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Review Paper

Inter-relationship among Female Labour - Force Participation, Fertility and Economic Development: Evidences from India

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ABSTRACT

The female labour-force participation rate has been falling in India despite a sharp increase in economic growth and development. The falling share of the female population in the labour force is a matter of concern from a different perspective. It raises the question of the inclusiveness of economic growth. On the other way round, female workforce participation is having significance in regard to its contribution to economic growth. The fertility rate is considered another important component of this relationship. The present study makes an attempt to explore the relationship between female workforce participation, fertility, and economic development using ARDL-based time series analysis. The study observed the existence of long run cointegration among fertility, female – labour force participation and economic development. The result of the study shows fertility rate is negatively associated with economic development and female labour force participation. Further, economic development is inversely dependent on both female labour force participation rate and fertility rate. The findings of the study may contribute to the economic literature and be conducive to formulating a better economic policy in order to achieve economic growth with gender equality.

HIGHLIGHTS

- Female labour force participation is one of the important indicators of economic empowerment of the female population.
- Both Female participation rate and fertility rate in India have been showing a declining trend for the time period 1990 – 2019.
- High rate of female labour force participation is mostly associated with the agricultural sector which requires low-skill labour in India. Statistically, the time series observation shows a negative association between female labour force participation and economic growth.

Keywords: Female Labour-force participation, fertility rate, economic growth, ARDL, India

The female workforce participation[1] is both ends and means of socio-economic development. As per the ILO estimate (World Bank, 2020) female labour force participation in the world has been declining over the years. How is female labour force participation related to economic development? The issue has been gaining attention across all over the world (Altuzarra *et al*. 2019; Dildar, 2015; Suh, 2016, Mazid & Siegmann, 2021). There are numerous studies which were concerned with the relationship between economic development and female workforce participation. The famous U[2] hypothesis is worth mentionable in regard to the linkage between economic development and female workforce participation. The hypothesis has been empirically verified across different countries and regions of the world and most of the studies

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conforms the existence of U relationship. Despite pursuing the objectives of inclusive growth, the trend of female workforce participation reflects downsizing the economic role of female. There has been scanty of literatures dealing with this issue with respect to Indian economy. Lahoti and Swaminathan (2016) have conducted a similar study covering states of India and reported an insignificant relationship between economic development and female labour force participation. However, the study was restricted in the sense they have included the females between 25 -29 years only.

Fertility rate[3] is another important variable that can affect female labour force participation rate. Higher fertility rate makes labour force participation of female an extremely difficult job in a patriarchal society. There are numerous studies which dealt with the relationship between fertility rate and female workforce participation rate. Again, fertility rate is also related with economic development (Gailor and Weil, 1999; Doepke, 2009; Luci and Thevenon, 2010). There is a possible two - way relationship between fertility and economic development.

There is lack of empirical literatures which examined the possible long run dynamic relationship among fertility, female labour force participation and economic development. The present study has made an attempt to investigate the existence of long run equilibrium relationship among these variables using time series data. The result of the study may contribute to the literatures in the field of female labour force participation and designing the policy to raise female workforce participation vis a vis economic development.

Conceptual Framework

There is possible long run relationship among female workforce participation, fertility and economic development. At the initial stage of economic development female labour force participation remains higher. The dominant sector in this initial stage be the agricultural sector and the significant role of women in this sector results higher female labour force participation. This initial stage is also characterised by having higher fertility rate. Due to the predominance of joint family system, number of children does not create much obstacle towards female labour force participation. Subsequently with the passage of time, economic development makes a shift in sectoral composition from agricultural to manufacturing or secondary sector (Sinha, 1965; Durand, 1975; Pampel and Tanka, 1986; Cagatay and Ozler, 1995).With the transformation of economy from primary towards secondary sector, consumption pattern of household change. Compared to the earlier stage in this stage of transformation, work opportunity of female decreases as economic activities targeted for agricultural production for self-consumption decreases and replaced by economic activities determined outside the household firm. Since woman's primary duty is to take care of children it becomes difficult for them to seek job going outside of the home (Altuzarra *et al*. 2019). The economic development is also supposed to bring changes in household and individual characteristic of female. In this stage joint family system starts to get breakthrough and is ready to be replaced by the mono family system. The change in the household characteristics leads to changing role of female from economic activities to child care and the management of household firm. Moreover, working in industry for a female is considered as a social stigma (Goldin, 1995). All these together may be responsible for falling female workforce participation in this stage of development. Finally, when economic development becomes much faster to attain an advanced stage service sector becomes the dominant sector. In this advanced stage of development social constraints that used to hinder a female's role outside the home dries out. Economic development is supposed to improve the educational achievement of people (Boserup, 1970). With sufficient participation of female in education and skill formation, the demand for females in various activities especially service kind of jobs rise spontaneously. The growth in the service sector is employment friendly for females. The fertility rate at this advanced stage of economic development remains low that also favours female labour force participation.

