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# Levels of Development and Female Labour Participation Rates in Rural India\*

Venkatanarayana Motkuri<sup>#</sup>

## Abstract

*This paper examines factors associated with the variation in female labour force participation rates across NSS regions in rural India. Our results based on quadratic form of equation for regression analysis show that the relationship between income and females' labour force participation rate is significant and the fitted curvature is inverted U-shaped one. Also, FLFPR is negatively associated with female wage rate, percentage of cultivator households, percentage of educated (Primary and above) and percentage of child population below 15 years of age; positively associated with sex ratio and percentage of SC/ST population in the region.*

*Although our results show the significance of the level of income / development in variation in females labour force participation rates across regions, the possible substitution effect of mechanization in the development process cannot be ignored. The negative relationship with female wage rate which is prevailed in developed regions could be due to high opportunity cost with respect to women's labour force participation in the developed region given the cultural factor of low value for women in general and those engaged in manual work resulting higher social cost for a household.*

Key Words: Female Labour, India, Employment, Women Work.

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## I Introduction

During the Post-reform period the Indian economy has witnessed a high growth but combined with decelerating rate of growth in labour force in general resulting in, as many scholars call it, jobless growth. Besides, the declining labour participation rate of females particularly in rural areas raises concern of scholars and policy makers as females' labour force participation has implications for the gender equality and women empowerment. There are some studies which have shown that with the better employment opportunities for women, if their labour force participation rates could have been increased further than what they are in India, the country's GDP would have increased much more than the current one. Despite such potentials, women participation rates in India have historically been low. Scholar engaged in women's studies have been emphasizing on marginalization of women in labourforce. The present trend is observed to be further worsen the situation. A considerable portion of deceleration in growth of total workforce could be due to decline in participation rate of female. Such a trend is observed across many states within the country and across social groups.

For the decline in participation rate during the 1990s, an explanation emerged from some of the research studies was that the increasing demand for education in general and females in particular

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thereby participation in educational institutions especially among the girls. But the continuity of discernible decline in females' labour force participation rate without much change in their male counterparts during the 2000s has been drawing attention of the policy makers and scholars especially economists to understand and explain the phenomenon going beyond the explanation of increasing demand for education. In this respect, some scholars have hinged the decline in labour force participation rate of rural women upon the estimations due to non-sampling error in data collection of the survey particularly that of NSSO, as source of the debate has been on the estimations based on their survey data. Besides, the failure of the national surveys to account for the unpaid family work (reproductive and productive) is another. Others have sought in economic explanations while bringing in two important hypothesis such as income effect of distress-driven participation and discouraged-worker hypothesis. Besides, there exist an argument that social-cultural factors particularly in the Indian context that interact with these above factors and leading to the decline. It is observed that due to various socio-economic and cultural factors along with security reasons females prefer to find employment opportunities in the vicinity. But the work opportunities for females were limited in rural areas with shrinking employment opportunities in agriculture and not enough employment opportunities in the non-farm sector.

Notwithstanding the above observations, the phenomenon in the Indian context still needs to be understood thoroughly and explained. In this backdrop, the main objective of the present study is to understand the possible factors resulting in decline in the labourforce participation rate of females in rural India. This study explores crucial factors such as income or development level and female wage rates along with some other economic and demographic factors that are associated with the variation in the labour force participation rate of women across NSS regions in rural India.

## **II Review: Declining Labour Force Participation Rates of Rural Females**

During the last two decades, that coincides with post-reform period, there are two discernible trends emerging in the Indian economy: they are high economic growth and decelerating rate of growth in labour force (Ghose, 2013). Most importantly is the declining female labour participation rate particularly in rural areas (See Chaudhary, 2011; Himanshu, 2011). Such a trend is observed across many states, except a few ones (see Ghose, 2013; Kannan and Ravindran, 2012, Thomas, 2012; Saha *et al.*, 2013; Neff *et al.*, 2013) and prevalent across social groups – ST, SC, OBC and Others (see Neetha, 2014) and across economic classes including the poor (see Ghose, 2013).

In fact the labour force participation rate particularly of women in general is widely varying across states (see Neff *et al.*, 2013; Ghose, 2013). A study, on regional pattern, observed that the participation rates are the lowest among the eastern states and the highest in southern states (Lahoti and Swaminathan, 2013). The rate of decline is also varying across states (see Neff *et al.*, 2013; Ghose, 2013). On the regional pattern of decline over long period, a steep decline was observed for eastern states while the southern states have witnessed the least decline (Lahoti and Swaminathan, 2013). Another study observes that the decline in short period (during second half of 2000s) relatively smaller states experienced the largest relative decline (Neff *et al.*, 2013). Variation across states/regions and social groups in the level of labour force participation rate of women and the rate of decline during the last two decades reflects varied socio-economic conditions and diverse cultural factors.

