Why is female labour force participation declining so sharply in India?

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Abstract

This paper attempts to shed light on the causes behind the recent sharp decline in female labour force participation in India and to identify factors underpinning the long-term stagnation in female participation. Through an examination of labour market trends, a series of scenario exercises, and econometric analysis, we analyse four prominent hypotheses of the root causes of declining female participation. The findings in this paper indicate that a number of factors were responsible for the recent sharp decline in estimated labour force participation rates among working-age women. Some factors, such as increased attendance in education and higher household income levels, are no doubt a positive reflection of rapid economic development. Additionally, we find evidence that changes in measurement methodology across survey rounds is likely to have contributed to the estimated decline in female participation, due to the difficulty of differentiating between domestic duties and contributing family work. However, the key long-run issue is the lack of employment opportunities for India's women, owing to factors such as occupational segregation.

1. Introduction

The National Sample Survey Organization (NSSO) survey on the *Employment and Unemployment Situation in India* conducted in 2009-10 exhibited a marked decline in female labour force participation. The labour force participation rate for women aged 15 years and above fell by 10.1 percentage points as compared with the previous survey round, corresponding to 22.6 million fewer women in the labour force in 2010 than in 2005.[1] This was driven by declines in female participation rates in both rural and urban areas, which dropped by 11.5 and 5.0 percentage points, respectively. In comparison, male participation in India declined by only 3.4 percentage points over the same period. Based on the most recent survey (GoI, 2013), female participation declined further in rural areas – a drop of 2 percentage points since 2010, while in urban areas the rate increased by 1.1 percentage points. The overall female participation rate declined by 1.3 percentage points while the male participation rate dropped by 0.8 percentage points.

These declines in participation occurred at a time when India was experiencing high average annual GDP growth of around 8 per cent (World Bank, 2012). It is expected that such a high rate of annual growth over a sustained period would create many new job opportunities and reduce the incidence of poverty. In addition, fertility rates have declined steadily over the past several decades, at 2.6 in 2011 compared with 3.1 in 2000 and 3.9 in 1990, which would tend to be supportive of increased female participation in the labour market (World Development Indicators). India also enacted a large-scale public programme promoting employment in rural areas (Mahatma Gandhi National Rural Employment Guarantee Act, (MGNREGA)) in 2005. Against this backdrop, the declines in participation appear very puzzling.

The overall female participation rate in India has been persistently low in comparison with other countries in the world. In 1994, India ranked 68th out of 83 countries with available data in terms of the rate of female participation. As of 2012, it ranked 84th out of 87 countries. The recent sharp decline in women's participation in the labour market must therefore be viewed in a longer-run context of low and stagnant female participation rates.

Low levels of female labour force participation can have negative economic effects, reducing potential growth rates. An ILO report estimated that global GDP could grow by US$1.6 trillion (in PPPs) versus the current trajectory, if gender gaps in participation rates moved half way towards the median gap observed across all countries in the European Union and North America in 2012 (equivalent to the observed gap in the Netherlands) by 2017 (ILO, 2012). Specifically for India, Lawson (2008) estimated that per capita income could be 10 per cent higher by 2020 and 20 per cent higher by 2030 than in the baseline scenario if India's gender participation gap could be halved. Given the large potential economic and social benefits of raising female participation in India, this paper attempts to identify the key factors that may explain why women's participation rates have fallen sharply in recent years and why they have stagnated at low levels for a long period of time.

The remainder of the paper is structured as follows. Section 2 puts forth the prevailing hypotheses for low and declining female labour force participation in India. Section 3 reviews the literature on determinants of female labour supply and participation in developing countries, with a focus on India. The trends in female labour force participation are analysed for India based on the five most recent Employment-Unemployment surveys in Section 4. An attempt is made to analyse a series of scenarios

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[1] The labour force in this paper includes both the usual principal and subsidiary status (UPSS).

related to changes in female participation, and to provide estimates of the impacts of increased education, increased household income, measurement precision and lack of employment opportunities on overall female participation rates in Section 5. This section also includes a scenario examining the potential role of occupational segregation in hindering female employment growth. Section 6 investigates the key factors that have influenced female labour force participation and how these have evolved over time using two binary choice models along with a Oaxaca-Blinder decomposition. Section 7 concludes and offers some policy directions.

