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Female Labor Participation Rate and Economic Growth in South Asian Countries

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Abstract

This paper investigates the impact of economic growth on the female labor force participation rate (FLPR) in six selected South Asian countries by employing balanced panel data from 2000 to 2019. Pairwise Dumitrescu Hurlin Panel causality test is used to examine the panel causality test between economic growth and FLPR. Pooled OLS, random effects, fixed effect, PCSE, and dummy variable interaction models are used to examine the impact of economic growth. The panel causality test confirms a unidirectional relationship from economic growth to FLPR. The panel regression confirms the U-shape relationship in Pakistan, while Bangladesh, India, and Nepal predict inverse U-shape relationships. Maldives and Bhutan are showing an insignificant relationship between FLPR and economic growth. This study also indicates a joint significant and U-shaped relationship between FLPR and economic growth within six selected South Asian countries. The control variable female fertility, shows negative and significant while female education shows positive and significant impacts on FLPR. Therefore, governments of the region should frame various policies to improve the female labor market through access to education and various training programs. Further, they should provide access to child care, skill development, maternity provisions, accessible and safe transport, job reservations in different public sectors, and pattern of growth that generates more jobs.

Keywords

Female labor force participation rate, economic growth, South Asia, U-shape

1. Introduction

Women constitute about 40% of the world's total labor force. However, in most countries, the female labor force participation (FLFP) rate is significantly lower than the male labor force participation (MLFP) rate (World Bank, 2016). The gap between gender differences has decreased over time. But the gap declined due to a decline in MLFP rate rather than a significant increase in female participation (International Monetary Fund, 2013). Female participation in the labor market is essential for the economic and social development of the country as it promotes efficiency and equality, and leads to human resource development, which creates opportunities for further economic growth and poverty reduction (Mujahid, 2014). Besides economic benefits, female participation also has a spillover effect: it leads to women empowerment through social and economic standing, and a greater female voice at home and society. And an increase in women income leads to more investment in education and health of their wards (Najeeb, et, al., 2020). In addition, increased female participation is associated with an increase in the age of marriages, higher education attainments, and reduced fertility (Heath and Mubarak, 2015).

Understanding various factors that encourage females to either take part or refrain from the labor market is essential for policymakers to frame various legislation to help an economy sustain sustainable and productive growth. Understanding these factors and their effect on female labor participation can determine the productive perspective of countries. It will help address the issues that deter female participation and assist in their encouragement. These findings are vital as female participation in the world has become an essential component in determining the economic growth in the world and South Asia. The present paper adds to the literature on the economic growth and female participation rate in South Asian countries.

South Asian countries are showing rapid economic transformation and high economic growth. Economic growth of the three largest economies of South Asia, namely India, Pakistan, and Bangladesh, was about 5% during the 1990s. Even after the financial crisis of 2008, India's growth rate was 9%, and that of Bangladesh, Pakistan, and Sri Lanka were about 7%. Despite these high growth performances, South Asian countries faced shortages of new job creation and quality jobs for the region's growing population. During the last decade, poverty declined more than about 10 percentage points in South Asian countries. Furthermore, women are excluded from the labor market due to the low female labor force participation rate, the larger disparity in gender-wise employment rates, and women's engagement in unpaid sectors. Therefore, providing productive employment for female workers and minimizing the various barriers are essential for sustainable and inclusive growth in South Asia.

Figure 1 shows the difference in the pattern of female participation rate across south Asian countries. Bhutan and Nepal are the only South Asian counties where FLPR is higher than the world average. Pakistan and India have the lowest FLPR in South Asian countries. Even Pakistan has surpassed India from the year 2012. The Maldives surpassed the FLPR in Sri-Lanka in 2004.