The relationship among these three variables can be explained from the other end. An increase in female participation is likely to increase economic development in two ways: firstly, directly it increases national income by increasing the workforce of an economy, and indirectly, female labour force participation lowers the fertility of females and

thereby increases per-capita income. Similarly, reduction in fertility is conducive to increase female labour force participation and consequently increase economic growth (Klasen, 1999; Knowles *et al*. 2002, Klasen and Lamanna, 2009, Bloom *et al*. 2009). Reduction in fertility rate provides fiscal liberty to a family which can better allocate its resources toward human capital formation (Galor, 2005; Doepke, 2004). Expenditure in human capital formation is the source of long-run economic growth in the neo-classical model. However, empirical studies on the relationship between female labour force participation give some ambiguities. Cheng (1996) finds fertility affects female labour force participation negatively, but in other wayround female labour force participation has no effect on fertility choice. Kim (2014) conducted a study in Korean population to investigate the relationship between female labour force participation and fertility. The result of the study finds female labour force participation restricts fertility but after the birth of first child.

Female Labour Force Participation in India over time and across regions

The trend of female labour force participation posing a question towards inclusiveness of India's economic growth. Female labour force participation is a strong indicator of female economic empowerment and also an important determinant of growth potentiality of an economy. Missing one of the genders in the participation in economic activities may consequent upon economic growth rate. Fig. 1 shows the trend of female labour force participation rate in India for the time period between 1990 to 2019. The overall trend reflects falling female labour force participation in India over time.

The scenario of female economic participation is not homogeneous across regions. There has been a large variation in female participation in labour force across different states. Further, variation exists between rural and urban region. Fig. 2 & 3 shows female labour force participation rate across different states for rural and urban regions, respectively. It appears from figure 3 that almost all the states are having lower female labour force participation rate in the recent year (2018) in relation to selected base year (2011). This again conforms downward trend of female labour force participation.

Both Fig. 2 & 3 reflects significant variation in FLFPR among different states in India. One of the important source of the variation may be the variation in economic development across regions. Although there may exist many social and cultural constraints in the way of female labour force participation, economic development may give a breakthrough to these constraints. Economic development may break the social obstacles but the degree of response may vary.

Another important reason behind this variation may be the variation in fertility rate. Traditionally, patriarchal social norms assign management task of household firm at the hand of female members. Responsibility of managing household functions becomes more complicated with the increase in fertility. Higher fertility means larger family and consequently the total hours required to nurturing children goes up that creates a time constraint in joining labour force. In addition to this higher fertility reduces per capita family income. This again reduces the total fund for investment in human capital formation. Since female children in the patriarchal society is treated differently than the male children. This is quite rational economically because the family usually don't rely upon daughters for old age income support as in the post marriage their daughters become the members of certain other family. Given financial constraint, therefore, a family remains biased towards the education of their male child. In this kind of situation less spending on human capital formation for a female child let her remain less productive and less fit to enter a job market. Figure shows the prevalence of the wide gap between male and female labour force participation rates in India.

Fertility Choice and Income

In relation to other developed regions of the world, fertility rate in India is still very high. The economic demographic theories linked fertility rate with economic development (Becker, 1960; Leibenstein,1974). At the initial stage of economic development an economy generally experiences high population growth with the feature of falling death rate and prevailing higher birth rate. Fig. 5 shows the trend of total fertility rate of India for the period 1990 to 2019.

Economic development in the post reform period

may be responsible for the falling trend of TFR. Table 1 shows distribution of women by birth order and wealth characteristics compiled from NFHS[4] survey (NFHS-4). As per the survey report around 26.5 percent women were observed having birth order more than 2. Wealth characteristics have been decomposed into five parts. It can be observed that the 14.8 percent belonging to two extreme level of wealth group were having children of birth order more than two. In the group of same birth ordering, there were 39.4 percent of women belonging to the bottom most wealth group. This indicates fertility level falls with the increase in wealth index.

