Journal of Business

Volume 04, Issue 02, 2019: 12-18
Article Received: 09-08-2019
Accepted: 23-08-2019
Available Online: 01-10-2019
ISSN 2380-4041(Print), ISSN 2380-405X(Online)
DOI: http://dx.doi.org/10.18533/job.v4i2.121

Investigating the Macroeconomic Factors That Determine a Female Worker to Participate in the Labor Force: Evidence from the South Asian Countries

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ABSTRACT

Over the last four decades women work force participation rate increases significantly within the South Asian countries, while it remains stagnant or sometime declines into the developed countries. The study is for investigating the macroeconomic determinants that play the vital role in making the decision of whether a female will participate in the labor force or not. We take data of five south Asian countries named India, Nepal, Pakistan, Bangladesh and Sri Lanka. Data are taken for the range of 1990-2015. We perform some Lagrange Multiplier tests to mark out the cross-section effects, Hausman tests to select the appropriate model. We also check the cross-sectional dependence and estimate Panel Corrected Standard Error (PCSE) model to get unbiased coefficients of the estimators. Estimated results confirm that GNI per capita, square of per capita GNI, Education and Fertility rate are significant macroeconomic factors which have strong influence on the labor force participation decision of a female. Estimated results also confirms the validity of Kuznets curve in the labor force participation decision of a female. This findings will help the policymakers to take the right policy about labor market and enhance social welfare.

Keywords: Female labor force participation rate, South Asian Countries, Panel data, Hausman test, PCSE model.

1. Introduction

Over the last four decades labor force participation rate of female increases significantly in the South Asian countries, while it remains stagnant or sometime declines into the developed countries. Now-a-days the ongoing propensity of female to participate in the labor force in developing countries has pulled both academic and social attention. The rate of female participation to the economy pointedly implies a glamorous norm for equity and sustainability issues. The labor force participation decision of a female worker can enhance not only their quality of life but also their socioeconomic status in the real world. Basically, this study aims to investigate the major macro-economic factors that influence female workers to take the decision of participating in the labor

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force in the South Asian countries. In this context, we amalgamate some existing theoretical understanding about determinants of female work force participation rate and try to construct a new model to mark out the core macro-economic factors that regulate the participation decision of female workers, whether they participate in the labor force or not, in the South Asian countries. Some previous empirical studies reveal a U-shaped relationship between economic growth and female work force participation rate. This U-shaped curve hypothesis actually comes from Kuznets (1995) curve hypothesis, which reveals that at the primary stage of economic development inequality increases but it starts to decline after reaching a pick point with higher level of economic development. This concept of Kuznets Curve was incorporated in the labor economics to express the dynamic inter-linkage between female work force participation rate and economic growth. This U-shaped curve hypothesis reveals that at the primary stage of economic development female work force participation rate increases, but it starts to decline after reaching a maximum point with higher economic growth and development. Empirically Lahoti & Swaminathan (2013), Doğan & Akyüz (2017), Tsani, Paroussos, Fragiadakis, Charalambidis, & Capros (2013) investigated the U shape hypothesis of labor force participation of female and found strong evidence.

Besides economic growth, theoretically education is an important element that has significant influence on the decisions of a female worker that whether she participate or not in the labor force. An educated female has a greater opportunity cost compare to an uneducated one, so that, female education enhance participation rate of female in the labor force. Empirically İnce & Demir (2006) and Ince (2010) investigated the relationship between education and women work force participation rate. Moreover, besides female education, male education can play an essential role in the labor force participation decision of women. An educated father or an educated husband is more concerned about the education and job of his daughter or his wife, where an uneducated father or an uneducated husband is not free from many superstitions and social obstacles which restrict a women to take part in the labor force. Therefore, it's nothing but overall education that is important for a female to take part in the labor force.

Theoretically fertility rate is another core determinant that has a great influence in the women work force participation decision. When fertility rate decline women get more time to work, as they have to spend less time to manage their baby caring activities. Empirically Mishra & Smyth (2010), Mishra, Nielsen, & Smyth (2010), Bick (2016) investigated the relationships between fertility and labor force participation of female.

In this study we amalgamate these theoretical literature to build a new model to mark out the main influencer that actually determine whether a female worker take the decision of participating in the labor force or not in the south Asian countries.

