"Should We Focus on Female Labor Force for Sustainable Development?"

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Abstract:

The female human capital is undervalued and underutilized all over the world, though scholars suggested that proper investment on the female human capital would increase economic growth, reduce poverty, and enhance societal well-being to ensure sustainable development in each country. In this research we will examine the impact of female labor force on economic growth by considering GDP per capital as dependent variable, three subgroup of female labor force (female wage and salaried workers, contributing female family workers and female self-employed workers), female unemployment rate and output per worker as explanatory variables in model

1. In addition we will also analyze the determinants of the female labor force in model 2. The dependent variable is female labor force participation rate and explanatory variables are domestic credit to private sector by banks, women business and the law index score, cost of business start-up procedures (female), total time required to start a business (female), and gross female secondary school enrollment. We conduct multiple regression analysis on panel data sets ranging from 2005 to 2019 using STATA for both models.

In model (1) the research reveals that female wage and salaried workers and female self-employed workers have a strong positive relationship with GDP per capital which suggests that investment in females will increase the productivity of the economy which ultimately will help to attain sustainable development. On the other hand, output per worker has a positive significant relation with GDP per capital as expected, yet female unemployment has also positive relation which is not statistically significant and requires further investigation. So to ensure maximum use of female human capital, the policy makers should focus on the driving factors of female labor force participation rate which we have focused on model 2. Analysis in model 2

reveals that availability of credit in the domestic market and female education are the most important factors to increase the female labor force participation rate as they have significant positive relationships. On the other hand, the cost of start up a business by a female has a significant negative relationship that implies that the cost of start up a business as an entry barrier will reduce the participation of the female labor force in the market. Although we expect that the time of start up a business will have a negative relationship as a barrier for women to enter in the labor force but it shows significant positive relationship, in addition there is an ambiguity regarding the result of women business and law index score as it shows negative relationships, both findings require further investigation.

Keywords: Female Labor Force Participation Rate (FLFPR), GDP per capital, Economic Growth, Sustainable Development.

1. Introduction

The new development agenda of Millennium Development Goals (MDGs) is not only attaining economic growth but sustainable development, in a comprehensive and integrated manner which is the most pressing challenge for developing nations.

Sustainable development can only be achieved through long-term investments in economic, human capital and environmental capital (IMF 2018).

It is believed that the full participation of both men and women's labor force is critical for sustainable development hence only acknowledging men's participation will not be beneficial to sustainable development. Although abundant research suggests investment in human capital for sustainable development where both male and female labor force should equally emphasize but at present, the female half of the world's human capital is undervalued and underutilized in the world.

Better use of the world's female population would increase economic growth, reduce poverty, enhance societal well-being, and help ensure sustainable development in each country.

So it is logical to concentrate rigorously on the contribution of labor force participation in economic growth to ensure sustainable development.

Although the most common and widely accepted recommendation is to provide more formal education opportunities for women that would allow women to get a job in the market but, girls' education is not only one magic key that would unlock the door to women empowerment to ensure sustainable development. As a result female labor force researchers require in-depth research considering the global socio-economic condition where the world of the job market is changing spontaneously due to

technological progress, free trade, green revolution, shifting of human geographically, etc.

To provide insights on this critical economic and development challenge, this study provides a comparative review of the literature. In addition, this research attempts to discover the contribution of each group of female labor forcein the economy by considering the GDP per capital as a proxy of economic growth.Along with that, this research finds out important determinants of female labor force participation rate, considering the global economic trends, so that the policy makers can focus and implement those factors proficiently to enhance female labor force participation rate to ensure sustainable development by improving economic growth. This paper is structured as follows: Section 2 reviews of literature on impact of female labor force on economic growth and its important determinants; Section 3 presents hypothesis development; Section 4 discusses methodologies,appropriate statistical analysis and findings, and Section 5 summaries contribution limitations and recommendation.

2. Literature review

The U-shaped hypothesis is a stylized description of the relationship between the female labor force participation rates with economic development, which is typically measured in terms of GDP per capital. Using this theory as a foundation, many studies found evidence that female labor force participation rates at first declined and then later rose with economic development in a U-shape way (Goldin 1995;Luci 2009; Tam 2011).

While this pattern holds true worldwide in broad terms, not all countries follow this U-shape. The relationship between female labor force participation rate and economic growth is in fact more complex, since many social and cultural factors may affect female labor participation rate (Islam and Islam 2013; Lechman and Kaur 2015; Klasen 2019). However, it is supported by most of the analysts that the female labor force has a significant impact on economic growth to ensure sustainable development. Perhaps Lucus (Lucas 1988) was the first to recognize human capital as a catalyst for economic growth where he emphasized that to enjoy constant marginal return in the economy, investment in human capital is an important factor as it attracts other factors such as physical capital, which also contribute to per capital income growth.

In addition Mohiuddin (Mohiuddin 2013) has figured out that continued improvement of labor through education and skill development can expand the production possibility frontier and believed that this productive labor can be a main driven factor for economic growth. On the other hand, high unemployment rates imply high costs in the economy and in such an environment, labor resources are underutilized and this may lead to adverse effects on growth potentials and development of the countries. There is general agreement that unemployment tends to cause workers to leave the

labor force (Schwietzer and Smith 1974).High levels of unemployment result in the underperformance of the economy through lost output and income (ACOSS 2003). Ozekek points out that an increase in the unemployment rate brings about "hidden unemployment" for females but not for male in European countries (Ozerkek 2013).

Female labor force participation rate has gained interest among researchers and development specialists worldwide due to their significant contribution tothe economy. Recent researchemphasizes that women's economic empowerment is key for growth both through the direct impact of the size of the labor force on output and through the impact on productivity (OECD 2008; Cuberes and Teignier 2016; Verick 2018). Several researchersexplore that there is a positive relationship between women empowerment and economic growth both directly and indirectly (Chaudhary and Verick 2014; Sohail 2014).

It is estimated that growth in GDP would be substantial, if female employment were raised to the male rate particularly in countries such as Japan. Similarly, a study in the United Kingdom found that the country could gain 2% of GDP by better harnessing women's skills (WWC 2006). Women would account for more than half of GDP in the OECD area if the value of housework and childcare were included in national accounting and undercutting the contribution of women's unpaid work to the economic growth of these countries (OECD 2008).

This scenario is even worse in developing countries, where failure to value women's work is a significant barrier to reducing poverty and fostering economic growth. Ustaba and Gulosypoint to a strong correlation between the rate of female labor force participation in industry and services sectors and economic development (Ustabaş and Gulosy 2017).Mammenand Paxson (2020) indicate that women's participation in the labor force first declines and then rises with development.

Internationally, most of the researches support that there is a link between poverty alleviation in countries and the development of their female human capital.In contrast (Klasen and Pieters 2012; Lahoti and Swaminathan 2013; Rahman2020) says female labor force participation rate does not play a major contribution towards economic growth.

To make the best use of their female populations, most countries are investing in female human capital to assure sustainable development. So along with the impact of female labor force participation in the economy it is also important to focus on the determinants that will scale up women's participation in the job market.