2. Hypotheses and Data sources

A number of competing hypotheses have been brought forward to explain the steep decline observed between the 2004-05 and 2009-10 survey rounds, see Chowdhury (2011) and Neff *et al*. (2012). In attempting to shed light on both the recent decline and longer-term stagnation in female participation, this paper distinguishes between four main hypotheses of the root causes: i) Increasing attendance in educational institutions; ii) Increased household income, which reduces the need for female labour; iii) Changes in measurement methodology related to some types of female employment; and iv) Insufficient job opportunities for women.

The official reports (Planning Commission, 2011, p. 6), suggest that the overall decline in participation for both men and women has been due to an increase in young adults attending educational institutions. While this may have depressed the most recent participation rates, it is expected that an increase in educational attainment leads to improved job prospects and higher labour market attachment in the future.

The second hypothesis is based on the literature on long-run changes in female labour supply which observes that there is a U-shaped relationship between national income and female labour force participation, see Lincove (2008) and Mammen and Paxson (2000). One of the explanations for this relationship is that an increase in household income first leads to a decline in participation through household income effects. That is, as households become wealthier, increasing numbers of women move out of low-productivity, often subsistence employment, and become economically inactive. This often coincides with higher female enrolment in education, as households can better afford to send girls and young women to school. Only later in the development process, when more jobs that are acceptable to women become available, do women increase their labour market participation.

The third hypothesis relates to data collection and changes in measurement precision across surveys, and is based on the argument that the NSSO used more contract workers than usual and that interviewers failed to ask crucial follow-up questions when conducting the 2009-10 survey (Seth *et al*., 2011). Other researchers have pointed to detrimental effects on participation from the global financial crisis and from the deficient monsoon rainfalls in 2009 (Chowdhury, 2011). These one-off shocks, which may have disproportionately affected the 2009-10 survey data, need to be distinguished from long-term trends in labour supply in India.

The fourth hypothesis is based on the evidence that available employment opportunities for women in India have declined (Chowdhury, 2011). This may be because employment generation has not kept up with the rise in the working-age population, due to increased competition with men for scarce jobs and an increasing reluctance of women to take up informal (and poorly-remunerated) work. A related possibility is that industrial and occupational segregation may be hindering an increase in female employment. That is, if industries and occupations that are experiencing job growth tend to be male-

dominated, women would be less likely to benefit from overall job gains and may remain out of the workforce given the limited opportunities.

The analysis is based on the 50th (1993-94), 55th (1999-2000), 61st (2004-05), 66th (2009-10) and 68th (2011-12) rounds of the Employment and Unemployment surveys, each of which were carried out over the course of 12 months, from July to June. The definitions, concepts and approaches are very similar across all five survey rounds. Very few questions were added or dropped across the various rounds, which allows for a comparison of labour market outcomes over time. Throughout the paper, 1994 will refer to the 1993-94 survey, 2000 to the 1999-2000 survey, 2005 to the 2004-05 survey, 2010 to the 2009-10 survey and 2012 to the 2011-12 survey.[2] The most recent survey is excluded from the empirical analysis, as the monthly per-capita expenditure data appear to be non-comparable with the earlier rounds.

3. Literature review on drivers of female labour force participation

Female labour force participation represents a woman's decision to be part of the employed or unemployed population as opposed to being part of the economically inactive population (comprised of those not in work and not seeking work). The economic literature distinguishes between male and female participation in the labour market due to observed differences in trends and determinants of each. Substantial increases in female labour force participation in most developed economies since the 1950s have generated a large body of literature on the subject. For a review, see Killingsworth and Heckman (1986).

The traditional framework for analysing the decision of women to join the labour market goes back to Mincer (1962), who considers that agents allocate their time between leisure, work at home and work in the market. Leisure is treated as a normal consumption good for which demand is derived from maximising utility subject to a budget constraint. This is the basis of the static labour supply model in which an agent's preferred number of working hours is estimated based on information on household income, the expected market wage, which represents the opportunity cost of not working, and individual preferences. In a fairly recent study, this model was applied to analyse changes in female labour supply between the 1980s and 2000 in the United States (Blau and Kahn, 2007).

The decision to participate in the labour market is driven by different factors across developing and developed countries. Models for developed countries treat labour supply as the result of individual utility maximization over consumption and leisure, subject to a budget constraint, (Blundell and MaCurdy, 1999). In contrast, labour supply decisions in developing countries are often modelled for the household as the decision-making entity and are closely linked with labour demand decisions, (Bardhan and Urdy, 1999). As Sen (1987) demonstrates, in any model of economic development it is crucial to take into account that cooperation and conflict exist simultaneously in gender divisions.