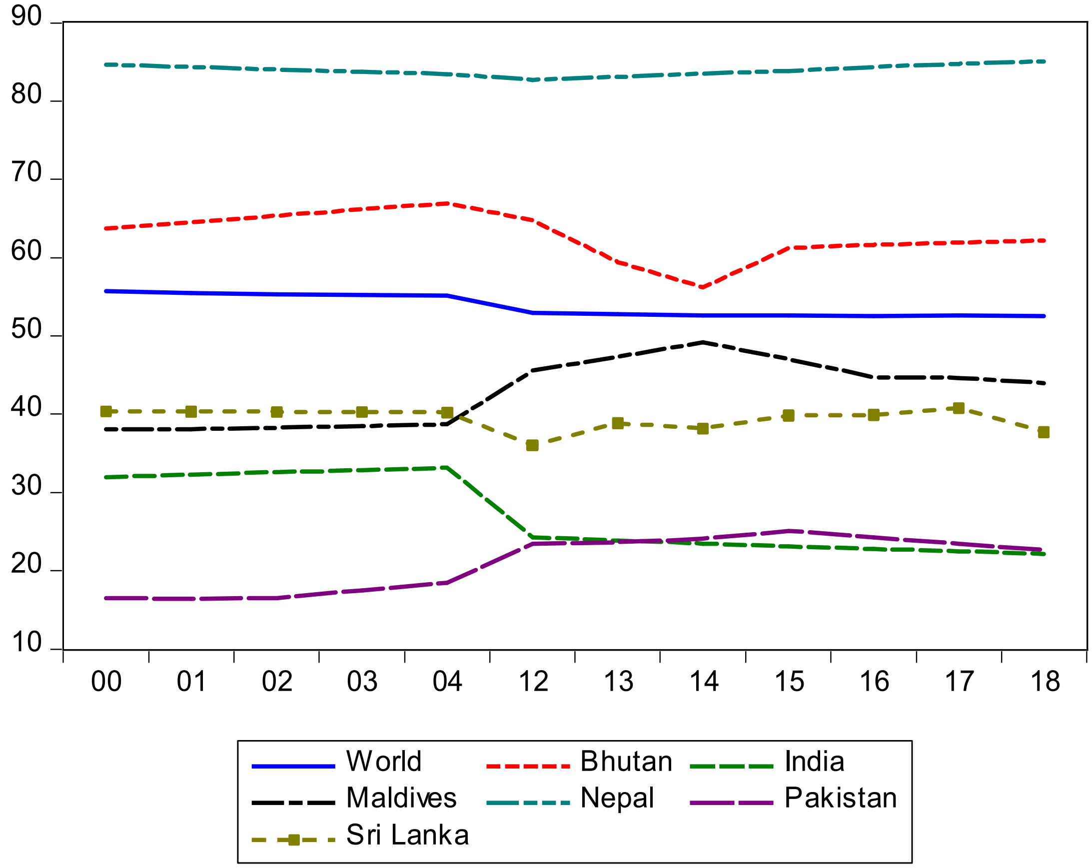

Figure 1: Female labor force participation rate in SAARC and World (2000-2019)

Source: Authors calculation from Worldbank database using STATA 16

Note: Y-Axis of graph shows Labor force participation rate, female (% of female population ages 15-64) (modeled ILO estimate) while X-Axis shows time (2000-2019).

Figure 2 shows the difference in male and female labor participation rates across South Asian countries. India, Pakistan, and Sri Lanka show increasing differences in participation rates. Maldives and Bhutan show a fluctuating pattern of participation rates. Intially they had eliminated the gap. But in recent years it has shown an increasing trend. Nepal has almost eliminated the gap both due to a decline in the male labor participation rate and an increased female labor participation rate.

