Female Labour Force Participation and the Economic Development in Egypt

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Abstract
Economic literature highlights the vital role that women can play in enhancing the economic development of nations. However, there is still gender inequality in developing countries, especially in education and labour market participation. Although women represent nearly half of the population in Egypt, their labour force participation rate is still very low compared to men. This paper’s primary goal is to investigate the short and long-run associations between female labour force participation and Egypt’s GDP growth rate. The study used annual time series data from 1990-2019, where the vector error correction model (VECM) was employed. The study found that female labour force participation and the gross fixed capital formation growth rate can enhance the GDP growth rate in the long run. Nevertheless, there is no statistically significant relationship in the short run. This paper’s main recommendations are that the Egyptian government needs to implement policies that encourage women’s labour force participation and decrease gender inequality. These policies could be changes in legislation, modernization of social norms, Job flexibility, and increasing access to childcare. Moreover, they need to focus on both the demand and supply sides of the quality of female labour force participation by matching the women’s education with the creation of suitable jobs.

Keywords: Gender inequality; labour force participation; economic development; labour market; Egypt;

JEL Classification: D63; J16; J21;
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1. Introduction

Although the expanded economic activities across the globe have given better chances for participation in education and employment, women's participation in the labour market is still relatively low compared to men, especially in developing countries. Economic literature highlights the vital role women can play in the economy (e.g., Heckman, 1978; Tansel, 2002; Altuzarra et al., 2021; Silva and Klasen, 2021). The high participation of women in economic activities can play a vital role in boosting economic development.

According to Fatima and Sultana (2009), the full integration of women in the labour force is considered a desirable goal for efficiency and equity. The women's labour force participation will improve their economic position, reduce the disparities in education, and
improve their health, increasing overall economic efficiency. Nevertheless, despite the increasing educational attainment for women in developing countries, their participation in the labour force is relatively low compared to the male involvement. Jayachandran (2021) argues that cultural barriers have a significant impact on women's labour force participation.

Egyptian women face many barriers in the labour market, such as house responsibilities, children's care, sexual harassment in the workplace, lack of informant on anti-discrimination laws, and lack of mobility. There is a substantial gap between female and male labour force participation in Egypt (Constant et al., 2020; Hassan and Zaharia, 2021). Although women represent about 49.48% of the total population, their labour force participation is meagre. The female labour force participation rate was 23.27% compared to 70.88% per cent for males (The World Bank, 2020). This paper aims to examine the short and long-run relationship between female labour force participation and Egypt's economic growth. It used time series data from 1990 to 2019 and employed the vector error correction model (VECM).

2. Literature Review

Women's labour force participation has attracted the attention of economic studies (e.g., Anker, 1983; Pampel and Tanaka, 1986; Contreras et al., 2005; Rahman and Islam, 2013; Hare, 2016; Busso and Fonseca, 2015; Ma, 2016; Varol, 2017; Asongu and Odhiambo, 2018; Kumari, 2018; Klasen, 2019; Pal and Chaudhuri, 2020; Klasen et al., 2020; Cameron et al., 2020; You, 2020). Other studies focused on the relationship between female labour force participation and economic development (e.g., Tansel, 2002; Luci, 2009; Fatima and Sultana, 2009; Klasen and Pieters, 2012; Paroussos et al., 2012; Tsani et al., 2013; Gaddis and Klasen, 2014; Klasen and Pieters, 2015; Sorsa et al., 2015; Das et al., 2015; Altuzarra et al., 2021; Silva and Klasen, 2021; Klasen and Pieters, 2020).

According to Tsani et al. (2013), female labour force participation changes may lead to a marginally decrease in economic growth, while decreasing region-specific barriers to female labour force participation may positively impact economic growth. Tam (2011) confirmed the existence of the U-shaped relationship between female labour force participation and economic growth. Similarly, Fatima and Sultana (2009) found a U-shaped association between economic growth and female labour force participation in Pakistan. Lahoti and Swaminathan (2013) showed no U-shaped relationship between economic development and female labour force participation in India. On the contrary, Jaba et al. (2017) reported a positive relationship between economic growth and female labour force participation in fifteen Central and Eastern European countries.