2. Literature review

This section contains some relevant empirical literature investigating the determinants of women work force participation rate. Some studies are conducted around the world to ascertain these determinants. Blau & Grossberg (1989) found that in case of married female, the work force participation rate is totally dependent on women's real wage, the higher the real wage the greater the female labor participation rate. But there are exceptions of this findings, especially the scenarios of 1970's are remarkable; when women work force participation rate dint response with the increased growth of real wage. The key point that they argued in their paper was that the associated uncertainty of expected future wages play the crucial role for a married women to take the decision of participating in the work force. Demirhan & Demirhan (2017) also found that economic growth plays an important role in the female labor force participation decision in the developing countries. Moreover studies of Lahoti & Swaminathan (2013), Doğan & Akyüz (2017), Tsani, Paroussos, Fragiadakis, Charalambidis, & Capros (2013) added the empirical evidence of the existence of Kuznets curve of women work force participation rate.

Participation rate of a female, who comes from a male-headed family, in the work force in Seoul are investigated by Nam (1991). He takes the data set of two periods, 1970 and 1980, from the censuses of Korean population. He found that in real life whether a female wants to participate in the labor force or not is highly influenced by two factors; one is the level of women's education and another one is the economic status of the family. He found that female who completed at least middle school education are economically more effective than one who have no education. Moreover, female who comes from a high-status family is less willing to participate in the labor force than a female who comes from a lower status. İnce & Demir (2006) also found that higher education has positive effect on labor force participation decision of a female. Moreover study of Ince (2010) added the empirical evidence of the relationship between education and labor force participation of women by studying the macroeconomic data of Turkey.

Jaumotte (2003) analyzed the data of 17 OECD countries where the range of time periods was 1985 to 1999. A clear specification of the full-time female participation rate are made by him. Results of his study are quite significant. Firstly he found that incorporating the tax treatment among the second earners shows a positive significant effect. Moreover, when a strong tax incentive are provided to divide market related work among spouses, subsidies for childcares, and maternity and parental furloughs with payment, then female participation rate decreased with increasing child benefits because of income effects and lump-sum character of these factors.

Some studies found that fertility rate is another core determinant that has a great influence in the women

work force participation decision. When fertility rate decline women get more time to work, as they have to spend less time to manage their baby caring activities. Studies of İnce & Demir (2006), Mishra, Nielsen, & Smyth (2010), Emamgholipour et al., (2016) add the empirical evidence that declining fertility rate will cause increasing female work force participation rate. Studies of Mishra & Smyth (2010), Mishra, Nielsen, & Smyth (2010), Bick (2016) were also found negative relationship between fertility and women work force participation rate.

So many studies have been conducted in order to mark out the determinants of female work force participation rate, but there is little prior work regarding the south Asian countries that deals with macroeconomic factors of female work force participation rate. In this context, we take South Asia as our study area. The main aim of this research is to mark out the macroeconomic factors that influence a female worker to participate in the labor force.

3. Methods of this study

To investigate the macroeconomic factors of the work labor force participation rate of women in the south Asian regions, we take the yearly data set of the selected factors from World Development Indicator 2018. We take data of five south Asian countries named India, Nepal, Pakistan, Bangladesh and Sri Lanka. Data are taken for the range of 1990-2015.

Investigating the macroeconomic determinants of women work force participation rate is the main objective of this study. Here we take the Female work force participation rate as the regressand and per capita GNI, square of per capita GNI, education, and fertility rate as explanatory variables. Table-1 illustrates the name, notation, definition and our expected sign of the respective regressors.

Table 1.

Variables and their definitions

Variable name	Definition	Expected Sign
Female Labor Force Participation (FLF)	female labor participation percentage of total female labor force	Dependent variable
Per capita GNI (PGNI)	GNI per capita (current US dollar)	(+)
Square of Per Capita GNI	Square of GNI per capita (current US dollar)	(-)
Education (EDU)	Enrollment in secondary school, general	(+)
Fertility rate	Fertility rate (total birth per women)	(-)

Logarithemic transformation of the variables have been used to get the elasticities. The estimable model of this study is:

$$lnflf_{it} = \alpha + \beta_1 lnpgni_{it} + \beta_2 lnpgni_{it}^2 + \beta_3 lnedu_{it} + \beta_4 lnfr_{it} + u_{it}$$

Where i = 1, 2, 3,…, N

t = 1, 2, 3,…, T

Here,

lnflf = natutal lof of female labor force participation rate

lnpgni = natural log of per capita GNI

lnpgni2 = natural log of square of per capita GNI

lnedu = natural log of education

lnfr = natural log of fertility rate

And uit = the error or the disturbance term.

3.1 Lagrange multiplier tests for random effects

At first we run the simple pooled OLS regression. But in case of panel data pooled OLS is not sufficient sometimes. So to identify the effects on pooled OLS estimators we run some multiplier tests and on the basis of these LM tests results we can conclude that whether pooled OLS is suitable for our study or we have to run the random or fixed effect model.