The literature on determinants of female labor force mostly emphasizes the supply-side perspective – that is, the factors affecting households' female members' decision to participate in the labor market. Blau and Khan (2006) consider the impact on family income of wages of both women participants and their spouses while controlling

for income from other sources. Klasen and Pieters (2015) use the share of regular salaried employment household income earned and the number of underemployed men in the household. Mahmud and Bidisha (2018) include household head's education to capture the socioeconomic position of the household, and household head's occupational dummy (whether self-employed or not) in the analysis.

Kabeer*et al*. (2018) emphasize in family planning, education, microcredit opportunities and export-oriented industrialization of Bangladesh. Heintz*et al*. (2018) stress the role of migration, education, access to electricity and mobile phones, RMG, etc. in increasing the participation of young women in wage and self-employment. But mostof the researchers suggest that education is the key factor to increase the supply and quality of the female labor force. Indeed educated women are successful in attaining employment, raising output and growth.

(Faridi et al. 2009; Sharma and Sahni, 2015). According to (Anxo 2009; Sharmila and Dhas 2010; Sharmaand Sahni20152015), women's education, FLFP has a positive impact on development in India. In addition Sharmila and Dhas share the findings that the drop-out rate had a negative effect on women's education as a result on women empowerment.(Tansel and Gungor 2012; Hasan and Cooray2013; Syomwene and Kindiki 2015; Ali*et al.*2016) has found that female education positively and significantly affects the steady-state level of labor productivity.

Similarly Kamal and Zunaid (2004) mention that marital status and women secondary education is the most significant predictor of empowerment in Bangladesh. Mamen and Paxson (2020) find that women's education levels, and the education levels of their spouses, appear to be important determinants of women's labor market activities. On the other hand, despite increases in educational attainment, women's employment rates remain very low in the Middle East and North Africa (Selwanessand Krafft2020). Along with education and health issues, gender inequality also gets significant attention from researchers in this female labor force issue all over the world.

The Gender Gap Index shows a positive correlation between gender equality and GDP per capital (WEF 2007; Cuberes and Teignier 2016). In addition King and Hill (1991) reveal that large gender disparities in education reduce gross national product. In this changing economy where economy is boosting up due to free trade, money transformation and money creation, financing is an important issue to start a business and to create new jobs.

Sundari (2020) notices that non-availability of jobs seems to be one of the prime factors accounting for decline in the FLFP in India. The availability of credit is a precondition to boost up the business. According to Kabeer *et al.* (2018) access to microfinance loans has the potentiality to increase female labor force participation. Islam and Islam (2013) explore rapid expansion of micro finance in rural areas has

supported women's employment in poultry and livestock other sectors are growing are either too small or are not employing women in large numbers.

The enormous challenges in the world of work make it more vital than ever to establish a clear picture of global employment hence,we need to understand which groups of female workers are contributing more and which one is less in the economy so that policy makers can understand where and what policy they should take and implement. Although many researchers examine the impact of female labor force but very limited number of research have been focusing on the impact of female labor force considering subgroup of female labor force especially in case of developing countries and this study is an attempt to minimize this research gap by addressing impact of each subgroup of female labor force on GDP per capital.

Similarly, abundant research have been done to find out the determinants of female labor force participation rate where majority are socio economic variables but there is a blurring scenario existing regarding excess of financial services, barriers of startup of business and legal issues such as rights to getting paid, managing assets, getting a pension and so on, which require conspicuous inquisition in the field of investment in female labor force and sustainability. This research aims to find outimportant deriving factors of the female labor force considering those issues so that the policy makers can concentrate to understand the role of women in maintaining economic growth as well as sustainable development.

1. Hypotheses Development

Impact of Female labor force on economic growth:

The tendencies which are observed worldwide advocated that there is relatively a more stable relation with female labor force participation rate and economic growth. Majority of researches show that the female labor force has a positive relationship with GDP per capital output after reaching a certain level. Some theoretical and empirical studies in the literature have concluded that female labor force participation rate has positive and strong links with economic growth (Fatima and Humera 2009). Based on those findings, we develop the following hypothesis considering each category of female labor force participation rate.

Hypothesis 1: Ceteris Paribus, there is a positive relationship between GDP per capital and female labor force participation rate.

The enormous challenges in the work environment make it more vital than ever to establish a clear picture to understand which groups of female workers are winning and which ones are losing. Sound answers to these questions can feed directly into the design of economic and social policies which is essential for a sustainable and inclusive path of development. ILO data on labor income demonstrate that, income

inequality is far greater than previously thought for all works, including self-employed worker all over the world which may reduce FLFPR but, Verick(2018) reveals that even when gender disparities in participation rates are low, women tend to earn less than men and are more likely to be engaged in unprotected jobs, such as domestic work On the other hand, Schaner and Das(2016) mention that women increase their labor force participation through wage employment in urban areas where women decrease their labor force participation by opting out of informal, unpaid employment in rural areas.

There are positive effects of self-employment policies on employment status and personal income of former unemployed individuals. Although according to Raihan and Bidisha (2018) most women are trapped in unpaid or low-skill occupation but Mammen and Paxson(2000) implies that women move from work in family enterprises to work as employees as incomes rise. Another study of Dauda (2013) has found that in case of female labor force participation, women account for most unpaid work, and when women are employed in paid work, they are overrepresented in the informal sector.

Raihan and Bidisha(2018) point out that a significant percentage of women are even involved in unpaid activities on family farms, and such unpaid family workers in the labor force (mainly women) cannot be considered part of mainstream remunerative economic activities.

Sundari (2020)mentions that large-scale informal employment and most self-employment in the form of unpaid work are indications of women's disadvantaged position in the labor market. The empirical evidence of three categories of female labor force such as contributing female family worker, wage and salaried female worker and self –employed female worker and GDP per capital is mixed and based on that we develop the following hypothesizes:

Hypothesis 2a: Ceteris Paribus, there is a positive relationship between GDP per capital and female wage and salary workers.

Hypothesis 2b: Ceteris Paribus, there is a positive relationship between GDP per capital and female contributing family workers.

Hypothesis 2c: Ceteris Paribus, there is a positive relationship between GDP per capital and female self – employed workers.

Determinants of Female labor force participation rate:

Worldwide in most of the cases, some common socio-economic factors such as education, health –oriented issues, social norms and cultural issues and family oriented policies have been considered as the main driving factors of female labor

force participation rate by many researchers but in this competitive global economy where there are enormous challenges in the world of job market,to find out more appropriate determinants of female labor force participation is needed.

Countries credit levels, number of accounts, availability of initial finance for projects, cost of and time to start a business are deemed important deriving factors in fostering female labor force hence, are getting attention by recent researchers. The number of accounts and having a bank account is significant and important in boosting women's independence in India (World Bank 2012).

Similar findings are revealed in research of Sorsa et al, (2015), banking services, individual and household characteristics strongly influence the low female labor market participation in India. Financial depth and breadth positively affect the female labor force participation (World Bank 2012; OECD 2012). According to Sorsaet al, (2015), the availability of banking and ability to get funding for small-scale businesses raises female labor force participation in India.

According to (Heath and Jayachandran, 2017) programs seeking to improve women's earning potential such as microfinance or business skills training have had some success in increasing female labor supplymaking access to finance easier may also facilitate start-ups or self-employment among women. Countries having mandated and family-friendly fund policies encouraged more working women (OECD, 2012). Based on above discussion we develop the following hypothesis:

Hypothesis 3: Ceteris Paribus, there is a positive relationship between female labor force participation rate and availability of domestic credit to the private sector.