Mujahid and Zafar (2012) found an association between female labour force participation and economic growth in both the short and long run. Similarly, Lechman and Okonowicz (2014) confirmed that female labour market participation could positively enhance economic growth. According to Sasongko et al. (2020), education level and provincial minimum wages positively and significantly affect the women's labour force participation rate. Education, being an essential driver for economic successes of the firm, is important tool of social and economic development in general (Samoliuk et al., 2021; Stacho et al., 2019). Nevertheless, there is no significant effect of economic growth on the female labour force participation rate. Thévenon (2013) indicated that female educational attainment, the proliferation of part-time job opportunities, and the private sector's expansion positively
impact female labour force participation. These factors belong to important features of quality-of-life perception by female population affecting their attitudes towards labour force participation (Puente and Sánchez-Sánchez, 2021; Tvaronavičienė et al., 2021). Atasoy (2017) showed that fertility, maternity conditions, and education positively affect female labour force participation. The same findings are obtained by Witkowska and Kompa, (2020). At the same time, traditional culture stifles female labour force participation.

Recent studies focused on the effects of epidemics on female labour force participation (Malik and Naeem; 2020; Alon et al., 2020). The COVID-19 pandemic forced women with young children to decrease their working hours four to five times than males, which increased the gender gap by 20-50 percent (Collins et al., 2021). Although women represent about 39 percent of global employment, they represent about 54 percent of the job losses related to the current COVID-19 pandemic (Madgavkar et al., 2020). In sectors with a high female employment share, the employment fall due to schools' social distancing and closures is more considerable than sectors with a high male employment share (Alon et al., 2020). According to (de Paz et al., 2020), women are involved in the most negatively affected sectors due to the COVID-19 pandemic.

At the Egyptian level, Hosney (2016) showed that educational attainment, years of schooling, and age increases female labour force participation. In contrast, the number of children, marriage, and living in urban areas decreases female labour force participation. According to (Constant et al., 2020), Egyptian women face many barriers in the labour market, such as house responsibilities, children care, sexual harassment in the workplace, lack of informant on anti-discrimination laws, and lack of mobility. Therefore, Lassassi and Tansel (2020) argued that increasing workplace safety, availability of part-time jobs, potential leave, access to childcare, job flexibility could increase female labour force participation. Regarding the job flexibility, it has obvious positive impact on women engagement in economic activity (Raišienė et al., 2021), however, sometimes it can be unavailable for women or at least available with essential obstacles (Karamanis and Gogos, 2020). Social and economic circumstances play a vital role in decreasing the gender gap in employment (Hendy, 2020) and, consequently, gender gap in remuneration (Oliinyk, 2020), availability of compensations and benefits (Bilan et al., 2020). Furthermore, microcredits can play a significant role in increasing women labour force participation (Arouri and Cuong, 2020).

### 3. Empirical Approach

Due to the lack of monthly or quarterly data, the authors used annual time series data for 1990-2019 and employed vector error correction model (VECM) to test the short and long-run association between female labour market participation and GDP growth rate. Table 1 shows the variables of our vector error correction (VECM) model.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFLFP</td>
<td>Log (Female labour force participation rate %)</td>
</tr>
<tr>
<td>LGDP</td>
<td>Log (Gross domestic product annual growth rate %)</td>
</tr>
<tr>
<td>LGFCF</td>
<td>Log (Gross fixed capital formation annual growth rate %)</td>
</tr>
</tbody>
</table>

Source: Authors
We obtained our data from the World Bank (2020).