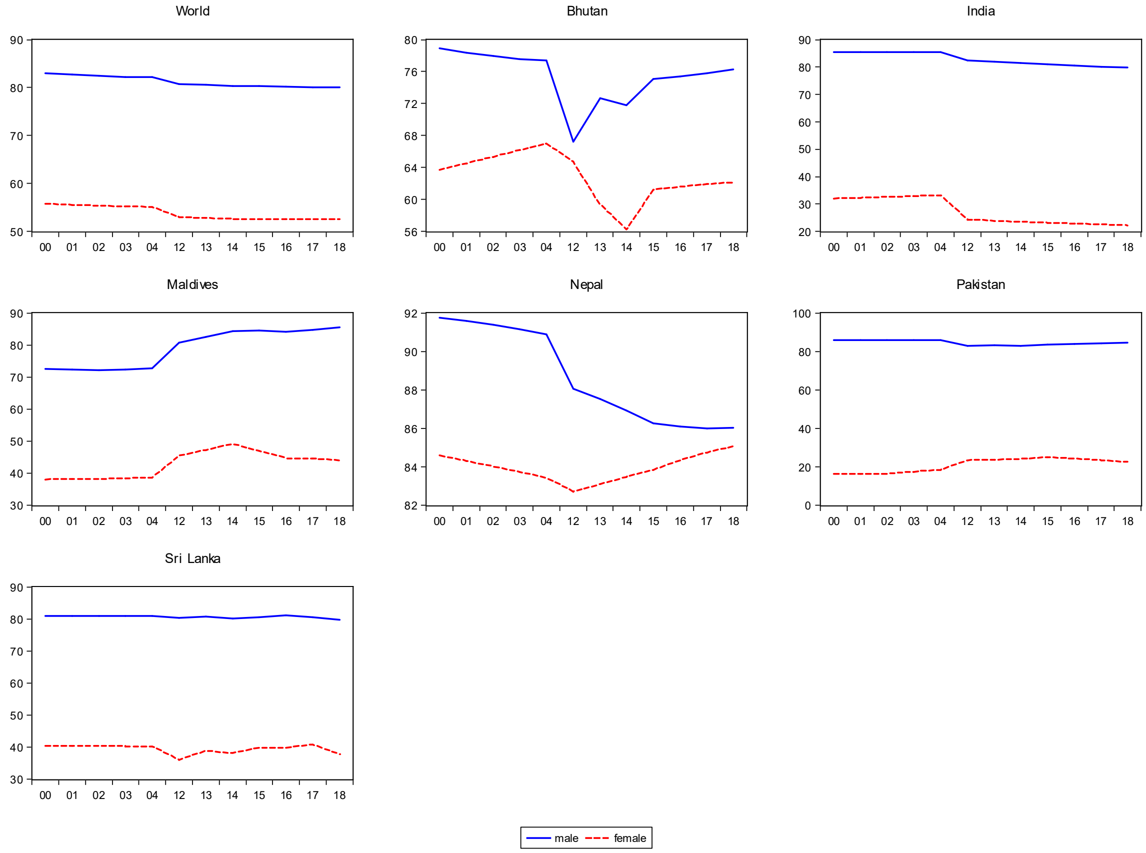

Figure 2: Male and *female labor force participation rate in SAARC and World (2000-2019)*

Source: Authors calculation from Worldbank database using STATA 16

Note: Y-Axis of graph shows Labor force participation rate, female (% of female population ages 15-64) (modeled ILO estimate) and Labor force participation rate, male (% of male population ages 15-64) (modeled ILO estimate) while X-Axis shows time (2000-2019).

Although, SAARC region has shown massive success in growth performance during last decade, the female labor force participation rate is only 23.6% while it is 80% for men (Worldbank, 2020). Therefore, women in the region are left out of region's economic success. There are several barriers that restrict the female participation rate, including low level of female education, domestic violence, domestic duties and unpaid care work that render women's work invisible (Worldbank, 2020). Female labor participation rate and access to decent standard work are essential for sustainable and inclusive development of a country. Women continue to face various constraints to enter in labor market and face a range of challenges related to access to decent choice of work, wage parity, discrimination, employment security, and balancing the family responsibility. Further, women are usually seen in the informal economy where their exposure to exploitation is great with minimum social protection.

Considering these insights, the paper seeks to examine the various determinants of FLPR in six selected countries of South Asia. The purpose of the paper is to determine whether economic growth has a significant impact on FLPR. The following are the contributions that the present paper aims to provide. First, despite the current and potential importance of female labour participation for economic growth, research into the SAARC countries remains fragmented (country-by-country) and limited, particularly in terms of studies examining the impact of economic growth on female labour participation. As a result, the paper presents critical insight on the impact of economic growth on female labour participation in emerging markets. Second, to the best of the author's knowledge, this is the first attempt to conduct an econometric analysis to investigate the female labour force participation rate and economic growth nexus in SAARC countries. Further, the present study provides the joint impact of economic growth of South Asian emerging countries as previous studies but also provides an additional contribution to the existing literature by introducing a dummy variable interaction model. On this point, the paper examines the relationship between FLPR and economic growth within the framework of the U-shaped Kuznets curve after controlling for female education and fertility rate. A first causal relationship between economic growth and FLPR is determined. After determining the direction of the relationship, the next step is to examine the joint impact. Besides the joint impact, the individual effect of economic growth in six South Asian countries and the comparison among these countries are also provided to distinguish the individual relationship between economic growth and FLPR.