Recent research supports that female participation in labor markets tend to increase when the time-cost of unpaid care work is reduced. Indeed, the high cost of start up a business and more time required to start up a business can demotivate women to enter the labor market. Along with that these barriers will reduce the potentiality of becoming an entrepreneur as a result new job creation will not be possible which may affect female labor in the market. According to Sundari (2020), non-availability of jobs seems to be one of the prime factors accounting for decline in the female participation rate in India. Women are disadvantaged in the workplace by time poverty (OECD 2012).

According to (OECD 2012; Heath and Jayachandran2017) reducing the burdens of home production (such as free child care) had some success in increasing female labor supply. Moreover minimizing entry barriers in the job market to increase female labor force is an important issue but limited research hasbeen done specially in case of developing countries. In this study we assume that the cost of start up a business and time required to start up a business can negatively affect the female labor force participation rate which will slow down economic growth. The following hypotheses

are considered based on the above assumptions.

Hypothesis 4a: Ceteris Paribus, there is a negative relationship between female labor force participation rate and cost of start up a business.

Hypothesis 4b: Ceteris Paribus, there is a negative relationship between female labor force participation rate and time required to start a business.

Recent researches provide sufficient evidence that sustainable development cannot be achieved without gender equality in economic participation, education, health and political empowerment of women. Sustainable development requires the full and equal participation of women at all levels. According to Canan (2012), gender inequality negatively affects economic development. Recent researches focus on gender inequality even in different levels of organization both in public and private sector in management positions which reduces performance, innovation and effectiveness of firms and governments (OECD 2008). Based on those empirical analyses we develop the hypothesis.

Hypothesis 5: Ceteris Paribus, there is a positive relationship between female labor force participation rate and women business and the law index score.

2. Methodology

In this research, panel data sets have been used for investigations and the data set ranging from 2005 to 2019 have been collected from secondary data and the sources of data include World Bank Data indicator, ILO database, Bangladesh Bureau of statistics. Two models have been adopted. In model 1, along with finding out the impact of the female labor force with economic growth, we will investigate which type of female labor force will contribute more in economic development. In this model we have considered GDP per capital as a proxy of economic growth and expected a positive relationship of GDP per capital with explanatory variables, contributing female family workers, female self-employed workers, female wage and salaried workers. We also consider female unemployment rate and output per worker as explanatory variables.

In model 2, we will find out the determinants of female labor force participation rate, particularly to know is there any link among explanatory variables domestic credit to private sector by banks, women business and the law index score, cost of business start-up procedures(female) and total time required to start a business (female). We will also consider gross female secondary school enrollment as another independent variable. Where we expect a positive relationship with dependent variable female labor force participation rate with explanatory variables domestic credit to private sector by banks, women business and the law index score, gross secondary school

enrollment (female), and a negative relationship with cost of business start-up procedures and total time required to start a business.

We will perform panel data analysis using STATA software for this study to know its capability to separate the effects of specific interventions and treatments both across cross-sections and time-series. To avoid arbitrariness involved in accepting fixed effects (FE) and random effects (RE), we perform Hausman Test to choose between the fixed effect and random effects models. For diagnostic tests of the models we conduct the Wooldridge test for autocorrelation and to check cross-sectional dependence we conduct Pesaran test. Correlation analysis such as the Pairwise correlations between all continuous variables will also be done to check multicollinearity in this research. All the outcomes of this analysis will be presented in Appendix

A.

We select Bangladesh and India as a limited number of researches have been done considering the issues we have used in our analysis for both countries. Based on availability of data, social norms and cultural issues, we select these two countries. We consider GDP per capital as a proxy of economic growthas increasing GDP per capital is often seen as a most popular measure of welfare and economic success by policymakers and academics. However, recently it is often debated by scholars that some other alternative indicators such as HDI, HCI, SPI are adequate gauge of a country's development but GDP per capital, while is not a comprehensive measure of economic well-being, but it is useful in and should provide a great deal of information that is closely related to welfare.

4.1 Model Specification, Results and Discussions

To understand the relationship within female labor force participation rate and GDP per capital, by considering three categories of female labor force, female wage and salary workers contributing female family workers and female self-employed workers, unemployment rate of female labor forceand output per worker, we would like to form and work on the following model (1) using the collected data.

$$GDPPC_t = \beta_0 + \beta_1 OPW_t + \beta_2 CFWF_t + \beta_3 WASWF_t + \beta_4 SEF_t + \beta_5 UEPF_t + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where,

Y = $GDPPC_t$ = GDP per capital (constant 2010 US$) in period t

X1 =OPW_t = Output per worker in period t

X2=$CFWF_t$ = Contributing family workers, female (% of female employment) in the period t

X3= $WASWF_t$ =Wage and Salaried Workers, female (% of female employment) in period t

X4= SEF_t = Self-employed, female (% of female employment) in the period t

X5=$UEPF_t$ =Unemployment rate female in the period t

t= time and ε= Error Term

Table 1: Descriptive statistics for model-1

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
GDPPC	30	1216.91	438.537	617.543	2169.14	617.543	2169.14	.634	2.487
OPW	30	3381.219	1371.062	1708.909	6460.043	1708.909	6460.043	.802	2.56
CFWF	30	43.407	14.734	27.636	66.435	27.636	66.435	.369	1.331
WASWF	30	22.434	5.923	16.408	43.771	16.408	43.771	1.889	6.862
SEF	30	79.759	6.452	67.644	89.315	67.644	89.315	-.364	2.385
UEPF	30	6.084	.856	4.44	7.609	4.44	7.609	.377	2.067

Descriptive statistics for the explanatory variables for model-1 is shown in table-1 where the average output per worker is 3381.21 units, the maximum value is 6460 units and minimum value is 1708.90 units, with a high standard deviation of 1371.06 units. The range of contributing female family worker is from 27.636% to 66.435 % and the mean value is 43% of female employment .On the other hand the mean value for female wage and salaried workers is 22.434% with a narrow range of from 16.408 % to 43.771 %. The average value of self-employed female workers is 79.759 % of female employment with a maximum value of 89.315 % and minimum value of 67.644 % and unemployment rate range from maximum 7.609 % and minimum 4.44% with a low standard deviation of 0.856 %.

Table 2: Pairwise correlations of variables for model-1

Variables	(1)	(2)	(3)	(4)	(5)	(6)		
(1) GDPPC	1.000							
(2) OPW	0.994*	1.000						
(3) CFWF	-0.827*	-0.787*	1.000					
(4) WASWF	0.014	-0.052	-0.142	1.000				
(5) SEF	0.076	0.142	-0.077	-0.885*	1.000			
(6) UEPF	-0.523*	-0.545*	0.524*	0.264	-0.471*	1.000		
*** $p<0.01$, ** $p<0.05$, * $p<0.1$								

Pearson correlation matrix has been used to examine the correlation of the dependent variable GDP per capital and each of the independent variables used in this study and has been presented in table-2.The statistical result shows that there is a positive correlation of female wage and salaried workers (0.0142) and self-employed female workers (0.0761) with GDP per capital. On the other hand contributing female family workers (-.8274) has a strong negative correlation with GDP per capital.