The three variables vector error correction model (VECM) can be specified as follows:

\[
\Delta LGDP_t = \sigma + \sum_{i=1}^{k-1} \beta_i \Delta LGDP_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta LFLFP_{t-j} + \sum_{m=1}^{k-1} \delta_m \Delta LGFCF_{t-m} + \lambda_1 ECT_{t-1} + u_{1t}
\]  

(1)

\[
\Delta LFLFP_t = a + \sum_{i=1}^{k-1} \beta_i \Delta LGDP_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta LFLFP_{t-j} + \sum_{m=1}^{k-1} \delta_m \Delta INF_{t-m} + \lambda_2 ECT_{t-1} + u_{2t}
\]  

(2)

\[
\Delta LGFCF_t = \sigma + \sum_{i=1}^{k-1} \beta_i \Delta LGDP_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta LFLFP_{t-j} + \sum_{m=1}^{k-1} \delta_m \Delta LGFCF_{t-m} + \lambda_3 ECT_{t-1} + u_{3t}
\]  

(3)

Where:
- \(k - 1\) is the lag length reduced by one;
- \(\beta_i, \phi_j\) and \(\delta_m\) are the short-run coefficients of the model's adjustment long-run equilibrium;
- \(\lambda_2\) is the speed of adjustment parameter;
- \(ECT_{t-1}\) is the error correction term;
- \(u_{it}\) are the residuals.

Figure 1 shows the evolution of the GDP growth rate in Egypt for the period 1990-2019. As we can see, it decreased sharply from 5.66% in 1990 to only 1.12% in 1991 when Egypt started a plan to reform its economic policy by giving a more significant role to the private sector. After that, the GDP growth rate started to increase until it reached about 6.33% in 2000. Nevertheless, due to external factors tied to the slowdown of the world economic growth and the regional insecurity, it fell to about 2.39% in 2002. It started to increase again until it reached 5.14% in 2010. Due to the 2011 revolution, it dropped sharply to 1.67%, and then it started to increase again until it reached 5.55% in 2019.

Figure 1. The evolution of Egypt’s GDP growth rate 1990-2019

Source: World Bank (2020)
Figure 2 shows the evolution of the female labour market participation in Egypt for the period 1990-2019. As we can see, it was 23.4% in 1990, and it reached its maximum level 23.63% in 2007; then, it started to decline until it reached only 18.35% in 2019.

Figure 2. The evolution of female labour force participation in Egypt 1990-2019

Figure 3 shows the evolution of the gross fixed capital formation growth rate in Egypt for 1990-2019. As we can see, it decreased sharply from 27.29% in 1990 to only 21.09% in 1993 then increased again until it reached 25.75% in 1997. Nevertheless, it declined sharply to only 18.09% in 2009, and then it reached 12.44% in 2014 due to the shocks caused by the 2011 revolution. Furthermore, it finally increased gradually until it reached 17.33% in 2019 due to the recent economic policy reform.

Figure 3. The evolution of gross fixed capital formation growth rate in Egypt 1990-2019

Source: World Bank (2020)
4. Results and Discussion

Before running our model, we used the Augmented Dickey-Fuller (ADF) test to fulfil the stationary condition. Table 2 shows that variables were nonstationary at levels, but after taking the first difference, they became stationary at a 5% significance level.

Table 2. Augmented Dickey-Fuller test

<table>
<thead>
<tr>
<th></th>
<th>Levels</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-value</td>
<td>Unit root</td>
<td>Stationary</td>
<td>P-value</td>
<td>Unit root</td>
<td>Stationary</td>
<td>P-value</td>
<td>Unit root</td>
<td>Stationary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFLFP</td>
<td>0.4247</td>
<td>YES</td>
<td>NO</td>
<td>0.5394</td>
<td>YES</td>
<td>NO</td>
<td>0.7118</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGDP</td>
<td>0.0096</td>
<td>NO</td>
<td>YES</td>
<td>0.0390</td>
<td>YES</td>
<td>NO</td>
<td>0.2928</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGFCF</td>
<td>0.4008</td>
<td>YES</td>
<td>NO</td>
<td>0.0034</td>
<td>NO</td>
<td>YES</td>
<td>0.2033</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First difference

<table>
<thead>
<tr>
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<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFLFP</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0001</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>LGDP</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>LGFCF</td>
<td>0.0064</td>
<td>NO</td>
<td>YES</td>
<td>0.0216</td>
<td>NO</td>
<td>YES</td>
<td>0.0004</td>
<td>NO</td>
<td>YES</td>
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</tbody>
</table>

Second difference

<table>
<thead>
<tr>
<th></th>
<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
<th>P-value</th>
<th>Unit root</th>
<th>Stationary</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFLFP</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>LGDP</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>LGFCF</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
<td>0.0000</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Source: Authors' calculations

Table 3 shows the lag selection criterion for the VECM model. As we can see, the Schwarz information criterion, the sequential modified LR test statistic, Hannan-Quinn information criterion, and Final prediction error suggest running our VECM model with one lag.