However, when, as it has been considered, employment generation is an important objective of economic growth, the trend in India indicates a phenomenon of jobless growth (Ghose, 2013; Saha

*et al.*, 2013). Virtual stagnation or decline in growth of workforce in agriculture, as observed in case of the states, could be considered as virtuous due to eventual structural shift but the deceleration in total workforce is a matter of great concern. But when the decline in agriculture is not equated with corresponding increasing in non-agriculture it is a matter of great concern. A considerable portion of deceleration in growth of overall workforce could be due to decline in participation rate of women. When women's labour force participation has implications for the gender equality and women empowerment, such a trend has far reaching implications in this concern (Ghose, 2013; Mazumdar and Neetha, 2011).

Scholar engaged in women's studies have been emphasizing on marginalization of women in labourforce (see Mazumdar and Neetha, 2011; Hirway, 2011). There are some studies which have shown that with the better employment opportunities for women, if their labour force participation rates could have been increased further than what they are in India, the country's GDP would have increased much more than the current one indicating a heavy cost of gender gap in employment (UNESCAP, 2007). Despite such potentials, women participation rates in India have historically been low. As the present trend is observed, it further worsens the situation.

Since late 1990s concerns have been raising over the decelerating rate of growth in workforce in general and adult female's labour participation rates in rural areas in particular. An explanation emerged from the research studies for the decline in participation rate was that increasing demand for education and thereby participation in educational institutions especially the young. But the continuity of discernible decline in females' labour force participation rate without much change in the male counterparts during the 2000s has been drawing attention of the policy makers and scholars especially economist to understand and explain the phenomenon (see Chaudhary, 2011; Rangarajan *et al.*, 2011; 2013; Kannan and Ravindran, 2012; Thomas, 2012; Mazumdar and Neetha, 2012; Neff *et al.*, 2012; Rustagi, 2013). The phenomenon is to be understood beyond the explanation of increasing demand for education for females (Kannan and Ravindran, 2012). As the age-group-specific participation rates over period indicates the decline is observed across age groups particularly among those in the 25 to 59 years age group which has the least probability of attending educational institutions (see Ghose, 2013; Ghose, 2013; Abraham, 2013).

Scholars from different disciplines and schools of thought have been making attempts to understand and explain the phenomena. As the trend observed is based on the estimates of NSSO survey, some scholars have hinged the decline in labour force participation rate of rural women upon the estimations due to non-sampling error in data collection of the survey particularly that of NSSO (Hirway, 2011). They have argued that NSSO covers only SNA activities and ignores the extended-SNA and non-SNA activities wherein a large portion of women in India engaged. Similarly, another study indicates that the national surveys are failing to account for the women engaged in unpaid family work (productive and reproductive) (Mazumdar and Neetha, 2011). However, what one has to see that the decline in the recent past cannot be explained with this because such a bias in enumerating women's work is not a new phenomenon it has been there for a long time.

Others have sought in economic explanations while bringing in hypothesis such as income effect of distress-driven participation (see Ghose, 2013; Ghose, 2013; Abraham, 2013; Himanshu, 2011; Srivastava and Srivastava, 2010) and discouraged-worker hypothesis (see Ghose, 2013; Mitra, 2011; Unni and Ravindran, 2007; Bardhan, 1984). The distress-driven participation hypothesis indicates when the labourforce participation is distress-driven, the increase in family income out of male wage earnings gradually reduces the women participation in labour market. In this line of thought it is observed that upward social mobility in Indian patriarchal society in the wake of growing incomes is

probably symbolised by women's withdrawal from paid labour and their confinement to unpaid domestic activities (Abraham, 2013). The discouraged-worker hypothesis indicates that due to lack of (suitable) employment opportunities in the economy as it discourages many even to search for, potential labourers withdraw from the labour force even do not like to be unemployed. All these explanations are convincing but not sufficient to explain and understand the decline in participation rate of women in the wake of when Indian economy is moving to high growth trajectory.

### III Theory of Labour Supply / Participation

In fact economic theory particularly development models, assumes that labour supply especially in developing countries is unlimited and perfectly inelastic (Bardhan, 1984). But the theory of factor markets has dealt with labour market wherein wage rate as price that determines the demand and supply of labour, and hence their equilibrium condition. Such a theory has been propounded since Classical economists, even some of the pre-Classicals, and it continued with neo-Classical economists (Douglas, 1934). But the Classical economists' main focus was the subsistence wage that gets the supply and demand equal. Since then in the economic theory of labour market, the impact of change in wage rate on labour supply and demand has been modeled (see Douglas, 1934). With the Marginalist Economists' influence the wage rate is determined by the marginal productivity of labour (*ibid*). However, what emerged from the economic theory of labour markets particularly that of labour supply in neo-classical tradition, is that instead of linear there is a non-linear relationship between wage rate and supply of labour.