Unemployment rate of female workers (-0.5230) also has strong negative correlation and output per worker (0.9937) has a strong positive correlation with GDP per capital as expected. The statistical value of correlation matrix within the independent variable shows that there is no severe correlation among the independent variables except self-employed female workers with female wage and salaried workers (-0.8855) and contributing female family workers with output per workers (-0.7868).

Before preceding the multiple regression analysis, the collinearityamong independent variables should be investigate properly, that's why we also conduct the Wooldridge test for autocorrelation and the high P value (0.974) can ensure us that the model is free from multicollinearity and is a good fitted model.

Table 3: Result of Hausman Test for model-1

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	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
OPW	.3645702	.2866335	.0779367	.0145193
CFWF	-4.12393	-4.202787	.0788568	.
WASWF	24.43405	-5.073892	29.50794	5.547759
SEF	26.44172	-8.367687	34.80941	6.62739
UEPF	.9479786	-.364853	1.312832	.

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 26.65

Prob>chi2 = 0.0001

(V_b-V_B is not positive definite)

As we know that Hausman test is a statistical test to select whether the most appropriate Fixed Effect or Random Effect model is used. If Result: H_0: Select RE (P> 0.05) H_1: Select FE (P<0.05) that means if H_0 or P value> 0.05 then we should choose the Random Effect model which is also known as Generalized Least Square (GLS) model. On the other hand if the Hausman Test receives H_1 or P value <0.05 we should go for the Fixed Effect model. In our analysis the P value (0.0001) of the Hausman test represents that we should select the Fixed Effect model for this panel data set.

After conducting the Wooldridge test for autocorrelation of this panel data the P value (0.0974) suggest to accept the null hypothesis of no first-order autocorrelation and along with that the average absolute value of the off-diagonal elements of Pesaran's test of cross sectional independence (0.433) indicate that there is no cross sectional dependence of this panel data set. The value of overall R^2 = (0.96) implies that the explanatory variables explains 96 % movement of the dependent variable. The value of F-statistics (1647.95) with a P value of (0.0000), implies that we reject the null hypothesis, which means all the explanatory variables explaining the dependent variable also indicate that this one is a good fitted model.

Table 4: Outcome of Fixed-Effect model-1

Fixed-effects (within) regression Number of obs = 30

Group variable: countryid Number of groups = 2

R-sq: Obs per group:

within = 0.9972 min = 15

between = 1.0000 avg = 15.0

overall = 0.9616 max = 15

F(5,23) = 1647.95

corr(u_i, Xb) = -0.8602 Prob> F = 0.0000

GDPPC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
OPW	.3645702	.0157748	23.11	0.000	.3319375	.397203
CFWF	-4.12393	.4216143	-9.78	0.000	-4.996106	-3.251755

WASWF	24.43405	5.928201	4.12	0.000	12.17063	36.69746
SEF	26.44172	6.919017	3.82	0.001	12.12864	40.7548
UEPF	.9479786	5.444234	0.17	0.863	-10.31428	12.21024
_cons	-2499.663	743.3382	-3.36	0.003	-4037.375	-961.9509

sigma_u	230.5802
sigma_e	17.32367
rho	.99438705 (fraction of variance due to u_i)

F test that all u_i=0: F(1, 23) = 26.37 Prob> F = 0.0000

Using Fixed Effect regression analysis for our model (1), we get the following:-

$$GDPPC_t = -2499.66 + 0.36457OPW_t - 4.123CFWF_t + 24.43WASWF_t + 26.44SEF_t + 0.9479_t + e_t \quad \ldots\ldots\ldots (2)$$

The value of the intercept term ($\beta_{0=}$ *-2499.66)* is negative, which implies that if the value of all explanatory variables are zero then the intercept for the dependent variable will be -2499.663 which is statistically significant at 1% significance level.

In this economic growth model 1 we expect a positive relationship between dependent variable GDP per capital and each category of female labor force participation rate. In our research the significant positive correlation coefficient of self-employed female workers (26.44) and female wage and salaried workers (24.434) implies that as female labor is an essential input in the production process such that increases in self-employed female worker and wage and salaried workers would lead to increase in GDP per capital. It also reveals that self- employed female workers are more positively correlated than female wage and salaried workers with GDP per capital.

On the other hand correlation coefficient of contributing female family workers is (-4.123) which is opposite of our expectation but supported by the research of

(Raihan and Bidisha 2018).According to themdecent work deficits are pronounced in the informal economy, especially for contributing family workers.

This one can be one reason behind these findings. Output per worker (0.364) also has a positive significant relationship with GDP per capital and this findings is in a line of (OECD 2008; Cuberes and Teignier 2016; Verick 2018). Although our literature on the relationship between unemployment and economic growth (Schwietzer and Smith 1974; ACOSS 2003; Ozerkek2013) expound that there should be a negative relationship between female unemployment and GDP per capital but our analysis implies that there is an insignificant positive relationship between these two.

To have a clear understanding on female labor force and its determinants, using the collected data we would like to form the following model (2):

$$LFF_t = \beta_0 + \beta_1 COBS_t + \beta_2 TRSB_t + \beta_3 SESF_t + \beta_4 DCPB_{t+} \beta_5 WBLI_t + ...e_{t\ldots} \quad (3)$$

Where,

$Y = LFF_t$ = Labor force participation rate female (% of total labor force) in period t

$X_{1=} COBS_t$= Cost of business start-up procedures, female (% of GNI per capital) in period t

$X_{2=} TRSBt$ = Total Time required to start a business, female (days) in period t

$X_{3=} SESF_t$= Gross School enrollment, secondary, female (% gross) in period t

$X_{4=} DCPB_t$ = Domestic credit to private sector by banks (% of GDP) in period t

$X_{5=} WBLI_t$ = Women Business and the Law Index Score (scale 1-100) in period t

t= time and ε= Error Term

Table 5: Descriptive Statistics of model-2

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
LFF	30	24.618	3.235	20.076	30.488	20.076	30.488	.201	2.003
COBS	30	33.153	21.727	7.2	78.4	7.2	78.4	.709	2.134

TRSB	30	32.959	17.093	16.47	93	16.47	93	1.956	6.761
SESF	30	62.783	11.095	46.998	79.345	46.998	79.345	-.001	1.532
DCP	30	44.532	6.669	29.03	52.386	29.03	52.386	-.882	2.843
WBLI	30	55.75	10.346	38.1	74.4	38.1	74.4	.103	1.792

Table 5 shows descriptive statistics of determinants of female labor force participation rate as analyzed in model-2.

The average cost of business startup is 33.15% of GNI per capital, where the maximum value is 78.4% and minimum value is 7.2%, with a high standard deviation of 21.727%.The range of total time required to start a business is maximum from 93 to minimum of 16.47 days and the mean is 33 days with a narrow range from 16 days to 93 days. On the other hand the mean value of gross secondary school enrollment is 62.783 % of gross school enrolment with a maximum value of 79.345% and minimum value of 46.99 % and domestic credit to private sector by banks range from maximum 52.386% of GDP and minimum is 29.03 % with a low standard deviation of 6.66%.

In case of women's business and law index score the average score is 55.75 out of 100 where the maximum is 74.4 and minimum is 38.1.