To conduct the analysis, yearly data of 19 years from 2000-2019 were collected from ILO and World Bank database. Pairwise Dumitrescu Hurlin Panel causality test is used to examine the panel causality test between economic growth and FLPR. The panel test confirms a unidirectional relationship from economic growth to FLPR. Next, the country-specific effect of economic growth is added along with the overall impact of economic growth in six countries of South Asia, which implies the originality of the present paper, as most of the existing literature only discusses the joint impact of economic growth. Initially pooled OLS, random effects (RE), Fixed effects (FE), and Panel corrected standard errors (PCSE) regressions are used to get the joint impact of economic growth and control variables on FLPR in the countries under study. Then, the dummy variable interaction regressions are run to get the separate effect on each country. The regression results show that the joint impact of economic growth is U-shaped and significant. The control variable fertility shows negative and significant while female education shows positive and significant impacts on FLPR. The country-specific dummy variable interaction model implies a U-shaped relationship in Pakistain while an inverse U-shaped relationship in Bangladesh, India, and Nepal. Maldives and Bhutan show an insignificant relationship between female labor force participation rate and economic growth.

The paper is structured as follows. First a literature review briefly discusses the literature on the relationship between economic growth and FLPR. It contains both theoretical and empirical reviews. In the theoretical review, the paper presents Kuznets U-shaped relationship; positive, negative, and neutral arguments about Kuznets U-shaped relationship. Second, the methodology section describes the variables, data for variables, sources of data, necessary economic and econometric models, methodology to derive these models, and empirical implementation of the present study. This is followed by empirical results of relevant estimations. Finally, in the conclusion, concluding remarks and policy recommendations are presented.

2. Literature Review

A huge amount of economic literature suggests a U-shaped relationship between FLPR and economic growth (Tsani et al., 2013). The hypothesis suggests that economic growth measured by GDP per capita and FLPR are mutually dependent, and such dependence is conditional to the structural transformation of the country (Boserup et al., 2013). The declining part of the U-shaped curve suggests the trade-off between FLPR and economic growth. The declining part explains the shift from the traditional agricultural sector to the modern and labor-intensive industry sector, where the demand of the male labor force is more than the female labor force. Sinha (1967) attributed the trade-off or downward portion of the U-shaped curve due to a decrease in the female labor force during shifts to non-agricultural production and urbanization. Women are excluded from the job market due to the domestic demands of large families, physical limitations, and gender discrimination in the labor market (Pampel & Tanaka, 1986). Pampel and Tanaka (1986) argue that the early stage of economic growth accompanied by mechanical farming and industrial development causes women to leave formal jobs and work on domestic production. Golden (1995) argued that social stigma excludes females in the labor market. However, this trade-off disappears as the country movies from the industry sector to the service sector. Post industrialization phase is usually associated with increasing FLPR of the country (Olivetti, 2013). Growth of the service sector, accompanied by rising women's access to modern education and a decline in fertility rate leads to high female labor force involvement in national activity. The process of growing female involvement is demonstrated by a rising portion of a U-shaped curve (Gaddis & Klassen, 2013). Both income and substitution effects operate during the process of a U-shaped relationship. The strong income effect dominates the substitution effect during the declining portion of the U-shaped curve. In the rising part, the substitution effect is more than the income effect.

Different authors emphasize different aspects and patterns of relationships. Durand (1957), Boserup (1970), Pampel and Tanaka (1986) suggest that the relationship between economic growth and FLPR varies across countries, as in different countries the industry sector employs a different amount of female labor depending on gender relations. The nature of the relationship is also described by religious factors representing the country's social norms, and cultural, attitudinal and institutional factors. Because of these factors, a well-grounded U-shape relationship may vanish (Wolch & Dear, 2014; Fernandez, 2013; Nassar, 2003).

Although the presence of a U-shaped relationship was observed in cross-sectional data of multiple countries (Sinha, 1967; Goldin, 1995; Pampel &Tanaka, 1986; Juhn & Ureta, 2003; Mammen & Paxson, 2000), individual countries are not confirming the presence of U-shape relationship over a period (Tam, 2011). Luci (2009) and Tam (2011) addressed the issue in their separate studies by using panel data techniques and confirmed U-shaped relationships. However, Gaddis and Klasen (2012) argued various issues with these panel models as they ignored the problem of endogeneity of economic growth with FLPR. Also, panel data are sensitive to underlying data, especially the economic growth estimates. The present paper provides both the joint impact of GDP per capita and the individual country-wise impact of GDP per capita in selected six countries of South Asia.