In this non-linear nature of relationship, there emerged the back-ward bending and inverted-S shaped labour supply curves (see Douglas, 1934; Mincer, 1962; Sharif, 1991; Dessing, 2002). Given the dichotomous choice between labour and leisure with latter being normal good, increasing income/wage rate initially increases work-intensity but when the painstaking labour costs more than the gain they received from increasing wages that reduces the work-intensity with the further increase in wage rate. Income and substitution effects influence such a path of labour supply curve. This is how backward-bending curve emerges. While the backward-bending represents situation of labour supply in developed countries, the inverted-S shaped labour supply curve is suitably representing the poor developing countries. Within the inverted-S shape labour supply curve lower and upper segments represents developing and developed countries respectively. The path of inverted-S shape labour supply curve show that when wage rate is below subsistence wage, the labour supply increases with a decline in wage rate and becomes perfectly inelastic at a reservation wage rate. Conversely, when wage rate moves up from reservation wage rate to subsistence one, the participation rates declines.

But when it comes to women labour supply there are many issues arise especially in the family context. Most of theoretical exposition of neo-classical economists has been on the response of hours of work supplied to variations in the wage rate. But the choice between to participation or not to, is somewhat different from the choice of the participants to choose between the intensity (hours) of work and leisure. Herein the women's participation in labour force is observed to be involved with complex set of factors in the family context. First of all instead of dichotomy of choice (labour-leisure), there is trichotomy wherein for women the choice is between paid work, unpaid family/home work and leisure (Mincer, 1962). The traditional role and responsibility of women assigns their involvement in home care, child care and home based reproductive activities. In the light of Gary Becker's Home Economic, analysis of women's labour supply is further advanced while taking into account above factors (See Mincer, 1962). Secondly, along with her own-wage

rate, the family income, or wage rate of spouse (if married) or the family head influence the women's labour supply to the market. Thirdly, the availability of substitute factors of production (appliances or machines) for women work at home and market for consumptions goods/services (packaged food etc.,) that substitute home made goods/services (*ibid*).

When examined the relationship between the economic development/growth and the labour participation rate there emerge U-shape hypothesis of women participation rate based on developed countries experience (Goldin, 1994; Mammen and Paxson, 2000). Initially, due to necessity to make subsistence in the presence under developed economic conditions, family labour including women is necessary. As most of them work on family farms and enterprises, social stigma attached to women participation in labour market is not a matter. But for those who do not have productive resources other than labour, they have to. Therefore, at this stage, women participation is a distress-driven one. As the economy gradually shifts from agriculture to industry along with increasing wage rate and thereby increase in family incomes reduces the compulsive participation of women and gradually reaches their participation rate a plateau. Because the growth of industry especially manufacturing sector is rather discouraging for the women's labour force participation along with income effect and social stigma attached to adverse working conditions of women in the labour market. But the gradual shift of economy further to services sector is encouraging with better working conditions in this sector. Therefore, the U-shaped curvature of labour participation rate of women is due to structural shifts in economy, changing income and substitution effects, educational development among women and emerging demand for female labour along with technology that substitutes women's home work (Goldin, 1994; 2006).

There is another hypothesis of the Discouraged Worker Effect saying that when there is economic downturn situation high unemployment discourages them to be in labourforce (see Dagsvik *et al.*, 2010). This hypothesis is an opposite one of Added Worker Effect that developed based on the labour market situation during the Great Economic Depression. According to the Added Worker Effect, when the main breadwinner are either unemployed or unable earn sufficient income, the otherwise non-workers enter into labourforce to supplement the family income. In other words it is a distress driven participation in the labour/work force. The Discouraged Worker Effect on the opposite indicates that in situation of high unemployment and under-employment, along with lack of confidence in getting employment and a high perceived cost of job search, it discourages the otherwise potential labourers to withdraw from labourforce (see Dagsvik *et al.*, 2010). For all these theoretical conjectures and hypotheses the underlying thread is an economic circumstance that is the income or development levels.

### ***Empirical Evidence***

Empirical verification of theoretical formulations or formulation of theory based on empirical evidence in respect of labour supply began in the first quarter of 20<sup>th</sup> Century. Douglas (1934) had observed the backward bending labour supply curve based on USA data related to labour supply. In the light of Gary Becker's theoretical formulation of Home Economics and Fertility, empirical studies on female labour supply have further advanced the analysis (Mincer, 1962; Goldin, 1994). There are a large number of empirical studies in this respect that have been conducted in the developed country context particularly in USA. Empirical evidence of many studies confirm the backward-bending labour supply curve but the debate is on size of the income and substitutions effects and labour supply elasticity (See McClelland and Mok, 2012). The cross-country and time series analysis while relating the women's labour participation rate with economic development observed the U-shape labour participation rate (Goldin, 1994).