3.2 Hausman test

To deal with the hypothesis testing problems that include two different estimators Hausman (1978) developed a test, which is widely known as Hausman test. By using Hausman test we can select the appropriate model between the fixed effect model and the random effect model. As our study deals with panel data set so that to select the appropriate model we use Hausman test. The null hypothesis of this test is- the appropriate model is random effect model. If the respect p-value of the Hausman test is less than 0.05 then we may reject the null hypothesis. When the null hypothesis can be rejected, we may conclude that the appropriate model is fixed effect model, otherwise the random effect model will be the appropriate one.

3.3 Methods to deal with contemporaneous correlation in the model

The fixed and random effect models sometimes provide biased results. This is the case when contemporaneous correction exists in the residuals. This is also known as cross-sectional dependence. So, in case of cross-sectional dependence we have to apply some other methods. We may use Feasible Generalized Least Squares (FGLS) method or Panel Corrected Standard Error (PCSE) model in the case of existence of contemporaneous correlation in residuals. In our research we use PCSE model. We perform some statistical tests to identify cross-sectional dependence.

4. Results and discussions

At first summary statistics of the regressand and regressors under this research are tabulated in Table-2.

Table-2.

Descriptive statistics

Variable Name	Lnflf	lnpgni	lnedu	lnfr
Observations	130	130	130	130
Mean	3.6519	6.4105	15.7381	1.1573
Median	3.5903	6.2822	15.5182	1.1545
Maximum	4.4159	8.2295	18.6675	1.7958
Minimum	2.5261	5.2470	12.9896	0.7241
Std. Dev.	0.5177	0.6734	1.4694	0.2978
Skewness	-0.2293	0.5439	0.5206	0.2554
Kurtosis	2.4014	3.0246	2.4365	1.8635
Jarque-Bera	3.0799	6.4139	7.5926	8.4102
Probability	0.2144	0.0405	0.0225	0.0015
Sum	474.7459	833.3604	2045.949	150.4426
Sum Sq. Dev.	34.5766	58.4900	278.5254	11.4431

4.1 Results of lagrange multiplier tests for random effects

Table-3 illustrates LM tests results to check out the random effects. Here the null hypothesis is no effect. To investigate the existence of random effects we conduct some tests like Breusch-Pagan, Honda, King-Wu, Standardized Honda and Standardized King-Wu LM test. Based on the results of these test we may conclude that which model is the best and provide unbiased results. Here null hypothesis is there is no random effect. From table-3 we observe that all the respective p-values are not greater than 5 percent level of significance, which implies that the null hypothesis is not accepted. So, there exists random effects and Pooled OLS will not be the appropriate model for this study.

Table 3.

Results of lagrange multiplier tests for random effects

Lagrange Multiplier Tests for Random Effects Null hypothesis: No effects			
Test	Cross-section	Time	Both
Breusch-Pagan	361.489 (0.0000)	4.167 (0.0412)	365.656 (0.0000)
Honda	19.013 (0.0000)	-2.041 (-)	12.001 (0.0000)
King-Wu	19.013 (0.0000)	-2.041 (-)	16.895 (0.0000)
Standardized Honda	34.673 (0.0000)	-1.931 (-)	10.960 (0.0000)
Standardized King-Wu	34.673 (0.0000)	-1.931 (-)	23.125 (0.0000)

4.2 Results of Hausman Test

We run both fixed effect and random effect model and then perform Hausman test to make out which one is appropriate for this study. In Hausman test there is null hypothesis which assumes random effects. From Table-4, we get the respective p-value of the Hausman test which is not greater than 5 percent so that we are unable to accept the null hypothesis, rather we accept the alternative hypothesis of fixed effects. Therefore, our results of Hausman tests suggest that fixed effect model should be the appropriate model for this study.

Table 4.

Hausman test results

Hausman Test	Chi-Sq Statistic	Chi-Sq d.f.	Probability
Cross-section random	319.607806	4	0.0000

4.3 Results of cross-sectional dependence test

Fixed effect model does not provide unbiased results if there exists contemporaneous correlation in residuals, the term known as cross-sectional dependence. So, at first it is important to check whether there exits cross-sectional dependence or not. In this regard we perform some cross-sectional dependence tests. Results of these tests are tabulated in Table-5.

Table 5.