Table 6: Pairwise correlations for model 2:

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) LFF	1.000					
(2) COBS	-0.082	1.000				
(3) TRSB	-0.073	0.487*	1.000			
(4) SESF	-0.110	-0.639*	-0.677*	1.000		
(5) DCP	-0.326	-0.183	-0.581*	0.749*	1.000	
(6) WBLI	-0.672*	-0.047	-0.367*	0.568*	0.845*	1.000
*** $p<0.01$, ** $p<0.05$, * $p<0.1$						

Table 6 represents the Pearson correlation matrix of female labor force participation rate and its determinants used in this study. The statistical result shows that there

is negative correlation of female labor force participation rate with all independent variables such as with cost of business startup (-0.0824), time required to start up a business (-0.0735), gross secondary school enrollment (-0.1104), domestic credit to private sector by banks (-0.3259) and with women's business and law index score (-0.6718). The statistical value of correlation matrix within the independent variables shows that there also have high correlation among most of the independent variables like cost of business startup with gross secondary school enrollment (- 0.6394), time required to start up a business with gross secondary school enrollment (-0.6774), domestic credit to private sector by banks with women's business and law index score (0.8448) and some others which can mislead our findings. For clear understanding we also conduct the Wooldridge test for autocorrelation and the low P value (0.0170) can ensure us that the model is not free from multicollinearity and require replacement by a good fitted model.

Table 7: Result of Hausman test for model 2

hausmanfe re

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
COBS	.1185395	.0278311	.0907084	.0201597
TRSB	.082466	-.0326502	.1151162	.0273224
SESF	.100186	.065958	.0342279	.
DCP	.44121	.2721375	.1690725	.
WBLI	.0917127	-.4154912	.5072039	.1382436

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 12.60

Prob>chi2 = 0.0274

(V_b-V_B is not positive definite)

The P value (0.0274) of the Hausman test represents that we should select the Fixed Effect regression model for this panel data set.Serial correlation is usually present both in time-series data and cross-sectional data.In our analysis we use Wooldridge test for autocorrelation in panel data where, H_0: no first-order autocorrelation and have found that in model-2 the P value is (0.0170), which means we reject the null hypothesis of no serial autocorrelation that means autocorrelation exist in this data set.

According to analysts, the FGLS estimator is better than usual OLS estimator in that case. To solve this autocorrelation and heteroskedasticity problem we select Feasible Generalized Least Squares (FGLS) rather than OLS estimators and prove that the panel is homoscedastic and free from autocorrelation. On the other hand, according to the analysts FGLS is better than PCSE method when time series observation (T) > cross sectional observation (N).

Along with that the average absolute value of the off-diagonal elements of Pesaran's test of cross sectional independence (0.599) also indicate that there is cross sectional dependence of this panel data set. The value of within R^2 = (0.569) implies that the model or explanatory variables explains 57 % movement of the dependent variable.

The value of F-statistics (6.07) with a P value of (0.0000), implies that we reject the null hypothesis, that none of the explanatory variables explains the dependent variable. The Wald chi2 of FGLS model is (3777.75) with a P value of (0.000) also indicate that this one is a good fitted model.

Now we would like to interpret the outcomes we got from model-2 using FGLS estimation:

Table 8: Outcome of Cross-sectional time-series FGLS regression for model-2

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances	=	2	Number of obs	=	30
Estimated autocorrelations	=	0	Number of groups	=	2
Estimated coefficients	=	6	Time periods	=	15
			Wald chi2(5)	=	3777.75
Log likelihood	=	-43.2291	Prob> chi2	=	0.0000

LFF	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
COBS	-.0116116	.0070307	-1.65	0.099	-.0253916	.0021683
TRSB	.0158501	.0053784	2.95	0.003	.0053086	.0263915
SESF	.1498492	.0082106	18.25	0.000	.1337568	.1659416
DCP	.1363142	.0371107	3.67	0.000	.0635786	.2090498
WBLI	-.0187909	.0347443	-0.54	0.589	-.0868885	.0493066
_cons	13.1135	1.377921	9.52	0.000	10.41283	15.81418

Using Feasible Generalized Least Squares (FGLS) regression model for panel data we can write the estimated as follows:

$$LFF_t = \beta_0 + \beta_1 COBS_t + \beta_2 TRSB_t + \beta_3 SESF_t + \beta_5 DCPB_{t+} \beta_6 WBLI_t + ...e_{t)..} \quad \text{(4)}$$

$$LFF_t = 13.1135 - 0.0116116 COBS_t + 0.0158501 TRSB_t - 0.1498492 SESF_t + 0.1363142 DCPB_t - 0.0187909 WBLI_t + ...e_{t)} \quad \text{(5)}$$

The value of the intercept term ($\beta_{0=}13.11$) is positive, it implies that if the value of all explanatory variables are zero then the intercept for the dependent variable will be 13.11 which is statistically significant at 1% significance level. Female labor force participation rate and cost of business startup indicate negative relationships as we expected and it is statistically significant at 10% significance level. Cost of startup a business is considered as an entry barrier to participation in the labor force by women because whenever there will be high cost for women to start a business they will be demotivated or unable to start a business which will reduce the job opportunity and is supported by the research of Sundari (2020).

In addition, time required to start up a business indicates a very negligible positive relationship which is statistically significant at all usual levels so we need further investigation regarding this determinant. Female labor force participation rateand female gross secondary school enrollment (0.1498) is positive as we expected that female labor force participation will increase with the increase of female education and this finding is in line with those of (Anxo 2009; Sharmila and Dhas 2010; Hassan and Cooray 2013, Syomwene and Kindiki2015; Sharma and Sahni 2015) and opposed by (Selwaness and Krafft2020).

Women business and the law index Score (-0.0187909), indicates an insignificant negative relationship although in recent years this one is one of the main concern of consultants and suggested by (WEF 2007; Canan 2012; Cuberes and Teignier 2016)that countries with equal rights of men and women in working place has high possibilities to ensure sustainable development, hence require further investigations.

On the other hand domestic credit to private sector by banks (0.1363142) has a strong positive relationship with female labor force participation as expected, because recent studies suggest that if the financial benefits and availability of credits increase in the market at a low cost then more women will willing to participate in the labor market. These findings are in line with (World Bank 2012, OECD 2012; Islam and Islam, 2013; Heath and Jayachandran2017; Kabeer et al. 2018)

3. Conclusion

The proposed model 1 successfully presents the impact of the female labor force on economic growth considering categories of female labor forces. Finding shows that the female labor force has a strong positive relationship with GDP per capital specially the self-employed and wage and salaried female worker. The findings of this research suggests that investment in females will increase the productivity of the economy, income level will go up hence will reduce poverty, will increase their bargaining power through participation in the economy which ultimately will help to attain sustainable development. As a result the policy makers should focus on female labor force for their maximum use and to do that they need to focus on the driving factors that will enhance the female labor force participation rate considering the changing global economic condition.

In model 2 analysis reveals that if the policy makers want to enhance the participation of female labor force then they have to create job opportunities where increasing country credit level and minimizing the entry barrier by reducing startup business cost should be a more focused area along with education and some other social and cultural issues.