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[2] All five surveys cover the entire Indian Union except for inaccessible villages in Nagaland, Andaman and Nicobar Islands and some districts in Jammu and Kashmir (NSSO, 2011, p.24). The stratified two-stage sampling procedure is representative at a regional level for both rural and urban areas.

The focus on the household stems from observations that household ties impose important constraints on individual decision-making. Skoufias (1993) finds that an increase in the market wage of a household member can have substantial effects on the time use of other household members. Moreover, a large part of many households' incomes is earned through work in household enterprises (e.g. a farm in rural areas or a small business in urban areas). Such households can be understood as simultaneously taking consumption and production decisions when determining the amount of household labour to allocate to different activities.

Aside from the focus on the household as decision-maker, analyses of labour markets in developing countries identify multiple heterogeneous segments, among which labour mobility is restricted. The literature suggests segmentation between agriculture, industry and services (Lewis, 1954), between rural and urban locations (Todaro, 1969) and between the informal and formal sectors (Fields, 2009; Maloney, 2004). As a result, analyses of the Indian labour market treat the rural and urban labour markets separately and the NSSO always reports statistics disaggregated by rural and urban areas. In India, large inter-state variations in labour market outcomes have also been observed and documented (Desai *et al.*, 2010). These variations may be due to differences in cultural beliefs and practices, in levels of economic development and the degree of urbanization, as well as differences in climate and agricultural productivity.

Around 70 per cent of the Indian labour force resides in rural areas, where most households are engaged in agricultural activities.[3] Labour supply in rural areas is characterised by the seasonality of the crop cycle and weather conditions, which can lead to large and partly unpredictable fluctuations in economic activity over the course of a year. As Behrman (1999) notes, the absence of insurance markets to mitigate the effect of weather conditions on agricultural production may lead risk-averse households to seek additional casual labour arrangements to supplement household income. In addition, low productivity of employment in agriculture has led to higher returns in non-agricultural activities. Recent evidence (Coffey *et al.*, 2011) suggests that short-term migration to urban areas in search of employment is very common among rural households. This fits with the general view on India as a labour surplus economy (Dasgupta and Goldar, 2005), with supply posing no constraint on labour market outcomes and prevalent underemployment in rural areas. Yet, given segmentation between urban and rural labour markets, there are also examples of labour shortages in India (for example for skilled workers in the construction sector), pointing to the existence of structural barriers to employment (Hajela, 2012).

In urban areas, labour markets resemble developed countries more closely: activities are more heterogeneous, there is larger variation in wages, returns to education are higher and institutions enforce more regulations (Behrman, 1999). In this setting, researchers have focused on the division between formal and informal employment and whether individuals are able to transition from the more vulnerable informal sector to the formal sector. Individuals engaged in informal employment are more likely to experience high volatility, lower wages and limited access to credit and capital (Chen and Raveendran, 2012).

In India, social norms tend to attribute the primary responsibility in securing household income through employment to men, while women are expected to devote their time to domestic care (Das,

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[3] Based on the most recent NSS survey round (2011-12), 28.8 per cent of the whole population lived in urban areas and the remaining 71.2 per cent in rural areas. According to the most recent Census for India, in 2011 31.2 per cent of the population lived in urban areas versus 68.8 per cent that lived in rural areas (see: http://censusindia.gov.in/2011-prov-results/paper2/prov_results_paper2_india.html).

2006). This leads to gender differences in employment outcomes, such as sectoral and occupational segregation, and to differences in determinants of participation for men and women. In comparison with men, women in India are on average less skilled and less educated. Women also have less access to land, credit and financial capital, which may inhibit their ability to find paid work. Norms affecting female participation often differ by region, religion and social group.

Empirical evidence shows that women are predominantly engaged in work that can be regarded as an extension of their domestic responsibilities (e.g. maids, tailors, teachers, and nurses). In addition, a large proportion of women prefer to participate in home-based work, which is more easily combined with domestic care responsibilities (Rani and Unni, 2009). This may create difficulties in correctly measuring the amount of market work relative to domestic care (non-market) work carried out by women.