3. Granger Causality Test

Like in time-series data, panel data casualty tests are performed by regressing k lags of dependent with k lags of the independent variable. If one or more lags of the independent variable are significant, we reject the null hypothesis that the independent variable does not cause a dependent variable. There are two approaches to check the causality test in data. The first approach is just to pool the data and then perform the Granger Casualty test. The method assumes homogeneity across all cross-sections. The second model developed by Dumitrescu and Hurlin (2012) rejects the assumption of coefficient homogeneity. The test proposes the Homogenous Non-Causality Test (HNC) by taking both the regression model and causal relation heterogeneity. Table 1 shows the result of the HNC hypothesis according to Dumitrescu and Hurlin (2012) by including heterogeneity among both regression models and casual relation. The results indicate that we can not reject the null hypothesis that female labor force participation rate does not Granger cause economic growth in South Asian countries. On the other hand, results allows us to reject the null hypothesis that economic growth does not cause female labor force participation rate and conclude that economic growth may cause female labor force participation rate in South Asian countries. The empirical results and interpretation of Granger causality test resembles the research work of Rahman, (2020). After looking the casual relation from economic growth to female labor force participation rate, the next step of research is to examine the impact of economic growth on female labor force participation rate.

Table 1. Pairwise Dumitrescu Hurlin Panel Causality Tests

Null Hypothesis:	W-Stat.	Z bar-Stat	Prob.
FLRP does not homogeneously cause GDP	0.94374	-0.27957	0.7798
GDP does not homogeneously cause LRP	22.1475	27.9341	0.0000***

****, significant at 1% level of significance.*

Source: Calculations from Worldbank database using STATA 16.

4. Impact of economic growth on the female labor participation rate

We followed a U-shaped relationship between female force labor participation rate and economic growth based on various empirical and theoretical literature. The U-shaped relationship is expressed as

$$FRPR = f(GDPcy, GDPcy^2, \text{Z}) \qquad (1)$$

Where $FRPR$ is the female labor force participation rate, $GDPcy$ the GDP per capita; and Z shows the impact of other variables on $FRPR$. We linearise the above equation by taking logs for empirical analysis as

$$\ln(FRPR) = \ln(GDPcy) + \ln(GDPcy)^2 + \ln Z \qquad (2)$$

To estimate the average impact of economic growth and other factors on female labor force participation rate from equation (2), the paper uses panel models Pooled OLS, Random Effects, and Fixed effects. Also, we applied interaction terms to see the country-specific impacts of economic growth, and combined effects of economic growth are calculated for South Asian countries. The panel data model are described as:

$$\ln (FRPR)_{it} = \alpha + \beta_1 \ln (GDPcy)_{it} + \beta_2 \ln(GDPcy)_{it}^2 + \Upsilon' \ln(Z)_{it} + e_{it} \quad (3)$$

$$\ln (FRPR)_{it} = \alpha + \mu_i + \theta_t + \beta_1 \ln (GDPcy)_{it} + \beta_2 \ln(GDPcy)_{it}^2 + \Upsilon' \ln(Z)_{it} + e_{it} \quad (4)$$

$$\ln (FRPR)_{it} = \alpha + \mu_i + \theta_t + \beta_1 \ln (GDPcy)_{it} + \beta_2 \ln(GDPcy)_{it}^2 + (\eta_1 D_{it}) \times \ln(GDPcy)_{it} + (\eta_2 D_{it}) \times \ln(GDP)_{it}^2 + \Upsilon' \ln(Z)_{it} + e_{it} \quad (5)$$

Where $(FRPR)_{it}$ is the female labor force participation rate, θ_t is the time-variant effect or country invariant effect, μ_{it}; is the country-specific effect or time-invariant effect. e_{it}; denotes the error term. The error term is independent and identically distributed (iid) with mean zero and constant variance. $(GDPcy)_{it}$ represents gross domestic product per capita(at constant 2010 prices) measured in US dollars for international comparison and $(GDPcy)_{it}^2$ represents the square of GDP per capita. $(Z)_{it}$ is the vector of explanatory variables impacting $(FRPR)_{it}$; other than GDP per capita, namely female fertility rate and female school enrollment rate. Subscript (t) denotes time $(t = 1,2,3,4 \ldots, T)$ where $T = 20$ in our study. Subscript (i) denotes time (i =1,2,3,4,…,N) where N=6 in our study. Country differences are captured by introducing interaction dummies, as shown in equation (5).