One of the limitationsof this study is to fail to gather more data on the nature of women's work in and out of the job market particularly for developing countries. Only two countries have been considered as samples for this research and dueto this limited cross sectional observations, perhaps one reason is to have autocorrelation problems in model 2. Including other explanatory variables such as minimum monthly wage, wage gap, government expenditure on education, accessibility of technology, etc., may enrich this research to find out the determinants of female labor force participation rate.

We can also consider sector wise contribution of female labor force participation to identify the impact of the female labor force in the economy. Sustainable development consists of three dimensions such as economic development, human capital development and environmental development, but this research focuses mainly on economic development, hence has the scope to work on other dimensions of sustainable development. Moreover issues related to gender differential in wages, labor standards, working hours, safety and health in the workplace, freedom of

association and collective bargaining are remaining and have the scope to work in future.

Based on the analysis, this study suggests the following recommendation. As we have found that the contribution of female wage and salaried workers and female self-employed workers are contributing more to ensure economic growth, so that the policy maker should concentrate rigorously on the deriving factors that will increase the participation rate of them. According to our analysis, more financial services, adequate funds for credit and less startup cost may help women to become entrepreneurs and create more jobs. In addition the literature also suggest that accessing decent work, including care responsibilities, improving skills and safety issues may also increase the participation of self-employed female workers and wage and salaried female workers.

Although micro-financing plays a significant role to increasing the female labor force participation rate but it is not sufficient to ensure adequate supply of funds for women. Despite micro-financing, all financial institutions especially the specialized government financial institution should provide more funds for credit and easy access to financial services.The positive result of our analysis between female education and female labor force participation rate would like to suggest the policy makers emphasize more on female education and skill development as to ensure sustainable economic development.

Education opportunities are the one that would allow for higher bargaining power, more access to higher wages and would make it easier for women to get a job in the market.It is suggested from this research that the government should provide technical and vocational education to the women. The government needs to play the lead role in education and institutional aspects, while the private sector should need to work in development in industries and regions that can increase job opportunities for women in developing countries.

References:

ACOSS (2003).“Hidden Unemployment in Australia” Australian Council of Social

Service, Work Wages Welfare Project. ISSN 1326-7124; 131. ISBN0858714574,

https://search.informit.com.au/documentSummary;dn=936237366777155;res=IELHEA

Ali, S., Nirob, K. J. A. and Noor. T. M. (2016), "An Econometric Analysis of the Human Capital Development and Econometric Growth in Bangladesh", Journal of Economics and Sustainable Development, Vol. 7(17), pp. 30-38.

Anxo, D. (2009). "Women's Impact on development in India", Master's Thesis, Linnawus University. Retrieved from, http://www.diva-portal.org/smash/get/diva2:293945/FULLTEXT01.pdf

Blau, F. D. and Khan, L. M. (2006). Changes in the Labor Supply Behavior of Married Women: 1980- 2000. IZA Discussion Paper 2180.http://ftp.iza.org/dp2180.pdf

Canan, I, R, S. (2012). "Women's Role in Economic Development: From Classical Approach to the Present", 3rd International Symposium on Sustainable Development, May 31-June 01, 2012, Sarajevo. https://core.ac.uk/download/pdf/153447998.pdf

Chaudhary, R, and Verick, S. (2014). Female Labor Force Participation in India and beyond. ILO Asia- Pacific Working Paper Series. https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-new_delhi/documents/publication/wcms_324621.pdf

Cuberes, D. and Teignier. M. (2016). "Aggregate Effects of Gender Gaps in the Labor Market: A Quantitative Estimate", Journal of Human Capital, Vol. 10 (1), pp. 1–32. http://diposit.ub.edu/dspace/bitstream/2445/110982/1/658812.pdf

Dauda R. O.S. (2010). "Role of Human Capital in Economic Development: An Empirical Study of Nigerian Case", Oxford Business & Economics Conference Program, ISBN : 978-0-9742114-1-9.

http://gcbe.us/2010_OBEC/data/Risikat%20Oladoyin%20S.%20Dauda.doc

Faridi, M. Z.,Malik, S. and Basit, A.B. (2009), "Impact of Education on Female Labour

Force Participation in Pakistan: Empirical Evidence from Primary Data Analysis", Pakistan Journal of Social Sciences (PJSS), Vol. 29(1), pp. 127-140.*https://www.bzu.edu.pk/PJSS/vol29no1_2009/PJSSArtical12.pdf*

Fatima, A. and Humera S. (2009)."Tracing out the U-Shape Relationship between Female Labor Force Participation Rate and Economic Development for Pakistan",International Journal of Social Economics, Vol. 36(January), pp.182-198. DOI: 10.1108/03068290910921253

Goldin, C. (1995)."The U-Shaped Female Labour Force Function in Economic Development and Economic History", NBER Working Paper 4707, National Bureau of Economic Research, Inc. https://www.nber.org/system/files/working_papers/w4707/w4707.pdf

Hassan, G, M, andCooray, A. (2013). "Effects of Male and Female Education on Economic Growth: some Evidence from Asia using the Extreme Bounds Analysis", Working Paper in Economics, 10/13, University of Waikato. https://ideas.repec.org/p/wai/econwp/13-10.html

Heath. R and Jayachandran, S. (2017). "The Causes and Consequences of Increased Female Education and Labor Force Participation in Developing Countries", Working Paper 22766, National Bureau of Economic Research. http://www.nber.org/papers/w22766

Heintz, J., Kabeer, N. and Mahmud, S. (2018). "Cultural norms, Economic incentives and Women's Labour market behavior: empirical insights from Bangladesh", Oxford Development Studies, Vol. 46(2), pp. 266–289.

IMF (2018). International Monetary Fund Washington, D.C., "Pursuing Women's Economic Empowerment" PolicyPaper,file:///C:/Users/Teacher/Downloads/pp053118pursuing-womens-economic empowerment%20(1).pdf

Islam R. R. and Islam, R. (2013). Female labor force participation in Bangladesh: trends, drivers and barriers. ILO Asia-Pacific Working Paper 994834893402676, International Labour Organization. https://ideas.repec.org/p/ilo/ilowps/994834893402676.html

Islam. R. R. (2006), "Access to Education and Employment: implication for Poverty" PRCPB Working Paper no. 14, Bangladesh Institute for Development Studies (BIDS) and Institute for Development Policy and Management (IDPM), University of Manchester, UK.

https://assets.publishing.service.gov.uk/media/57a08c1940f0b64974000fc2/wp14fulltext.pdf

Kabeer, N., Mahmud, S. and Tasneem, S. (2018) 'The contested relationship between paid work and women's empowerment: empirical analysis from Bangladesh', The European Journal of Development Research, Vol. 30(2), pp. 235–251

Kamal, N, andZunaid, K.M. (2004). "Education and women's Empowerment in Bangladesh", Working Paper 11, Centre for Health Population and Development at Independent University, Bangladesh, Dhaka.

King, E. M., Hill, M. A. (1997)."Women's education in developing countries: Barriers, benefits, and policies", World Bank Publications.

http://documents1.worldbank.org/curated/en/849491468740172523/pdf/multi-page.pdf

Klasen, S. (2019)."What Explains Uneven Female Labor Force Participation Levels and Trends in Developing Countries?" The World Bank Research Observer, Vol. 34(2), pp. 161–197.

