value	
Serial correlation	18.88236	0.02	
ARCH	6.206684	0.0208	
White	1.574207	0.2993	

Note: Superscripts *, **, and *** represent 10%, 5%, and 1%*** statistical significance rejection levels respectively.
Source: Author's computation.

Table 8 summarises the short and long-run dynamic relationships among variables with *LNFLFP* as endogenous, using the optimum lag length as given by AIC. The long-run results reveal that there exists a positive significant relationship between female labour force participation and all the variables of interest: female tertiary school enrolment, female life expectancy and gross domestic product per capita. This result is in line with a prior expectation that female school enrolment will lead to a higher level of education and con-

sequently encourage such highly qualified females to join the labour force. Similarly, higher life expectancy will lead to a higher labour force participation rate, and gross domestic product could have both a positive and negative impact (income and substitution effect) on the female labour force participation rate. If the income effect outweighs the substitution effect, then the influence of economic growth on the female labour force participation rate will be negative, while a higher substitution effect will imply a positive relationship between the variables [Goldin, 1994]. A positive significant relationship between economic growth proxied by gross domestic product per capita and the female labour force participation rate implies that, for Saudi Arabia, the substitution effect outweighs the income effect in both the long and short run, positing that an increase in macroeconomic activities contributes positively to female labour force participation within both time periods.

Gross domestic product and female tertiary school enrolment contribute more to the female labour force participation rate in the long run than in the short run. On the other hand, life expectancy is not significant in the short run, but highly significant in the long run. This study further reveals that investment in female tertiary education will contribute and translate into a comparable improvement in their place of work and higher chances for females to be willing to enter and remain in the labour force. This result is in line with studies from other countries, such as Mujahid and Zafar [2012] for Pakistan and Kizilgol [2012] for Turkey. Furthermore, the ECM model shows that the speed of adjustment to an equilibrium path is about 85% of the speed of convergence by the yearly contributions of female school enrolment, economic growth and female life expectancy.

To ensure that the fitted model is not plagued with serial correlation and that the model is properly specified and stable, we apply diagnostic tests (serial correlation, ARCH and White test) as well as the CUSUM and CUSUM squared tests. Plots of the cumulative sum of the residuals and the cumulative sum squared that lie within 5% significance lines (Figures 6 and 7) show that the estimated model is robust and viable for policy options.

Figure 6. CUSUM squares test plot

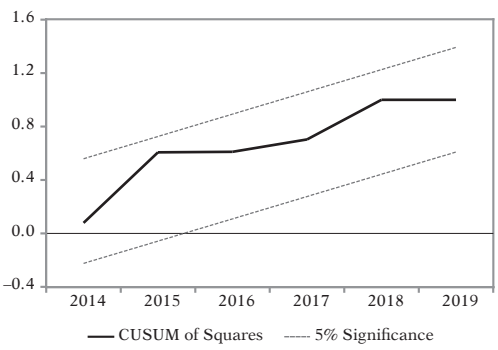
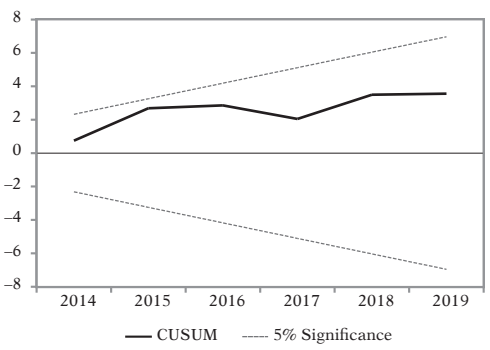


Figure 7. CUSUM test plot



Source: Author's computation.

Table 9 reports the results of Granger causality testing with the use of the Toda-Yamamoto approach. There is a feedback causality between female tertiary enrolment and life expectancy, indicating that women with a higher level of education end up making better health choices and enjoy a high index of life. There also exists a bidirectional relationship between female school enrolment and gross domestic product. This is in line with the expectation of education being an important component of human capital. It is thus expected to contribute positively to economic growth.

Also, there exists a unidirectional relationship between female labour force participation and life expectancy as well as gross domestic product. This result indicates that women's participation within the labour force contributes positively to economic growth as well as the wellbeing of the economy. On the other hand, there is no causal relationship between female tertiary school enrolment and the female labour force participation rate. Likewise, there is no causal relationship between school enrolment and gross domestic product, over the studied period.

Table 9. Causality analysis

Null Hypothesis	Causality	Chi-square.	Prob.
LNEN≠>LNFLFP EN≠FLFP		6.244466	0.1816
LNFLFP≠>LNEN	*EN≠FLFP*	4.854064	0.3026
LNGDPC≠>LNEN		17.96703***	0.0013
LNEN≠>LNGDPC	*EN↔GDPC*	28.29716***	0.000
LNLE≠>LNEN		1.651648	0.7995
LNEN≠>LNLE	*EN→LE*	80.22473***	0.0000
LNFLFP≠>LNGDPC	*FLFP↔GDPC*	20.44003***	0.0004
LNGDPC≠>LNFLFP		33.58448***	0.0000
LNLE≠>LNGDPC		1.334996	0.8554
LNGDPC≠>LNLE	*GDPC→LE*	78.26281***	0.0000
LNLE≠>LNFLFP		0.631191	0.9595
LNFLFP≠>LNLE	*FLFP→LE*	24.6399***	0.0001

Note: The superscripts *, **, and *** represent 10%, 5%, and 1% statistical significance levels respectively. Here, ≠, → and ↔ represents No Granger causality, one-way causality and bi-directional causality respectively. Additionally, ≠> means 'does not Granger-cause'.

Source: Author's computation.

Conclusions and Policy Recommendations

In 2019, the female labour force participation rate in the MENA region was 17.5%, very low compared to the global figure of 47.7%. Saudi Arabia, which is one of the countries in the Middle East and North Africa region, has outlined its Vision 2030 goal to provide women with more freedom and opportunity to contribute to the economy. As a result, the country's unemployment rate is expected to fall from 11.6% to 7% and female labour force participation is projected to increase to 30% by 2030. It is on this premise that the study examined the determinants of the female labour force participation rate in Saudi Arabia using yearly data from 1991 to 2017. With the help of robust econometric techniques, the study examined the effect of economic growth, life expectancy and female tertiary enrolment on female labour force participation. These econometric techniques include the cointegration test of Bayer and Hanck, further validation using the Pesaran ARDL bounds test for reliability of estimation, and the Zivot-Andrews unit root test (structural break).

The short- and long-run results present positive significant relationships between female school enrolment, economic performance as captured by economic growth, and female labour participation. This result reflects policy implications for Saudi Arabia, for the Vision 2030 targets to be achieved both in the short and long term, especially when it comes to increasing the number of women joining the labour force. Policies will be directed towards providing support for women and encouraging female tertiary enrolment, maintaining economic growth and increasing health status as captured by life expectancy.

Also, the causality test showed a bi-directional relationship from female labour force participation to economic growth, between female tertiary enrolment and economic growth, and a unidirectional relationship flowing from female tertiary enrolment, female labour force participation and economic growth to life expectancy. These findings revealed that, for Saudi Arabia, women are key players in contributing to economic growth if given the opportunity. With the nation's Vision 2030 goals, the country is expected to experience fast economic growth if there is an increase in female labour force participation.

An important future study is to examine the contribution of female labour force participation to economic growth in Saudi Arabia as compared to neighbouring countries.

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