In the developing country context, empirical studies on the form of labour supply curve with respect to wage rates or labour participation rates with respect to income in general and that of women in particular are very few. One study conducted in one of the developing country observed the inverted-S shape of women's labour supply curve in respect of wage rate and income (see Sharif, 1991). Some studies have observed an inverse relationship between labour supply and wage rate at a low level of wage (Dessing, 2002; El-Hamidi, 2003). A study that investigates cyclicalities in women's labour supply in response to smoothing household consumption in environments characterized by income volatility found that within-country relationship of women's employment and income is negative in Asia and Latin America but positive in Africa (Bhalotra and Umarita-Aponte, 2010).

In the India context there are a few systematic studies that relate the labour supply with wage rate (see Dasgupta and Goldar, 2005). But there were attempts since long back to estimate labour supply functions for poor agrarian households in India (Bardhan, 1979; 1984; Rosenzweig, 1980). Bardhan study in the Indian agrarian economy context observed that wage rate on market labour supply was not significant but asset effect is strongly negative (Bardhan, 1984). With respect to women it was observed that along with insignificant effect of wage rate, a strong negative effect of assets and status on female labour supply. The study states that "the dominant culture ascribes low status to women's ... manual work and upwardly mobile social groups and households often withdraw their women from labour force" (Bardhan, 1984: p. 22). But among the dispossessed groups (SC/ST) at the bottom of the social hierarchy such a trend is not observed (*ibid*). Besides, it was also observed that demand conditions in the labour market strongly influences the labour supply behavior wherein the job search discouragement effect prevails and it can outweigh the income effect on labour supply.

A recent study observes that forced employment or need-based participation in workforce for females from BPL families in rural areas (Dasgupta and Goldar, 2005). It infers that if the female wage rate earned by BPL households in rural areas goes up substantially or if male members of such households get more employment opportunities, more and more women of BPL families may withdraw from the labour force. It argues that women withdraw from the labour force because they find the returns from home based work higher. Another study, in the Indian context, using dynamic panel models, it did not find a significant relationship between level of economic development and women's participation rates in the labour force. It suggests that growth by itself is not sufficient to increase women's economic activity, but the dynamics of growth would matter (Lahoti and Swaminathan, 2013).

Another study (see Saha *et al.*, 2013), based on filed survey<sup>1</sup> observed that due to various socio-economic and cultural factors along with security reasons females prefer to find employment opportunities in the vicinity. But the work opportunities for females were limited in rural areas with shrinking employment opportunities in agriculture and not enough employment opportunities in the non-farm sector. As, the study observed, their participation in the labour market is greatly constrained by their responsibilities in households, it restrict them from looking for jobs in areas beyond their immediate neighbourhood. Besides, lack of conveyance facilities and adequate skills are restricting their mobility beyond their vicinity (*ibid*).

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<sup>1</sup> Conducted by IAMR in two states: Gujarat and Uttar Pradesh. It was conducted to understand some of the reasons behind the phenomenon, explored factors and changes in different dimensions such as the social, demographic, economic, education and health that affecting the labour force participation rate of women in rural areas.

A study that examined the stagnation in women's labour participation rate in urban India, observed that the main supply side factors were rise in household incomes, husband's education, social stigmas against educated women engaging in menial work, and falling selectivity of highly educated women. On the demand side, employment in sectors appropriate for educated women grew less than the supply of educated workers, leading many women to withdraw from the labor force (Klasen and Pieters, 2013). Another study observes that work participation decision by women depends on personal attributes, household characteristics, local economic conditions and socio-religious traditions (Mazumdar, 2013). Besides, there exist an argument that social-cultural factors particularly in the Indian context that interact with these above factors and leading to the decline (Neff *et al.*, 2013).

The above discussion indicates that there are multiple dimensions to the change (decline) in females' labourforce participation rates. Along with the safety/security considerations and social prestige that is intrigued with the cultural factors, there is a crucial economic factor i.e. income/development levels that are associated with the variation and change in labourforce participation of women.

#### IV Evidence in the Developing Country (Indian) Context

##### *Data and Methods*

In the light above review and discussion, we have examined the relationship between level of economic development or income (proxied with MPCE) and females' labour participation rates (FLFPR) in rural India, based on the cross-sectional data across NSS-Regions. We consider in this exercise that MPCE represents the levels of development of the region. Using the unit record data of 66<sup>th</sup> round (2009-10) of the NSSO's Employment and Unemployment Survey (EUS) for the participation rates and of the Consumer Expenditure Survey (CES) for the per capita consumer expenditure which is used as a proxy for the level of income or development, across regions. The rural wage rate (casual/daily) for females and the other important variables are also drawn from the EUS of the same NSSO round survey. In addition to income and wage rates we have taken into account the other factors which are significant in explaining the variation in FLFPRs across regions. The age-group we have considered is 15-59 years of age for the participation rates of women in rural India.

Following the Mincer's (1964) equation we have estimated the labour force participation rate of women in relation with family/household income (MPCE) and market wage rate for female labourers. The Mincer's simplest specification of a labor-market supply function of women can be written as:

$$m = a.y + b.w + u \quad \text{----- 1}$$

where  $m$  is the quantity of labor supplied to the market,  $y$  is a "potential" of family income computed at a zero rate of leisure and of home production,  $w$  is the women's full-time market wage or market earning power, and  $u$  reflects other factors or "tastes."