A prominent observation concerning female labour supply in India is that participation by educational attainment follows a U-curve. Women with less education tend to have higher participation rates than women with primary or secondary education. This observation may be related to socio-economic status, as women in poorer households may be required to complement their household's income through market work in order to meet minimum subsistence needs (Dasgupta and Goldar, 2005). As household income increases, women drop out of the labour force as domestic non-market work is perceived to have a higher status than market work. In contrast, women with higher levels of education and those living in affluent households also have higher participation rates than women in middle-income households. Some authors suggest that these women benefit from increased investment in their human capital and may be able to obtain jobs with better working conditions and adequate remuneration (Klasen and Pieters, 2012).

4. Recent female labour supply trends in India and potential measurement issues

4.1 Recent trends in female labour supply

The NSSO surveys measure participation in the labour market according to three different reference periods: one year (usual principal status), one week (weekly status) and on each day of the reference week (daily status). The usual principal status is determined based on the activity on which an individual spent the majority of his or her time over the past year. In addition to the usual principal status, an individual is assigned a subsidiary status, if he or she worked for a minimum period of 30 days over the past year. It is thus possible for an individual to be classified as inactive according to the usual principal status and as employed according the subsidiary status.

The analysis of participation in this paper is based on the basis of usual principal and subsidiary status (UPSS). Individuals who were employed based on the subsidiary status are counted among the active population irrespective of whether they were classified as inactive or active in the usual status. Participation rates based on the usual principal and subsidiary status are higher than rates based on the usual principal status alone, and tend to be higher than the weekly and daily statuses. While analytical results may differ depending on which definition is applied, the overall participation rates for both men and women for each definition have followed the same trends across the five years under consideration.

As shown in Figure 1, while female participation in urban areas is much lower than in rural areas, the overall fluctuations over time are similar across regions and different age groups. There is a decline in participation rates across all age groups between 1994 and 2000, an increase between 2000 and 2005 and sharper decline between 2005 and 2010. However, the trend for rural and urban areas differs for the period 2010 and 2012. For all age groups, the rural rates declined and the urban rates increased. More specifically, the overall rural female participation rate declined by 2 percentage points while the urban rate increased by 1.1 percentage points.

The sharp decline in labour force participation among females aged 15 to 24 years old, falling from 35.8 per cent in 1994 to 22.2 per cent in 2010 and further down to 20.2 per cent in 2012, was likely driven in large part by increased attendance in education. However, as women in the 25-34 and the 35-54 age groups also experienced substantial declines in participation, this explanation can only account for part of the recent decline in overall female participation.

Figure 1: Female and male labour force participation rates, by region
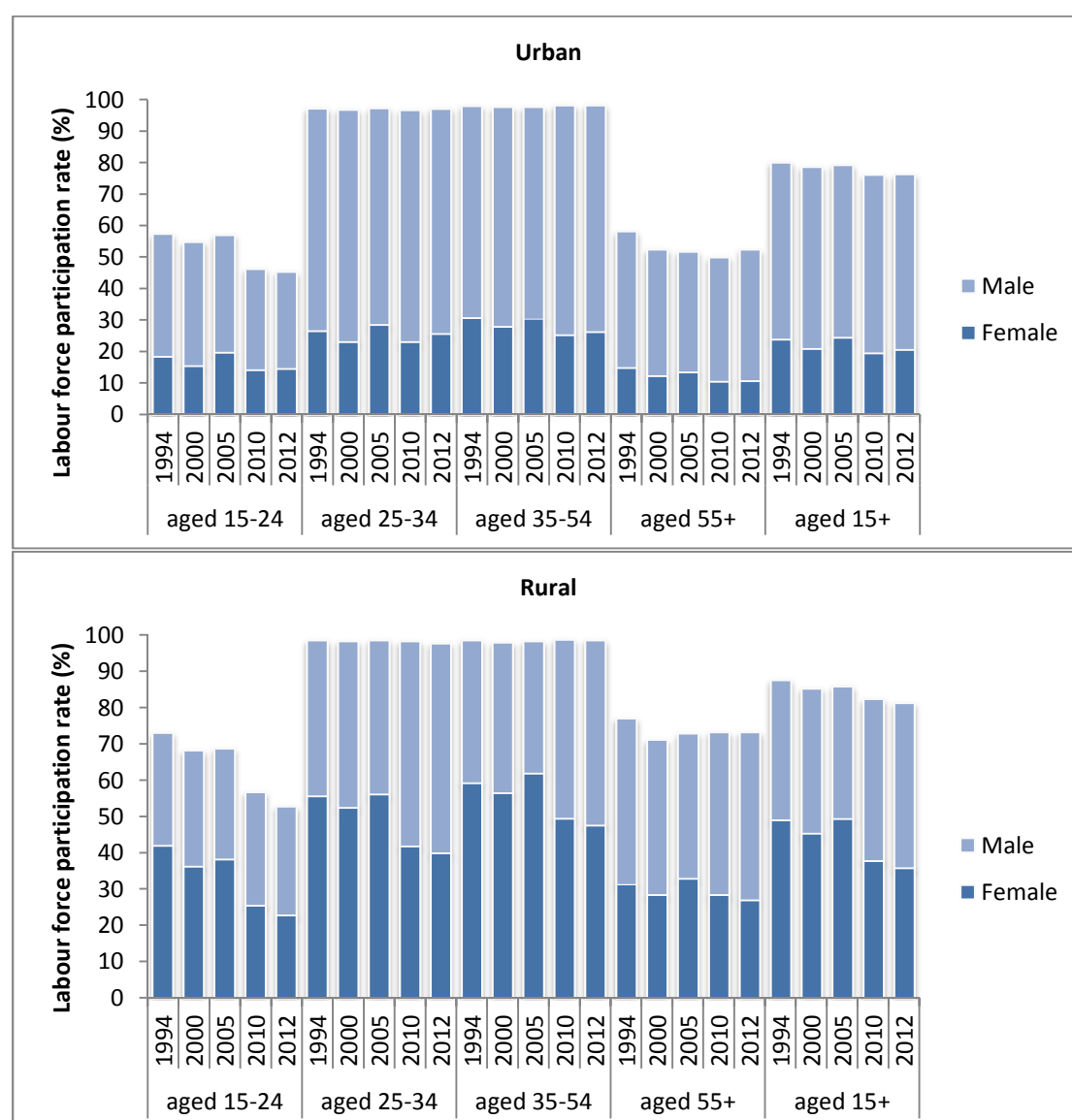
Source: Authors' calculations on the basis of NSS data.