Table 1: Distribution of Birth Order by the Wealth Characteristic

Wealth Index	Birth Order less than three Children (%)	Birth order more than three Children (%)	Total
Lowest	53.7	46.3	100.0
Second	67.5	32.5	100.0
Middle	75.9	24.1	100.0
Fourth	82.5	17.5	100.0
Highest	87.9	12.1	100.0
Total	73.5	26.5	100.0

Source: *NFHS-4.*

The falling rate of infant and child mortality rate in India is also responsible for lowering fertility rate. When parents observe greater survival chance of a child, their tendency to expand family size is likely to be declined. However, the decline in infant and child mortality is also associated with economic development (O'Hare *et al*. 2013). As per NFHS-4, infant mortality rate in India has fallen by 39 percent and child mortality rate by 48 percent over the estimates of NFHS round 3. These fall in might have raised the parental expectation regarding survival probability of children and that in turn result falling fertility.

Data and Methodology

Data

The time series data are ranged from the year 1990 to 2019 compiled from World Bank Development Indicators and publication of Reserve Bank of India. The variables included in the study includes female labour force participation rate, total fertility rate and per-capita net state domestic product.

Methods

In order to study the long run relationship among female labour force participation rate (FLFPR), fertility rate (FERT) and Economic development (EDEV), following models have been formulated:

$$FLFPR_t = f(FERT_t, EDEV_t) \quad \ldots(1)$$

$$FERT_t = f(FLFPR_t, EDEV_t) \quad \ldots(2)$$

$$EDEV_t = f(FERT_t, FLFPR_t) \quad \ldots(3)$$

The econometric model for functional relationship given in equations 1 – 3 is expressed in the following form:

$$Y_t = \alpha + \beta \sum X_t + U_t$$

The usual practice to deal with time series data in regression model is to check their stationary property. Some of the widely used unit root tests include Augmented Dicky-Fuller Test (Dickey and Fuller, 1979), Philips-Perron (Philips and Perron, 1988)and DF-GLS estimators (Elliott *et al*. 1996). Among these DF-GLS test is efficient especially when the sample size is small (Debnath and Das, 2017). In addition to these long run co-integrating relationship among the three variables have been tested as a routine work.

Empirical Analysis

Unit Root Test

The result of the unit root test of DF-GLS is highlighted in Table 2. Findings shows that the test statistic for DF-GLS estimator is found significant for all these variables but in different levels. For instance, the variable FERT is found stationary at level while the other variables FLFPR and EDEV are observed stationary at their first difference.

Table 2: Result of DF-GLS Unit Root Test

Variable	DF-GLS Statistic at Level	DF-GLS Statistic at First Difference
FLFPR	1.498	1.962**
FERT	3.78*	—
EDEV	0.16	3.87*

**indicates 1% and **indicates significant at 5% level.*

Testing for Co-integration

When the time series variables are stationary at different levels it is efficient to use autoregressive distributive lag model – ARDL(p) to investigate the existence of long run co-integration. However, the essential condition to use ARDL appropriately is to satisfy that the variables should be of stationary of either I(0) or I(1). The unit root test result in the previous section ensures that all the conditions of ARDL is satisfied. The ARDL framework of the three regression models is given in equation 5:

$$D(FWFPR_t) = \alpha_0 + \sum_{i=1}^{p} \alpha_1 D(FWFPR_{t-i}) + \sum_{i=0}^{p} \alpha_2 D(FERT_{t-i}) + \sum_{i=0}^{p} \alpha_3 D(EDEV_{t-i}) + \sum_{i=0}^{p} \alpha_4 D(EDEV)^2_{t-i} + \phi_1 FWFPR_{t-1} + \phi_2 FERT_{t-1} + \phi_3 EDEV_{t-1} + \phi_4 EDEV^2_{t-1} + v_t \quad \ldots(5)$$