Table 3. Lag length criterion test

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>109.2757</td>
<td>NA</td>
<td>4.08e-08</td>
<td>-8.502059</td>
<td>-.355794</td>
<td>-8.461491</td>
</tr>
<tr>
<td>1</td>
<td>149.1742*</td>
<td>67.02942*</td>
<td>3.47e-09*</td>
<td>-10.97394</td>
<td>-.3888*</td>
<td>-10.81167*</td>
</tr>
<tr>
<td>2</td>
<td>153.3483</td>
<td>6.010719</td>
<td>5.30e-09</td>
<td>-10.58787</td>
<td>-.9.56401</td>
<td>-10.30389</td>
</tr>
<tr>
<td>3</td>
<td>165.3536</td>
<td>14.40635</td>
<td>4.59e-09</td>
<td>-10.82829</td>
<td>-.9.36563</td>
<td>-10.42261</td>
</tr>
<tr>
<td>4</td>
<td>177.8490</td>
<td>11.99560</td>
<td>4.22e-09</td>
<td>-11.1079*</td>
<td>-.9.20647</td>
<td>-10.58054</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations
Table 4. Johansen Cointegration Test

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Trace Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.576469</td>
<td>28.85642</td>
<td>29.79707</td>
<td>0.0639</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.153825</td>
<td>5.659918</td>
<td>15.49471</td>
<td>0.7353</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.041703</td>
<td>1.150143</td>
<td>3.841465</td>
<td>0.2835</td>
</tr>
</tbody>
</table>

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Max-Eigen Eigenvalue</th>
<th>Max-Eigen Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.576469</td>
<td>23.19650</td>
<td>21.13162</td>
<td>0.0253</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.153825</td>
<td>4.509775</td>
<td>14.26460</td>
<td>0.8020</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.041703</td>
<td>1.150143</td>
<td>3.841465</td>
<td>0.2835</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

The results of the Johansen co-integration test are presented in Table 4. As we can see from the maximum eigenvalue test, there is at least one co-integration at a 5% significance level. Therefore, we can run the vector error correction (VECM) model to capture short- and long-run associations.

The Johansen co-integration test shows that we have only one co-integrating equation for the VECM model. Hence, we need to estimate the LGDP regression to examine the long-run and short-run relationships and know which ones are statistically significant. Therefore, we estimate the following equation using the ordinary least square method:

\[
D(LGDP) = C(1) \times (LGDP(-1) - 1.1084357859 \times LGFCF(-1) + 1.14235353057 \times LFLFP(-1) - 0.733823085061) + C(2) \times D(LGDP(-1)) + C(3) \times D(LGFCF(-1)) + C(4) \times D(LFLFP(-1)) + C(5) \tag{4}
\]

Where:
- \( C1 \) is the coefficient of the co-integrating model showing the speed of adjustment towards equilibria or the error correction term;
- \( C3 \) is the coefficient of LGFCF, indicating the short-run causality running from the gross fixed capital formation growth rate to the GDP growth rate;
- \( C4 \) is the coefficient of LFLFP, indicating the short-run causality running from the female labour force participation to the gross domestic product (GDP) growth rate.

From Table 5, we can see that the set of regressors are statistically significant with a probability value of 0.003384, which implies that at 1%, 5%, and 10% levels of significance, the set of variables are jointly significant. The Durbin-Watson test statistics of 1.658426 shows that there is no autocorrelation in the error term. And finally, the R-squared of about 50% shows that the set of independent variables can only about 50% variation in the dependent variable (LGDP).