In comparison, male participation among 25 to 54 year olds was extraordinarily stable between 1994 and 2012. Males aged 15 to 24 years experienced a similar trend as females, with a decline in participation rates in both rural and urban areas.

When disaggregating total employment by status in employment (see Figure 2), we find that the proportion of female wage and salaried workers in both rural and urban areas has been steadily rising since 1994, though their proportion remains very low in rural India (9.4 per cent in 2012). Increased wage employment is a positive development, as wage and salaried workers are more likely to obtain decent working conditions and more adequate remuneration as compared with own-account workers or contributing family workers. The share of wage employment for both women and men remains low in comparison with many developing and emerging countries, as India ranks 135th among 145 countries with available data.[4]

Figure 2: Female employment by status and location over time
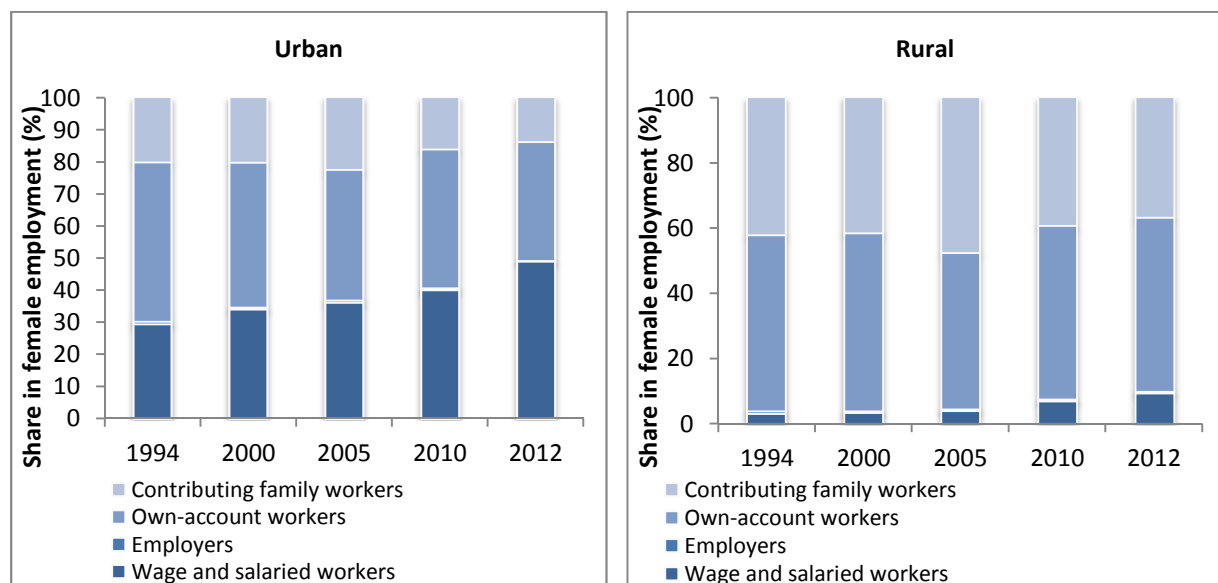
Note: Age group is 15+.
Source: Authors' calculations on the basis of NSS data.