We can rewrite the Mincerian equation with our construction of factors/variables, the specification would be

$$FLFPR_i = a.AMPCE_i + b.AWRF_i + c_j.X_{ij} \quad \text{----- 2}$$

The econometric form of the equation is

$$FLFPR_i = a + b_1.AMPCE_i + b_2.AWRF_i + c_j.X_{ij} + U_i \quad \text{----- 3}$$

We have also included the quadratic term for income variable in the equation so that equation as follows:

$$FLFPR_i = a + (b_1.AMPCE_i) + (b_2.AMPCE_i^2) + (c.AWRF_i) + d_j.X_i + U_i \quad \text{----- 4}$$

Where FLFPR – Female Labour Force Participation Rate

‘i’ – i<sup>th</sup> region

‘j’ – j<sup>th</sup> factor (controlled variables)

AMPCE – Average Monthly Per Capita Consumption Expenditure

AWRF – Average Wage Rate of Females

X – other factors (set of controlled variables)

U – Error/disturbance Term

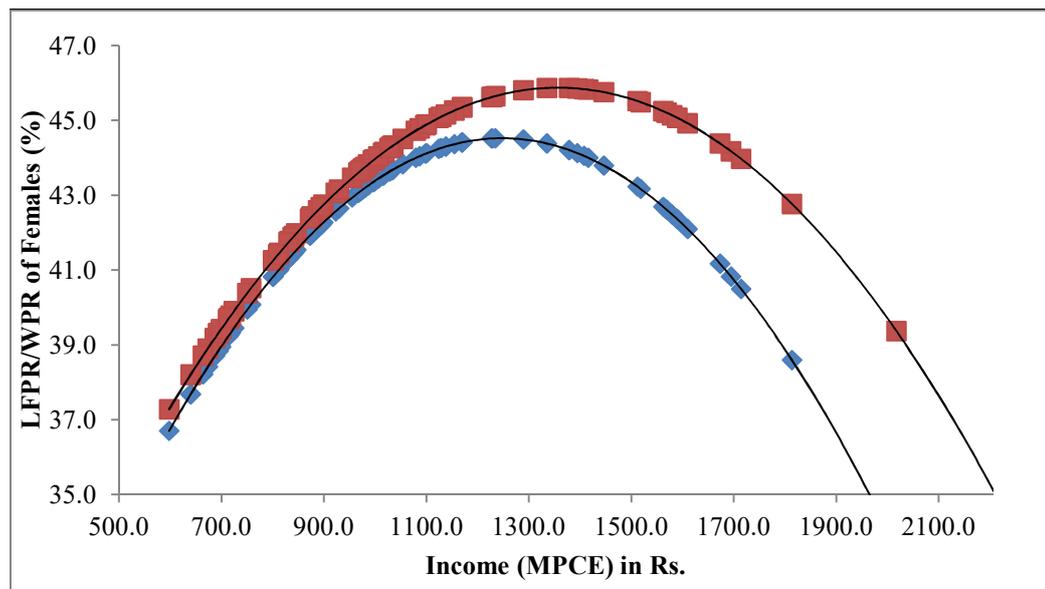
### ***Results and Discussion***

Based on the above specification, when the labour force participation rate of rural females across NSS regions is regressed against only the average household income (proxy - average MPCE) in a quadratic equation form of regression, the fitted curvature observed is explicitly the inverted U shaped one (see Figure 1). Although this estimated equation leaves unexplained most of the variation in it (FLFPR), it is able to identify significance of the family income in females' labour force participation rate (FLFPR), particularly in rural areas. The signs of the estimated coefficients of regression with a quadratic functional form of equation and the fitted curvature indicate that initially the labour force participation rate of females is low at low income level and it increase with a rise in income level till a threshold point and thereafter it begins to decline with continuous rise income.

The inverted U-shaped curvature continued to present when we includes the another variable that is the average female wage rate (FWR) in the region and the labour force participation rate of rural females across NSS regions regressed against their household income proxy (average MPCE) and FWR with a quadratic equation form of regression. The regression results presented in Table 1 under Model I show that co-efficients of both the variables (family income & female wage rate) and the quadratic term of the income variables are significant.

The inverted U-shaped curvature that we have observed with respect to the females' labour participation rates in rural areas against the levels of income / development in the Indian context is completely opposite to the U-shaped curvature in the context of developed countries during their transition as observed by scholars like Claudia Goldin (1994). Herein one has to note the context and circumstances in this regard, wherein the U-shaped curvature observed by said scholars, is in the context of developed countries during their overall transformation (agriculture to industry to services) including industrialization and urbanisation. The inverted U-shaped curvature we observed is in the context of a developing country particularly where in the rural areas that have been continued to remain predominantly agriculture dependent ones.