$$D(FERT_t) = \alpha_0 + \sum_{i=1}^{p} \alpha_1 D(FERT_{t-i}) + \sum_{i=0}^{p} \alpha_2 D(FWFPR_{t-i}) + \sum_{i=0}^{p} \alpha_3 D(EDEV_{t-i}) + \sum_{i=0}^{p} \alpha_4 D(EDEV)^2_{t-i} + \phi_1 FWFPR_{t-1} + \phi_2 FERT_{t-1} + \phi_3 EDEV_{t-1} + \phi_4 EDEV^2_{t-1} + v_t \quad \ldots(6)$$

$$D(EDEV_t) = \alpha_0 + \sum_{i=1}^{p} \alpha_1 D(EDEV_{t-i}) + \sum_{i=0}^{p} \alpha_2 D(FWFPR_{t-i}) + \sum_{i=0}^{p} \alpha_3 D(FERT_{t-i}) + + \phi_1 FWFPR_{t-1} + \phi_2 FERT_{t-1} + \phi_3 EDEV_{t-1} + v_t \quad \ldots(7)$$

The lag length of the ARDL(p) has been chosen using Akaike Information Criterion (AIC). In order to test long run co-integrating relationship ARDL Bound Test has been conducted. The result of this test is given in table3.

Table 3: Bound Test Result of Long Run Co-integration

Dependent Variable	Calculated-F statistic	Critical Values I (0)	I(1)	Decision
FLFPR	8.43 (k=3)	3.65	4.66	Co-integration
FERT	4.47(K= 2)	3.17	4.14	Co-integration
EDDEV	4.47 (K=2)	3.17	4.14	Co-integration

It appears from the table 3 that calculated F statistic for all the three regression models is greater than the critical values indicating existence of co-integration among the variables. Next we estimate the ARDL model giving consideration to the R^2 criterion, Hannan Quinn Criterion, AIC criterion and SBC criterion. However, we have presented ARDL result on the basis of AIC criterion as Monte Carlo experiment finds AIC is superior to the other criterion when the number of time period is less than 60 observations (Liew, 2004). The result of ARDL estimation of long run coefficients given in Table 4.

Table 4: Long run co-efficient Estimation Result

Variable	FLFPR ARDL (3,5,3,3)	FERT ARDL (4,4,4)	EDEV ARDL (6,5,6)
FLFPR	—	- 0.303(-7.08*)	- 317.22 (- 5.84*)
FERT	-3.85 (- 7.51)*	—	-799.53 (- 7.70*)
EDEV	-0.01 (- 0.013)*	- 0.01(- 7.36*)	—
EDEVSQ	0.00000243 (3.68)*	—	—
Constant	52.67 (21.23)*	13.32 (12.15*)	1831.6 (4.36*)

N.B. (*) indicates level of significance at 1%, Figure in parenthesis shows the value of students t.

In FLFPR model we find that the coefficient of fertility rate (FERT) is negative and statistically highly significant. The increase in fertility rate is observed to affect female labour force participation negatively. Higher fertility demands more time to take care of children and domestic works for females and thereby scope for working going outside home is affected severely. Secondly, economic development is found showing a quadratic relationship with female labour force participation. The positive and significant coefficient of EDDEV indicates that increase in economic development reduces female labour force participation. However, square of EDDEV is found positive showing direct relationship with the female labour force participation. This can be interpreted as when economic development increases initially female labour force participation decreases due to negative income effect. At the initial stage of economic development although females grow by education but there is lack of skill or job-oriented education that attracts female towards labour force participation. Moreover, with the increase

Table 5: Short Run ARDL Estimates (ECM)

Variable	ΔFLFPR ARDL (3,5,3,3)	Δ FERT ARDL (4,4,4)	Δ EDEV ARDL (6,5,6)
Constant	122.1 (3.65*)	0.36 (6.56*)	45219.4 (1.63)
ΔFLFPR	—	-0.0094 [-25.48*]	3519.78 [23.81*]
Δ EDDEV	0.09 [12.97*]	0.000041 [4.11**]	—
Δ $EDDEV^2$	-0.00001 [14.29*]	—	—
Δ FERT	-2.61 [12.27*]	—	-12745.1 [6.06*]
ECT_{t-1}	-2.19 (-10.92*)	-0.013*(-6.46*)	-5.63 (-5.74*)
	0.94	0.99	0.71
B-G (Serial-Correlation)	1.75	1.79	0.79
χ^2 (heteroskedasticity)	0.43	0.24	0.72
J-B (Normality)	0.47	0.46	0.99