Klasen, S. and Pieters, J. (2015). "What explains the stagnation of female labor force participation in urban India?", World Bank Econ Review, Vol. 29(3), pp. 449-478

Klasen, S, andPieters, J. (2012). "Push or Pull? Drivers of Female Labor Force Participation during India's Economic Boom", IZA Discussion Paper No. 6395. http://ftp.iza.org/dp6395.pdf

Lahoti, R, andSwaminathan, H. (2013). "Economic Growth and Female Labor Force Participation in India', Indian Institution of Management Bangalore, IIM Bangalore Research Paper No. 414, http://dx.doi.org/10.2139/ssrn.2284073

Lechman, E. and Kaur, H. (2015), "Economic Growth and Female Labor Force Participation – Verifying the U-Feminization Hypothesis. New Evidence for 162 Countries over the Period 1990-2012", Economics & Sociology, Vol. 8(1), pp. 246–257.

Luci, A. (2009)."Female Labour Market Participation and Economic Growth", International Journal of Innovation and Sustainable Development, Vol. 4(2/3), pp. 97-108.

Lucus R. E. Jr. (1998), "On the Mechanics of Economic development", Journal of Monetary Economics. Vol. 22(1), pp. 3-42, North-Holland. https://www.parisschoolofeconomics.eu/docs/darcillon-thibault/lucasmechanicseconomicgrowth.pdf

Mahmud S., Bidisha S.H. (2018). "Female Labor Market Participation in Bangladesh: Structural Changes and Determinants of Labor Supply", In: Raihan S. (eds) Structural Change and Dynamics of Labor Markets in Bangladesh. South Asia Economic and Policy Studies. Springer, Singapore. https://doi.org/10.1007/978-981-13-2071-2_4

Mammen, K. and Paxson, C. (2000). "Women's Work and Economic Development", Journal of Economic Perspectives, Vol. 14(4), pp. 141-164.

Mohiuddin A. (2013). "Road Map for Skill Development in Bangladesh", A Power Point Presentation, Dhaka, Bangladesh

OECD (2012)."Closing the Gender Gap: Act Now", OECD (Organization for Economic Co-operation and Development) Publishing, Paris. https://www.oecd.org/gender/Executive%20Summary.pdf

OECD (2008). "Gender and Sustainable Development: Maximising the Economic, Social and Environmental Role of Women". OECD (Organization for Economic Co-operation and Development), Paris.https://www.oecd.org/social/40881538.pdf

Ozerkek Y. (2013), "Unemployment and Labor Force Participation: a panel cointegration analysis for European countries", Applied Econometrics and International Development, Vol. 13(1) , pp. 67-76.

Rahman Z.(2020), "Female Labor Force Participation and Economic Growth: Granger Causality Test", Master of Arts in Economics Thesis, Hunter College, The City University of New York (CUNY), USA.

Raihan, S. and Bidisha, S. H. (2018), "Female Employment Stagnation in Bangladesh", EDIG Research Paper 5. London: ODI, The Asia Foundation and UKaid. https://asiafoundation.org/wp-content/uploads/2018/12/EDIG-Policy-Brief-Female-employment-stagnation-in-Bangladesh.pdf

Schaner, S and Das, S. (2016). "Female Labor Force Participation in Asia: Indonesia Country Study", ADB Economics Working Paper, no. 474.

https://www.adb.org/sites/default/files/publication/180251/ewp-474.pdf

Schweitzer, S.O., Smith, R.E. (1974), "The Persistence of the Discouraged Worker Effect", Industrial and Labor Relations Review, Vol. 27(2), pp. 249-260.

Selwaness, I. and Krafft, C. (2020). "The Dynamics of Family Formation and Women's Work: What Facilitates and Hinders Female Employment in the Middle East and North Africa?" Population Research and Policy Review, Springer Verlag.

Sharma, P. and Sahni, P. (2015). "Human Capital and Economic Growth India: A Co- integration and Casualty Analysis", Journal of Business Management, Vol.14(2), pp.1-18,

Sharmila, N, andDhas, A, C. (2010). "Development of Women Education in India", Munich Personal RePEc Archive (MPRA), Paper No. 20680. https://mpra.ub.uni-muenchen.de/20680/

Sohail, M. (2014). "Women Empowerment and Economic Development – An Exploratory Study in Pakistan", Journal of Business Studies Quarterly, Vol. 5(4), pp. 210-221.

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.653.1490&rep=rep1&type=pdf

Sorsa, P., Mares, J, Didier, M., Guimaraes, C., Rabate, M., Tang, G. and Tuskeii,

A. (2015) "Determinants of the Low Female Labour Force Participation in India," OECD Economics Department Working Paper No. 1207, OECD Publishing, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?coteECO/WKP(2015)25&docLanguageEn

Sundari,S. (2000)."Structural Changes and Quality of Women's Labour in India", The Indian Journal of Labour Economics, Vol. (63), pp.689–717.

Syomwene, A. andKindiki J. N. (2015). "Women Education and Economic Development in Kenya: Implications for Curriculum Development and Implementation Processes", Journal of Education and Practice, Vol. 6(15), pp. 38-43. https://files.eric.ed.gov/fulltext/EJ1079984.pdf

Tam, H. (2011), "U-Shaped Female Labor Participation with Economic Development: Some Panel Data Evidence", Economics Letters, Vol. 110(2), pp. 140–142.

Tansel, A, andGungor, N, D. (2012). "Gender Effects of Education on Economic Development in Turkey". IZA, Discussion Paper No. 6532. http://ftp.iza.org/dp6532.pdf

Ustabaş, A., Gülsoy, T. Y. (2017). "The Relationships between the Female Labor Force Participation Rate and Economic Development: A Correlation Analysis for Turkey" in Proceedings of International Conference of Eurasian Economies 2017, pp.104-113, Istanbul, TURKEY.DOI: https://doi.org/10.36880/C08.01912

Verick. S. (2018). "Female labor force participation and development", The International Training Centre of the ILO, Italy, and IZA, Germany. https://wol.iza.org/uploads/articles/87/pdfs/female-labor-force-participation-in-developing-countries.one-pager.pdf

WEF (2007). "The Global Gender Gap Report", World Economic Forum. http://www3.weforum.org/docs/WEF_GenderGap_Report_2007.pdf

World Bank (2012), "Gender Equality and Development", World Development Report, Washington. http://d.repec.org/n?u=RePEc:men:wpaper:40_2013&r=dev

WWC (2006). "Shaping a Fairer Future", Women and Work Commission, United

Kingdom.

https://webarchive.nationalarchives.gov.uk/20100211010917/http://www.equalities.gov.uk/pdf/297158_WWC_Report_acc.pdf

Appendix A

Set the data as panel data:

panel variable: countryid (strongly balanced)

time variable: Year, 2005 to 2019

delta: 1 year

For model 1:

Result of fixed effect model:

Fixed-effects (within) regression Number of obs = 30

Group variable: countryid Number of groups = 2

R-sq: Obs per group:

within = 0.9972 min = 15

between = 1.0000 avg = 15.0

overall = 0.9616 max = 15

F(5,23) = 1647.95

corr(u_i, Xb) = -0.8602 Prob> F = 0.0000

GDPPC | Coef. Std. Err. t P>|t| [95% Conf. Interval]