Cross-section dependence test results

Residual Cross-section Dependence Test

Null hypothesis: No cross-section dependence (correlation) in residuals

Test	Statistic	Degrees of freedom	p-value
Breusch-Pagan LM	72.85372	10	0.0000
Pesaran scaled LM	12.93649		0.0000
Bias-corrected scaled LM	12.83649		0.0000

Here we have a null hypothesis which assumes no contemporaneous correlation in residuals. After performing these tests we observe that the respective p-value of these tests are not greater than 5% and that's why we are unable to accept the null hypothesis. As we accept the alternative hypothesis, this implies that there exists contemporaneous correlation in residuals and fixed effect model will provide biased results in this context. Neither fixed effect nor random effect model is appropriate in the presence of contemporaneous correction in residual, so we have select such a model which will provide results by adjusting this correlation. One of such model is the PCSE, Panel Corrected Standard Error model. Moreover, PCSE model will also provide results by removing auto-correlation and heteroscedasticy problem.

4.4 Results of Estimated models

Results of the PCSE model are presented at table-6. Positive and statistically significant impact of per capita GNI on female work force participation rate are found in this study. We find that the expected value of the female work force participation rate will increase by 0.754 percent with a 1% increase of per capita GNI. Square of per capita GNI is found significant and negative, indicating the existence of Kuznets curve in the study areas. This inverted U shaped curve implies that at the initial level of economic growth, women work force participation rate increases, but with higher level of economic growth it will start to decline. Here we find that the expected value of the female work force participation rate will increase by 0.0556 percent with a 1% increase of the square of per capita GNI. This findings are consistent with the previous empirical findings of Lahoti & Swaminathan (2013), Tsani, Paroussos, Fragiadakis, Charalambidis, & Capros (2013), Demirhan & Demirhan (2017) and Doğan & Akyüz (2017).

Table 6.

Results of estimated models

Variables	PCSE Model
Lnpgni	0.754182*** (0.0000)
$lnpgni^2$	-0.055634*** 0.0000)
Lnedu	0.145455*** (0.0000)
Lnfr	-0.451017*** (0.0000)
Constant	-1.682618*** (0.0080)
R^2	0.9862
Adj R^2	0.9852
S.E. of regression	0.938191
F-statistic, Prob (F-statistic)	1081.594 (0.0000)

*** Significant at 1% level

We find significant and positive effect of education on women work force participation rate, and the expected value of female work force participation rate will increase by 0.146 percent with a 1% increase of overall education. This findings are also consistent with the previous findings of İnce & Demir (2006) and Ince (2010).

Negative significant impact of fertility rate on female work force participation rate is found in this study. Average Female work force participation will increase by 0.451 percent with a 1% decrease of fertility rate. This results are also consistent with the previous findings of Mishra & Smyth (2010), Mishra, Nielsen, & Smyth (2010), Bick (2016), and Emamgholipour et al., (2016).

Table-7 checks the cross-sectional dependence of PCSE model and we find that there is no contemporaneous correlations in the residuals now.

Table 7.

Results of cross-sectional dependence for PCSE model

Residual Cross-section Dependence Test			
Null hypothesis: No cross-section dependence (correlation) in residuals			
Test	Statistic	Degrees of freedom	p-value
Breusch-Pagan LM	15.62524	10	0.1109
Pesaran scaled LM	0.139807		0.888
Bias-corrected scaled LM	0.039807		0.9682

Table-8 checks for normality assumption which implies that data are distributed normally. In this study we are unable to reject the normality assumption as the respective p-value is very high. Therefore, we may conclude that data set, which is used in this study, follows the normal distribution.

Table 8.

Normality test result

Jarque-Bera = 0.604435
Probability = 0.739177

5. Conclusion and policy recommendation

Our objective of this research was investigating the macroeconomic determinants that play the vital role in making the decision of whether a female will participate in the labor force or not. We took the data of five south Asian countries named India, Nepal, Pakistan, Bangladesh and Sri Lanka for the range of 1990-2015 and performed some Lagrange Multiplier tests to mark out the cross-section effects and used the Hausman test to select the appropriate model. We also checked the cross-sectional dependence and run PCSE model to get unbiased coefficients of the estimators. Estimated results confirm that GNI per capita, square of per capita GNI, Education and Fertility rate are significant macroeconomic factors which have strong influence on the labor force participation decision of a female. Estimated results also confirms the validity of Kuznets curve in the labor force participation decision of a female. Our results reveal that a 1% increase of economic growth will help to increase female participation in the labor force by 0.754 %, but a 1% increase of square of economic growth will reduce the labor force participation of female by 0.056 %. Moreover, a 1% increase of education will help the female to participate in the labor force more by 0.145% and a 1% decline of fertility rate will increase this rate by 0.45% on average. This findings are consistent with theoretical and some other empirical studies mentioned in the results section and we think the findings of this paper will help the policymakers to take the right policy about labor market and enhance social welfare.

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