**Figure 1: Income (MPCE – proxy) and Females’ Labour Participation Rate (FLPR) – across NSS Regions in India Rural**



**Notes:** 1. Across NSS Regions of rural India; 2. upper line represents the LFPR and lower line represents the WPR estimated for rural females; 3. The model and the coefficients are significant at 1 per cent level.

**Source:** Authors’ estimates using unit record data of NSSO 66<sup>th</sup> round (2009-10) employment and unemployment Survey and Consumer Expenditure Survey.

There are two aspects in this relationship between labour force participation rates of rural females and the level of income or development especially in the context of rural India. At a lower levels of income, all the household members, as many as they are including women their participation is necessary in order to meet the household needs (distress driven conditions). Although women’s participation in a labour market is inevitable in this distress driven situation but all that depends on the availability of employment opportunities. Thus, the low participation rates at lower income / development levels could be due to lack employment opportunities which may discourage them to be in the labour force. Working men of households, as main breadwinners, occupy all the opportunities in the labour market. Women rather occupy in domestic duties and in activities that substitute goods and services that otherwise have to seek (buy / exchange) from the market (like fetching water, collecting firewood, gleaning on the fields), in the development / economic parlance they are non-SNA activities.

However, expanding labour market along with an expanding economy may facilitate women working in the labour market and that may raise the demand for their labour. It could be, on the one hand, that increasing opportunities for women along with the men. On the other, in an expanding economy, when men move away (prime movers in shifting / diversifying) from their traditional occupation, for instance, agriculture, the space left behind in this labour market is occupied by the women labour. Also, the increasing wage costs in the production may encourage the producers to look for a cheaper labour and hence to restructure the labour market in a segmented manner (gendered) by engaging the female labour at cheaper wage rate. There may be difference in productivity of labour by gender. If at all, then, when the gains to employers through the difference in wage rates (between male and females) is much higher than loss accrued with the difference in labour productivity between them, it may augment the demand for cheaper female labourers. It is however, may be limited to specific operations where men and/or women can perform. That is how

we have been observing feminization of agriculture labour. The left wing of the fitted curvature may be seen in this context (see Figure 1).

But the declining participation rates at higher income levels must be due to either women relieving themselves from their participation under distress driven condition or growing aspirations and leaving the agriculture with an expectation of better opportunity in non-agricultural activities, but lack of opportunities in this sector may discourage them for being in the labour force. In a distress-driven situation labour force participation of women is doubling burden on her shoulder as she has to carry out household / domestic duties along with labour market work. Once the household is comfortable with the men wage earnings or income, the women of the households may wish to relieve themselves from that burden of their working in the labour market desperately to meet the household's basic needs. They may restrict themselves in carrying out domestic duties. Also, there is a cultural factor that household that is not desperate in depending on the contribution of women's wage earning or market income particularly out of menial / manual work in agricultural or other activities, earns a social prestige particularly in a village society. The *sankritisation* of this cultural norm with the increasing household's income and reproduction of such a culture among the households that are experiencing an upward economic mobility may reduce / restrict women's entry in or encourage withdrawal from the labour force / market.

Notwithstanding the line of argument elicited above, one should not ignore the displacement of labour in the advent of mechanization process leading to decline in participation rates at higher levels of development. As we know when the elasticity of substitution is higher in the production process, mechanization definitely affects the opportunities in the labour market; it substitutes and thereby dispenses the labour. It may affect especially the feminized rural labour market particularly that of agriculture; as we know most of the female workforce in rural areas is engaged in agriculture. As this mechanization process may go along with the level of development, one can find that regions at higher income levels may have higher levels of mechanization. Thus, the lower laborforce participation rates of women may be a fall out of the above phenomenon. Hence, herein again, it is be due to lack of opportunities affected by mechanization that is taking away opportunities of women. Therefore, one has to find whether it is the income effect or the substitution (mechanization) effect due on declining or low female labour force participation at higher income levels.

When we run a regression for females' labour force participation rate (FLFPR) and females' workforce participation rate (FWPR) separately and regressed against income, the estimated participation rates and the fitted curvature shows that both are following a same pattern. But at lower levels of income, difference between FLFPR and FWPR is lesser and it increases with the higher levels incomes (see Figure 1). As the difference between LFPR and WPR is unemployment rate, it means unemployment rate also increase with the level of income or development. It could be that affordability to be unemployed for a female member in a poor household / region is very limited. Also, it could be due to the discouragement affect due to lack of opportunities even though one desperately needs or job search costs, that pulls out them from the labourforce. As the households' income increases, their choice also expands as they look for better employment opportunity than otherwise have participated in distress-driven condition.