The present paper examines the relationship between female labor force participation rate and economic growth in six South Asian countries, namely, Bhutan, India, Maldives, Nepal, Pakistan and Sri- Lanka. A panel data set for 20 years in the period 2000-2019 is used containing information from six countries. These six countries are sampled from 2000-2019 since all of them have available data and information on GDP per capita, female labor force participation rate, and other control variables. The paper has strongly balanced panel data since the period is identical for all six countries. Afghanistan and Bangladesh are excluded due to lack of necessary data. Also, observations before 2000 are dropped to avoid the problem of unbalanced panel data, and due to lack of panel data. SAARC countries are emerging and have low data availability, that is reason scarce literature is available on female labor force participation rate. Further, variables are not measured at 5-year intervals over the period as done by Cingano (2014) to capture the fluctuations of time series data. Taking 5-year interval gap in data would reduce the sample size, making it impossible to carry out the econometric analysis developed in this paper. There are number of studies using data without 5-interval gap of data like Llorca-Rodríguez et al (2020), Sharma et al (2021), Makun et al. (2022), and so on. The average impact of panel is specified to get an ideal of determinants of female labor force participation rate of overall South Asia. Thus, through this research we can understand the present scenario, identify the obstacles and provide suggestions for further improvement.

The present study is based on secondary data. The data of female labor force participation rate, GDP per capita, female fertility rate and female school enrolment are gathered from Worldbank database. In the first part of estimation, equation (1) is estimated by pooled OLS model assuming no country-specific and time-specific effect. Then, equation (2) is assessed through random effect based on the assumption that individual effects are uncorrelated with regressors. Next, equation (2) is obtained using a fixed-effect model, which controls the correlation between explanatory variables and individual effects. Next, we estimate the impact of economic growth and other explanatory variables through the panel-corrected standard error model (PCSEs). The technique is used because it provides accurate standard error estimates, free from Autocorrelation and less sensitive to outliers.

After obtaining the necessary estimation of parameters, necessary tests are conducted to make a decision about which model is best among pooled OLS, random effect, fixed effect, and PCSEs. Breusch-Pagan LM test is conducted to select a model between pooled OLS and random effects. Then to choose between RE and FE models, the Hausman test is used. The Wooldridge test is used to check the Autocorrelation of the model, and the Modified Wald test is used to detect heteroskedasticity. In the second part of the analysis, pooled OLS, RE, FE, and PCSEs are run for dummy variables interaction model as depicted in equation (5).

There is a high chance of omitted variable bias due to unobserved heterogeneity across different cross units in panel data. Endogeneity can be solved using the general method of moments (GMM) and instrumental variables (IV) estimation. GMM estimators are biased in small sample sizes due to the correlation between weight matrices and moments. IV estimators are also biased in the case of a small size sample. A small violation of assumptions of IVs leads to a bias even in a large sample. In the present paper, sample size comprising 120 observations is not too small, but is no large enough to use IV or GMM estimators. Omitted variables bias justified by including cross-country effects in the fixed effect regression model of the present paper. Same methodologies were applied by Sutradhar (2020) in 160 observations.

5. Empirical Results

Table 3 represents the coefficients of explanatory variables of pooled OLS, random effect, fixed effect, and PCSEs regression, which confirms the U-shaped relationship between economic growth and female labor force participation rate. Table 2 represents the post estimation tests of pooled OLS, random effects, and fixed effects regression. Hausman test is conducted, and it is seen fixed effect model is better than random effects. The Breusch-Pagan LM tests confirm that pooled OLS is a better choice than random effect. Wooldridge test of Autocorrelation and Modified Wald test of heteroskedasticity confirms the presence of Autocorrelation and heteroskedasticity, respectively. Therefore PCSEs model is a better choice for our study. The results of PCSEs model that coefficient GDPcy is negative and significant while the square of GDPcy is positive and significant. Therefore, the existence of a U-shaped relationship between female labor participation rate is confirmed. This implies that the increase in economic growth leads to a decrease in the female labor participation rate. After reaching minimum thresh point, an increase in economic growth leads to a rise in the female labor force participation rate. The other variable, the fertility rate, shows a negative and significant impact on the female labor force participation rate. A 1% increase in fertility rate leads to a 0.62% decrease in the female labor participation rate. Female school enrollment is contributing positively to the female labor force participation rate. A 1 % increase in school enrollment leads to a 0.61% increase in female labor force participation.