N.B. Figure within round brackets ( ) are calculated t statistics and figures within angled brackets [ ] are calculated Wald test statistics; (*) and (**) indicates significance at 1% and 5%, respectively.

in income especially for male population, the norms of patriarchal society discourage females to participate in low skilled and low wage job. However, with further advancement in economic development, the social constraints in the way of female labour force participation get slacken. Further, economic development also makes further progress in females' education and skill formation. The educational achievement and skill formation outweighs the negative income effect and that defends the U relationship. However, the scatter plot in Fig. 6 weakly supports the existence of U relationship between FLFPR and income for India, rather it exhibits inverse 'J' relationship. Meaning of J relationship between FLPR and income is that with the rise in income at the early phase of economic development female labour force participation rate falls and rise in income beyond a critical limit show turning point in female labour force participation. It may be predicted that if income rises continuously then the U relationship may be strongly visualised.

In the second model, we find that coefficients of both female labour force participation and economic development is negative. Female labour force participation affects fertility choice negatively. This finding is more plausible in country like India where child caring is especially a greater responsibility of female and there is lack of external service availability in connection with child care. Except limited public sector jobs, other job contracts are not suitable for females to liberalise fertility choice. Similarly, economic development makes the concept of small family norms more popular. With the progress in economic development and standard of living parental preference shifts from quantity to quality. In India, standard of living is a significant force to determine fertility.

In the final model, it is found that economic development is affected negatively by the female labour force participation rate and fertility rate. As per statistical observation female labour force participation in India has been declining. The higher rate female labour force participation is more associated with agricultural sector in India. With the increase in economic development the share of agricultural sector in income and employment has declined and this simultaneously lowered female labour force participation. Next we proceed to the result of error correction model of equations (5 -7) given in Table 5.

Table 5 shows the result of error correction model. It is observed that coefficient of error correction term in FLFPR, FERT and EDEV model is negative and statistically significant. This further confirms the existence of long run equilibrium relationship among the variables. The estimates of error correction coefficients indicate that the deviation from long run equilibrium in FLFPR model is corrected by more than 200 percent in the next year and more than 500 percent for EDEV model while error correction in FERT model in the next year is only by 1.3 percent. This reflects that speed of adjustment in FLPR and EDEV model is much higher than the FERT model. Since we are not interested in the estimates of short run coefficients for the present work, only the results of short

run coefficients have been documented in table 5. Finally, the diagnosis tests result given in table 5 are satisfactory as the models are not found having heteroskedasticity, non-normality and presence of serial correlation values of Adjusted R^2 is also found satisfactory for all the three models.

CONCLUSION

The study finds a long run equilibrium relationship among female labour force participation, fertility rate and economic development. Female labour force participation is jointly affected by the level of economic development and fertility rate. High fertility rate has been found to act as a constraint towards female labour force participation in India. The finding of the study is in compliance with the U relationship between female labour force participation and economic development as observed by other studies. Fertility rate is found negative association with economic development and female labour force participation. Finally, economic development is inversely dependent on both female labour force participation rate and fertility rate.

One of the development objectives of India in recent plans is concerned with reduction in fertility rate and to increase female labour force participation rate. The study finds female labour force participation along with economic development is conducive to lower fertility rate. Simultaneously, lowering fertility rate is conducive to increase female labour force participation. More importantly, high economic development is necessary to include females in the labour force. This is because economic development is supposed to increase skill formation and employability criteria of females which is required to raise their market demand for labour. The negative causal association from female labour force participation to economic development should be carefully interpreted. This may be due to structural shift in sectoral composition of economy. We find skill formation among female is crucial to increase labour force participation.

ENDNOTES

1 Female workforce participation rate is defined as the percentage of total female workers to the total population. In contrast female labour force participation rate refers to the percentage of total female population belonging to the age group 16-64 years who are either employed or seeking employment.

2 The U hypothesis states that female labour force participation in the poor countries is higher, it falls gradually with the initial rise in economic growth and eventually with the increase in economic growth, female labour force participation rate also increases.

3 Fertility rate is the number of live births in a year per 1,000 women of reproductive age group in a population.

4 National Family Health Survey (NFHS) is a nation-wide survey conducted by Ministry of Health and Family Welfare, Government of India, with the International Institute for Population Sciences serving as the nodal agency.

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