Our regression results show a negative association or inverse relationship between the FLFPR and female wage rate (FWR). It may be surprising to see it, but the theory of backward bending supply curve of labour (men or women) supports such an association. It must be due to high opportunity cost of women's labour force participation, if not with respect to their leisure time, but may be

owing to necessity of their engagement in domestic duties involving child care and other activities, or a cultural factor of loss of household's social prestige when the women of a household given their social and economic status, has to engage in menial or manual work. This opportunity cost may be higher at higher income levels. When such opportunity cost is high, even higher wages may not be able to attract women into labour force. Rather, higher wage could be due to non-availability of women in the labour market given their high opportunity cost. On the other hand, higher wage rates are associated with higher income regions, so these higher wages are reflecting the higher standard of living of that region where a higher reservation price for labour is marked.

We have also extended the two variables (income and wage rate) regression model with a quadratic term (of income) and included other factors (co-variables)  $X_j$  and regressed the LFPR of rural females against all these selected (independent) variables ( $X_j$ ) along with income and wage rate. The following are ( $X_j$ ) variables included in the regression:

- $X_1$  (*%Cult*) percentage of cultivators households to total rural households;
- $X_2$  (*Prmedn*) percentage of rural females who had educational levels primary and above;
- $X_3$  (*C14*) percentage of child population below 14 years of age to the total rural population;
- $X_4$  (*SR*) Sex Ratio in general in rural areas; and
- $X_5$  (*% SC/ST*) percentages of SC/STs in rural population.

The results of the model II based on the estimated equation that included all the variables above mentioned, presented in Table 1 shows that all they are statistically significant, at one per cent level (see Table 1). Although the estimated equation still leaves unexplained a little more than two-fifths ( $R^2 = 0.58$ ) of the variation in it, the significance of these selected variables is explicitly exhibited and a considerable proportion of variation in FLFPR is explained through these variables. The result of the Model II indicates that the female's LFPR across NSS regions is negatively associated with the female wage rate (FWR), percentage of cultivators (*%Cult*), percentage of educated (Primary and above - *Prmedn*) and percentage of child population (*C14*) below 15 years of age. It is positively associated with sex ratio (*SR*) and the percentage of SC/ST (*%SC/ST*). The negative sign for coefficient of income in the quadratic term indicates the inverted U-shaped curvature even after controlling for all these variables. When we worked out the standardized coefficients (Betas) which indicates the relative explanatory power of a variable, it shows the significance of percentage of child (below 14 years of age) population along with the level of income.

With respect to the inverse relationship between FLFPR and the percentage of child population, increasing spread of the notion of childhood to lower strata of social and economic classes and increasing awareness of value of education for their children may be increasingly exerting on the women's labour time in home work, in the child care. The substitutes for a mother in child care such as crèche or domestic helps in rural areas are yet to come up or develop. Although there have been efforts under integrated child development scheme (ICDS), *Anganwadi / Balwadis* are being opened up in most of the villages for catering the children below 6 years age, their functioning is erratic or not upto the mark. Even if they are functioning, their role is reduced to distribution of food while completely sidelining the other function such as a play school/day care that may relieve the mothers sometime from the child care when children are very young. They are not able to relieve mothers from these engagements.

**Table 1: Regression Results**

Sno	Variables	Model I				Model II			
		B	SE	t value	Sig	B	SE	t value	Sig
1	Constant	102.53	28.75	3.57	0.001	125.0	30.8	4.1	0.00
2	MPCE	0.08	0.02	3.32	0.001	0.058	0.02	2.9	0.01
3	MPCE <sup>2</sup>	(-0.000024)	0.00	-3.10	0.003	(-0.000010)	0.00	-2.2	0.03
4	lnFWR	(-25.55)	7.75	-3.30	0.001	(-28.59)	6.03	-4.7	0.00
5	%Cult					(-0.35)	0.07	-4.9	0.00
6	%Prmedn					(-0.48)	0.13	-3.8	0.00
7	Sex Ratio					0.07	0.02	3.8	0.00
8	%C14					(-1.37)	0.36	-3.8	0.00
9	%SC/ST					0.32	0.08	4.1	0.00
		R <sup>2</sup> =0.154	F=5.05* ; SE=16.5		R <sup>2</sup> =0.58		F = 13.55* ; SE=11.96		

**Note:** 1. **MPCE** –monthly per capita consumption expenditure; **lnFWR** – (natural) log of Average of Female Wage Rate (daily/casual wages); **%Cult** – percentage of Cultivator households to total rural households; **%C14** – percentage of child population (below 14 years age); **%Prmedn** – percentage of educated population (primary and above); **%SC/ST** – percentage of SC/STs; 2. \* the model is significant at 1%.

**Source:** Authors' Calculations / Estimates.

Also, the school going children too need their mother's time and care in preparing them for school and in completing their home work. One can see the school participation rates in India particularly in rural areas during the last two decades have increased remarkably. On the supply side, schooling provisions have improved during the period thanks to DPEP and SSA initiatives. On the demand side, rising demand under the emerging circumstances of the high perceived value of education complemented with affordability in the context of growing real wages and rural incomes along with supplementary welfare measures (such as direct and/or indirect cash transfers through pension, scholarships, PDS etc.,) and punitive action against child labour that might have reduced the opportunity cost of child schooling.