Table2. Hausman, Breusch and Pagan LM test, Autocorrelation, and Heteroscadcity

	Hypothesis	Test	

Hausman test	H0: Fixed effect	Chi^2 (Prob > Chi^2)	0.77
Breusch and Pagan LM test	H0: Random effect	Chi^2 (Prob > Chi^2)	590.48***
Wooldridge test	H0: No autocorrelation	F	14.454**
Modified Wald test	H0: No heteroscedasticity	Chi^2 (Prob > Chi^2)	70.05***

Source: Calculations from Worldbank database using STATA 16

**** significant at 1%.*

Table 3. Impact of economic growth on the female labor participation rate

	Pooled OLS	**RE**	**FE**	**PCSEs**
$(GDPcy)_{it}$	-5.08*** (.671)	-4.31*** (.648)	-4.29*** (.661)	-4.456*** (.304)
$(GDPcy)^2_{it}$	.316*** (.044)	.255*** (.041)	.254*** (.041)	.272*** (.021)
$(FR)_{it}$	-.585* (.342)	-.542*** (.116)	-.544*** (.118)	-.625*** (.092)
$(School)_{it}$	3.939*** (1.23)	1.242*** (.361)	1.235*** (.364)	.615*** (.226)
Cons	9.238** (5.29)	17.202*** (2.357)	17.18*** (2.38)	19.942*** (1.601)
Observations	120	120	120	120
AR (1)				.96
Specification	41.78***	65.64***	15.72***	951.41***

Source: Calculations from Worldbank database using STATA 16

****, **, * significant at 1%., 5% and 10% respectively*

Table 5 represents the robust results of Pooled OLS, random effects, fixed effect, and PCSEs regression for dummy variable interaction. After running these four regressions of the dummy interaction model, the next step is to choose the appropriate model with the help of post-estimation tests. Results of post estimation are shown in Table 4. Hausman test is conducted, and it is seen random effect model is better than the fixed-effect model. The Breusch-Pagan LM tests confirm random effect model is a better choice than the fixed effect model. Wooldridge test of Autocorrelation and Modified Wald test of heteroskedasticity confirms the presence of Autocorrelation and heteroskedasticity, respectively. Therefore PCSEs model is a better choice for our study. The PCSEs confirm the U-shaped relationship between female labor force participation rate and economic growth in Pakistan while inverse U-shaped relationships in Bangladesh, India, and Nepal. Maldives and Bhutan show an insignificant relationship between female labor force participation rate and economic growth. Other variables like female fertility rate are show a significant negative impact on female labor force participation rate. A 1% increase in female fertility rate leads to a .216% decrease in female labor force participation rate. Female school enrolment is having a positive and significant impact on the female labor force participation rate. A 1% increase in female school enrolment leads to a .141% increase in female labor force participation rate.

Table 4. Hausman, Breusch and Pagan LM test, Autocorrelation, and Heteroscadcity

	Hypothesis	Test	
Hausman	H0: Fixed effect	Chi^2 (Prob > Chi^2)	26.43**
Breusch and Pagan LM	H0: Random effect	Chi^2 (Prob > Chi^2)	0.016
Wooldridge:	H0: No autocorrelation	F	13.228**
Modified Wald	H0: No heteroscedasticity	Chi^2 (Prob > Chi^2)	500.12***

Source: Calculations from Worldbank database using STATA 16

**** significant at 1%.*

Table 5. Impact of economic growth on the female labor participation rate

	Pooled OLS	RE	FE	PCSEs
$(GDPcy)_t$ Bhutan	-.012 (1.27)	-.012 (1.27)	-3.522 2.76	.421 (1.41)
$(GDPcy)_t^2$ Bhutan	-.004 (.080)	-.004 (.081)	.218 (.175)	-.031 (.089)
$(GDPcy)_t$ Bangladesh	.263*** (.098)	.263*** (.098)	5.89* (3.23)	.271*** (.098)
$(GDPcy)_t^2$ Bangladesh	-.026** (.012)	-.026** (.012)	-.391* (.206)	-.026** (.012)
$(GDPcy)_t$ India	.494*** (.128)	.494*** (.128)	4.257 (3.31)	.408*** (.143)
$(GDPcy)_t^2$ India	-.076*** (.016)	-.076*** (.016)	-.318 (.216)	-.063*** (.019)
$(GDPcy)_t$ Nepal	.462 (.290)	.462 (.290)	-12.23* (6.36)	.493 (.312)
$(GDPcy)_t^2$ Nepal	-.055 (.041)	-.055 (.041)	.981** (.476)	-.058 (.044)
$(GDPcy)_t$ Pakistain	-1.01*** (.209)	-1.01*** (.209)	32.63*** (11.71)	-.563** (.288)
$(GDPcy)_t^2$ Pakistain	.136*** (.028)	.136*** (.028)	-2.282*** (.842)	.069** (.041)
$(GDPcy)_t$ Maldives	-.445** (.202)	-.445** (.202)	-4.01 (14.03)	-.215 (.171)