The rule is that if \( C1 \) has a negative sign and statistically significant, we can imply that there is a long-run association running from the gross fixed capital formation and female labour force participation to the GDP growth rate. We can see from Table 5 that the sign of coefficient \( C1 \) is negative, and the P-value 0.0048 is statistically significant at 1%, 5%, and 10%. Hence, we can conclude a long-run causality running from gross fixed capital formation and female labour force participation to the GDP growth rate.
From Table 5, we can see that the p-value of C3 is 0.1457, which is insignificant at 1%, 5%, and 10%. This implies no short-run association running from the gross fixed capital formation to the GDP growth rate. Looking at C4, we can see that the probability value is 0.1409, statistically insignificant at 1%, 5%, and 10%. Therefore, there is no short-run association running from the female labour force participation to the GDP growth rate.

### Table 5. Ordinary Least Squares estimation

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
<td>-0.609006</td>
<td>0.194330</td>
<td>-3.133870</td>
<td>0.0048</td>
</tr>
<tr>
<td>C(2)</td>
<td>-0.105985</td>
<td>0.157900</td>
<td>-0.671214</td>
<td>0.5091</td>
</tr>
<tr>
<td>C(3)</td>
<td>1.146438</td>
<td>0.760084</td>
<td>1.508305</td>
<td>0.1457</td>
</tr>
<tr>
<td>C(4)</td>
<td>3.736356</td>
<td>2.445852</td>
<td>1.527630</td>
<td>0.1409</td>
</tr>
<tr>
<td>C(5)</td>
<td>0.034555</td>
<td>0.028363</td>
<td>1.218294</td>
<td>0.2360</td>
</tr>
</tbody>
</table>

R-squared: 0.496829, Mean dependent var: 0.024968
Adjusted R-squared: 0.405343, S.D. dependent var: 0.184309
S.E. of regression: 0.142128, Akaike info criterion: -0.898601
Sum squared resid: 0.444408, Schwarz criterion: -0.658632
Log likelihood: 17.13112, Hannan-Quinn criterion: -0.827246
F-statistic: 5.430670, Durbin-Watson stat: 1.658426

Table 6 indicates the results of the diagnostic tests of the VECM. As it is shown, the variables follow the normal distribution with no unit roots outside the unit circle, no serial correlation in the residuals, and finally, there is no heteroskedasticity.

### Table 6. Diagnostic tests for the VECM model.

<table>
<thead>
<tr>
<th>Diagnostic test</th>
<th>Test statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Serial Correlation LM Test</td>
<td>0.989246</td>
<td>0.3312</td>
</tr>
<tr>
<td>Residual Heteroskedasticity Test</td>
<td>0.263246</td>
<td>0.9477</td>
</tr>
<tr>
<td>Stability Test</td>
<td>The stability condition is Fulfilled</td>
<td>Variables are stationary</td>
</tr>
<tr>
<td>Normality Test (Jargue-Bera)</td>
<td>1.565612</td>
<td>0.457122</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

5. Conclusion

Nobody can deny women's vital role in all aspects of economic activities in developing and developed countries. Although women represent nearly half of the population in Egypt, their labour force participation rate is still very low compared to men. This paper aimed to examine the relationship between female labour force participation and economic growth in Egypt. Due to the lack of monthly or quarterly data, we employed annual time series data from the World Bank for 1990-2019. A vector error correction (VECM) model was used to capture the short and long-run relationship. The results showed that female labour force participation and the gross fixed capital formation growth rate have a long-run relationship with the GDP growth rate. Nevertheless, there is no statistically significant relationship in
the short run. Therefore, an increase in female labour force participation can play an important role in enhancing the economic growth in Egypt.

This study’s main implications are that the Egyptian government needs to implement policies that remove the barrier on female labour force participation. These policies could be changes in legislation, modernization of social norms, job flexibility, and increasing access to childcare. Furthermore, they need to focus on both the demand and supply sides of the quality of female labour force participation by matching women’s education with the creation of suitable jobs.

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