Therefore, women's withdrawal from the labour force / market could be due to as she engaging herself in nurturing the human capital of the future generations in the absence of proper substitutes for child care. Even if the substitutes are available, the affordability related to these substitutes given the household income even after taking into account the women's earning is matter of household's decision. Again, the preferences (of the households head / husband or her own) such as giving home-made food for children and other family members and mothers directly involving in child care is also a matter of concern for the women's participation in labour force.

The negative coefficient in respect of the percentage of cultivator households could be that most of the women in cultivator households engage in their own farms as an own account unpaid-labourer, such a participation sometimes may not be reflected in their labour market participation. Also, it could be that the cultural factor related to stigma attached to women's involvement in manual work among the rich peasant households may restrict their entry into labour force altogether. Similarly, the educational levels in general may discourage engaging menial and manual work, so it must be the case for women as well. The educated women may be willing to take up better opportunity but lack of availability of such opportunities might discourage them to be in labour force<sup>2</sup>.

<sup>2</sup> When we included percentage of households participated in NREGS, it is found to have positive relationship with FLFPR but not significant. However, the positive association indicates that when otherwise lack of opportunities for women that discourages them to be in labour force, the implementation of NREGS created some employment opportunities for women and encouraged them to participate in the labour force. Opportunities for women generated are

The positive association of FLFPR with sex ratio which is included in our analysis to reflect the cultural factors – low social and economic value for females – in predominantly patriarchal societies in some parts of the country particularly in northern regions. In south and tribal regions the sex ratios are not so adversely against the females and the labour force participation rates are also fairly moderate. The positive association of FLFPR with the percentage of SC/ST indicates that for women in these economically backward and socially marginalized sections it is their economic necessity to participate in the labour force. Most of these caste households especially those belonging to SC community own none of the productive assets like land, rather they have to depend on their labour power. In tribal and hill regions in general and tribal communities anywhere in particular, women participation in labour force is higher when compared to other regions and castes.

On the whole, what one can make out from above analysis and discussion is that the female labour participation rate varies along the level of income / development. Particularly in a rural and agrarian economy, lack of opportunities at lower levels of development may result in lower participation rates and it rises with the increasing opportunities in any expanding economy. If the women's participation in labour force is desperate in a distress-driven circumstance, at higher levels of development with the ease of distress conditions women withdrawal from the labour force is inevitable (income effect). The cultural factor may further augment the income effect. However, it may also be possible that if mechanization which dispenses the labour, is associated with the level of development, the declining or low female labour force participation rates at higher income levels could be partly associated with mechanization (substitution effect) that dispenses the labour. Herein one has to see whether the phenomenon of declining or the low participation rates at higher incomes/development levels are due to the income and substitution effect.

## V Concluding Remarks

High growth of Indian economy combined with decelerating rate of growth in labour force resulting in jobless growth. The declining labour participation rate of women particularly in rural areas raises concerns as women's labour force participation has implications for the gender equality and women empowerment. In this backdrop, we have made an attempt to examine factors associated with the variation in female labour force participation rates across NSS regions in rural India. Our results based on quadratic form of equation for regression show that the relationship between income and females' labour force participation rate is significant and the fitted curvature is inverted U-shaped one. Also, FLFPR is negatively associated with female wage rate, percentage of cultivator households, percentage of educated (Primary and above) and percentage of child population below 15 years of age; positively associated with sex ratio and percentage of SC/ST population in the region.

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either directly in the programme itself or indirectly in the labour market through a consequent labour shortage. Such a situation may be true in case of leftwing of the fitted inverted U-shaped curvature (representing relatively underdevelopment or backward region / situation) fitted for FLFPR against the income. Also, in the right wing the decline in FLRPR, if it is due to mechanization (substitution) effect, NREGS might have generated some opportunities for women. Higher and equal wage in NREGS might have been encouraging for women to participate in the labour force. However, one has to note that NREGS has not been implemented rigorously across regions in the country, there is huge variation. The states which are successful in this endeavour of implementing the scheme, are observed to be relatively modest or better ones in terms of their level of development, whereas many of the poorer states are not so successful. Secondly, some of the successful states particularly southern ones like Andhra Pradesh have already higher FLFPR. The observed positive association could be due to this fact of coincidence. It is interesting to note even in these successful states the FLFPR has declined during the 2000s that is coincided with implementation of NREGS.

Although our results show the significance of the level of income / development in variation in females labour force participation rates across region, the possible substitution effect of mechanization cannot be ignored. The negative relationship with female wage rate which is prevailed in developed regions could be due to high opportunity cost with respect to women's labour force participation in the developed region given the cultural factor of low value for women in general and those engaged in manual work resulting higher social cost for a household.

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