$(GDPcy)_t^2$ Maldives	.052** (.023)	.052** (.023)	.228 (.803)	.026 (.021)
$(FR)_{it}$	-.167 (.146)	-.167 (.146)	-.241 (.153)	-.216** (.112)
$(School)_{it}$	.549** (.265)	.549 (.265)	.593** (.296)	.146* (.190)
Cons	2.035 (4.795)	2.035 (4.79)	-.521 (12.08)	(1.916) 5.512
Observations	120	120	120	120
AR (1)				.59
Specification	913.64***	12790.96***	37.06***	4465.41***

Source: Calculations from Worldbank database using STATA 16

****,**,* significant at 1%., 5% and 10% respectively*

Robustness and Sensitivity

The behavior of essential regression coefficient estimation can be verified by adding and removing different regressors to the basic regression as a sensitivity test (Sutradhar, 2020). To verify sensitivity of coefficients, we re-estimate our regression model by excluding countries one-by-one with replacement. In each case, most of coefficients are largely remain unaffected in size, sign and significance panel corrected standard error model. There is a presence of first-order autocorrelation and heteroscedasticity of residuals in fixed-effect model, so results model are interpreted on the bases of panel corrected standard error (PSCE) model. PCSE estimates are provides accurate standard errors, are less sensitive to outlier estimates and are free from autocorrelation (Ikpesu et al., 2019). Also, PCSE model performs better with dynamic heterogenous panel data (Eboiyehi, 2017; Bailey & Katz, 2011; Reed & Webb, 2010). Further, different regression specifications presents the same results of inverse U-shaped relationship between female labor force participation rate and economic growth in SAARC region. Thus, results of PCSE model can be considered as robust.

The same testing procedure is used for robustness and sensitivity for the dummy variable interaction model where also PCSE model is chosen. Inclusion and exclusion of various independent variables and countries do not mostly affect the sign, significance and size of estimates and therefore are less sensitive to regression specification. Robust standard errors of PCSE model fights against both heteroscedasticity and autocorrelation.

6. Conclusion and Policy Implications

The present paper uses the panel data of selected six South Asian countries to examine the U-shaped relationship between FLPR and economic growth. The paper investigated factors like fertility and female education in the form of female school enrolment in determining the U-shape relationship. The results confirm the presence of a U-shape relation between economic growth and FLPR. The result indicates that female participation increases with the economic growth in recent years. Economic growth has increased the work opportunities for females. The significant positive coefficient of female school enrollment and negative coefficient of female fertility indicates that females are taking full advantage of these opportunities by reducing fertility and increasing their level of educational attainment. Based on the dummy interaction model, only Pakistan confirms the U-shape relationship, while Bangladesh, India, and Nepal are predicting an inverse U-shape relationship. Maldives and Bhutan show an insignificant relationship between FLPR and economic growth. Therefore, females in Pakistan are enjoying the fruits of economic growth.

Analysis of this paper may prove useful in designing labor market policies in general and framing various programs and initiatives for promoting female participation in the labor market. Our study suggests a strong relation between FLPR and education. It can be argued that providing women education would be an investment in their human capital, allowing them to be equipped with modern skills and creating a more productive labor market. The other policy variable is women's fertility. Our study suggests a strong negative relationship between FLPR and women's fertility. A decrease in fertility leads a reduction in population growth and therefore increases the capital per labor ratio. Also, a shift towards the service sector increases the working-age population. Both of these effects lead to an increase in FLPR (Bloom et al. 2001, 2003). Therefore, the governmens of the region should frame various policies to improve the female labor maket through access to education and various training programs, acess to child care, skill development, maturnity provisions, accessible and safe transport, job reservations in various public sectors, and patterns of growth that generate more jobs. Further, policymakers should be concerned about wether women are taking an active part in new startup businesses and enable them to participate in these startpus as labourers and entrepreneurs. Ultimately, the aim of policymakers should be to provide economic empowerment of women through provision of opportunities for decent work.

The paper does not, however, incorporate the possible effect of education on fertility. Thus further research should discuss the possible impact of education on fertility. For more robust results, further research should increase the number of observations by including more time-series data and number of countries.

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