OPW	.3645702	.0157748	23.11	0.000	.3319375	.397203
CFWF	-4.12393	.4216143	-9.78	0.000	-4.996106	-3.251755
WASWF	24.43405	5.928201	4.12	0.000	12.17063	36.69746
SEF	26.44172	6.919017	3.82	0.001	12.12864	40.7548
UEPF	.9479786	5.444234	0.17	0.863	-10.31428	12.21024
_cons	-2499.663	743.3382	-3.36	0.003	-4037.375	-961.9509

sigma_u | 230.5802

sigma_e | 17.32367

rho | .99438705 (fraction of variance due to u_i)

F test that all u_i=0: F(1, 23) = 26.37 Prob> F = 0.0000

Result of Random effect Model(for model 1)

Random-effects GLS regression Number of obs = 30

Group variable: countryid Number of groups = 2

R-sq: Obs per group:

within = 0.9941 min = 15

between = 1.0000 avg = 15.0

overall = 0.9973 max = 15

Wald chi2(5) = 9010.25

corr(u_i, X) = 0 (assumed) Prob> chi2 = 0.0000

GDPPC	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
OPW	.2866335	.0061673	46.48	0.000	.2745459 .2987212
CFWF	-4.202787	.6042916	-6.95	0.000	-5.387177 -3.018397
WASWF	-5.073892	2.089484	-2.43	0.015	-9.169205 -.978579
SEF	-8.367687	1.987588	-4.21	0.000	-12.26329 -4.472086
UEPF	-.364853	7.799682	-0.05	0.963	-15.65195 14.92224
_cons	1213.616	246.9169	4.92	0.000	729.668 1697.564

sigma_u	0
sigma_e	17.32367
rho	0 (fraction of variance due to u_i)

Result of Hausman Test: (for model 1)

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
OPW	.3645702	.2866335	.0779367	.0145193
CFWF	-4.12393	-4.202787	.0788568	.
WASWF	24.43405	-5.073892	29.50794	5.547759
SEF	26.44172	-8.367687	34.80941	6.62739
UEPF	.9479786	-.364853	1.312832	.

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 26.65

Prob>chi2 = 0.0001

(V_b-V_B is not positive definite)

Result of Pesarans test for cross-sectional dependency:(model 1)

Pesaran's test of cross sectional independence = -1.677, Pr = 0.0936

Average absolute value of the off-diagonal elements = 0.433

Result of Wooldridge test for autocorrelation (model 1)

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 1) = 42.029

Prob> F = 0.0974

For model 2 :

Result of fixed effect model:

Fixed-effects (within) regression Number of obs = 30

Group variable: countryid Number of groups = 2

R-sq: Obs per group:

within = 0.5690 min = 15

between = 1.0000 avg = 15.0

overall = 0.2159 max = 15

F(5,23) = 6.07

corr(u_i, Xb) = -0.9226 Prob> F = 0.0010

LFF	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
COBS	.1185395	.0346456	3.42	0.002	.0468697	.1902094
TRSB	.082466	.0417127	1.98	0.060	-.0038233	.1687554
SESF	.100186	.066926	1.50	0.148	-.038261	.238633
DCP	.44121	.1320413	3.34	0.003	.1680619	.7143581
WBLI	.0917127	.1551491	0.59	0.560	-.2292375	.412663
_cons	-13.08083	13.20312	-0.99	0.332	-40.39357	14.23191

---

sigma_u | 8.8653963

sigma_e | 1.6507011

rho | .96649272 (fraction of variance due to u_i)

F test that all u_i=0: F(1, 23) = 12.42 Prob> F = 0.0018

Result of Random-effects GLS regression(model 2)

Random-effects GLS regression Number of obs = 30

Group variable: countryid Number of groups = 2

R-sq: Obs per group:

```
     within  = 0.3552                        min =        15
     between = 1.0000                        avg =      15.0
     overall = 0.6820                        max =        15

                                             Wald chi2(5)      =      51.48
corr(u_i, X)   = 0 (assumed)                 Prob> chi2        =     0.0000
------------------------------------------------------------------------------
         LFF |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        COBS |   .0278311   .0281763     0.99   0.323    -.0273934    .0830557
        TRSB |  -.0326502   .0315188    -1.04   0.300     -.094426    .0291256
        SESF |    .065958   .0804454     0.82   0.412    -.0917121    .2236281
         DCP |   .2721375   .1494509     1.82   0.069     -.020781    .5650559
        WBLI |  -.4154912   .0704269    -5.90   0.000    -.5535253    -.277457
       _cons |   31.67528   4.390424     7.21   0.000     23.07021    40.28035
-------------+----------------------------------------------------------------
sigma_u |          0
sigma_e |  1.6507011
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Result of hausman test: (model 2)

```
                ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       fe           re         Difference          S.E.
```

COBS	.1185395	.0278311	.0907084	.0201597
TRSB	.082466	-.0326502	.1151162	.0273224
SESF	.100186	.065958	.0342279	.
DCP	.44121	.2721375	.1690725	.
WBLI	.0917127	-.4154912	.5072039	.1382436

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 12.60

Prob>chi2 = 0.0274

(V_b-V_B is not positive definite)

Result of Pesaran's test of cross sectional dependence

Pesaran's test of cross sectional independence = -2.319, Pr = 0.0204

Average absolute value of the off-diagonal elements = 0.599

Result of Wooldridge test for autocorrelation:

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 1) = 1399.117

Prob> F = 0.0170

Result of test for iglspanels(heteroskedastic)(model 2)

Iteration 1: tolerance = .07152456

Iteration 2: tolerance = .07654954

Iteration 3: tolerance = .0543058

Iteration 4: tolerance = .0419741

Iteration 5: tolerance = .04152169

Iteration 6: tolerance = .04253455

Iteration 7: tolerance = .05339696

Iteration 8: tolerance = .06813145

Iteration 9: tolerance = .08617492

Iteration 10: tolerance = .09700394

Iteration 11: tolerance = .08076475

Iteration 12: tolerance = .04227324

Iteration 13: tolerance = .01433297

Iteration 14: tolerance = .00384506

Iteration 15: tolerance = .00095242

Iteration 16: tolerance = .00023091

Iteration 17: tolerance = .00005569

Iteration 18: tolerance = .00001341

Iteration 19: tolerance = 3.230e-06

Iteration 20: tolerance = 7.776e-07

Iteration 21: tolerance = 1.872e-07

Iteration 22: tolerance = 4.507e-08

Result of Cross-sectional time-series FGLS regression (model 2)

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances = 2 Number of obs = 30

Estimated autocorrelations = 0 Number of groups = 2

Estimated coefficients = 6 Time periods = 15

Wald chi2(5) = 3777.75

Log likelihood = -43.2291 Prob> chi2 = 0.0000

LFF	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
COBS	-.0116116	.0070307	-1.65	0.099	-.0253916	.0021683
TRSB	.0158501	.0053784	2.95	0.003	.0053086	.0263915
SESF	.1498492	.0082106	18.25	0.000	.1337568	.1659416
DCP	.1363142	.0371107	3.67	0.000	.0635786	.2090498
WBLI	-.0187909	.0347443	-0.54	0.589	-.0868885	.0493066
_cons	13.1135	1.377921	9.52	0.000	10.41283	15.81418