Educational attainment is an important factor in determining the employability of a worker and is likely to affect women's labour force participation decisions in India. Indeed, the relationship between female labour force participation and educational attainment for India resembles a U-curve. Across both rural and urban locations and for all years, women with secondary education had the lowest participation rates. As can be seen in Figure 3, the participation rates in 2010 shifted downwards as compared to 1994 for all levels of educational attainment apart from pre-primary and primary education in urban areas. Between 2010 and 2012, female participation rates at all educational levels increased in urban areas and the largest increase occurred at the pre-primary level (2.7 percentage points). In contrast, over the same period in rural areas, for all educational levels female participation rates dropped, with the largest decline occurring in the pre-primary level (3.7 percentage points).

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[4] ILO, Key Indicators of the Labour Market, 8th Edition (table 3).

Figure 3: Female participation rates by educational attainment
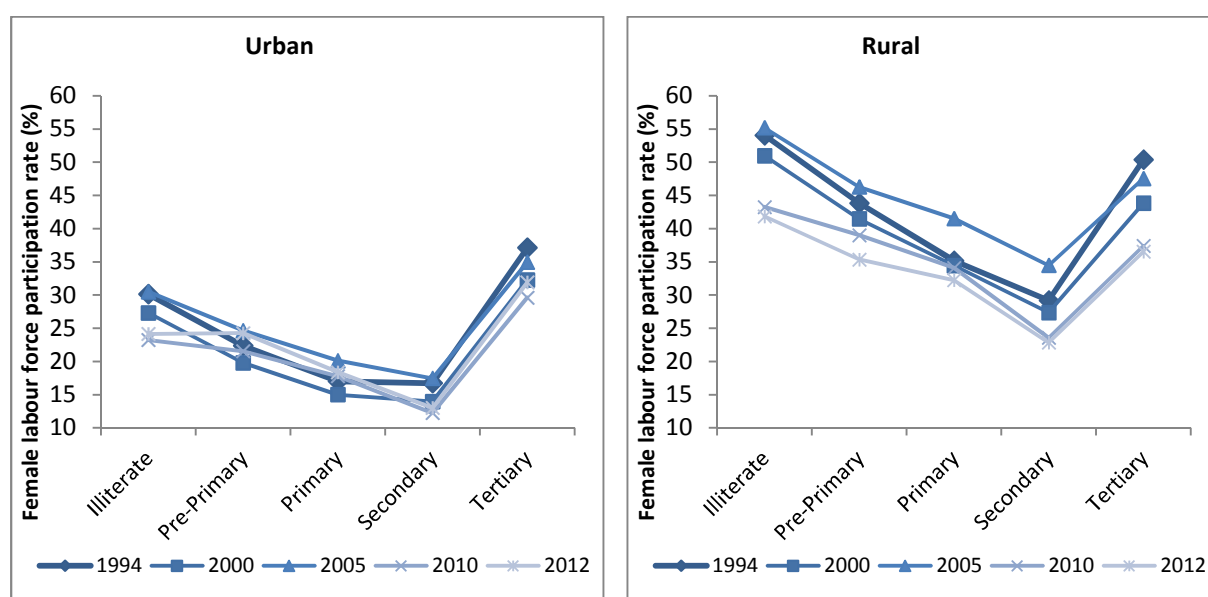
Note: Age group is 15+. Illiterate means no schooling.
Source: Authors' calculations on the basis of NSS data.

Underlying these changes in participation rates by educational attainment are substantial changes in the level of educational attainment of the female working-age population. Despite substantial progress in raising female literacy, the proportion of working-age illiterate women remained very high in 2010, at 49.8 per cent in rural areas and 23.6 per cent in urban areas. In 2012, this share dropped to 47.5 per cent in rural areas and to 22.6 per cent in urban areas. These shares have declined sharply compared to 1994, from 70.8 per cent and 36.3 per cent for rural and urban areas, respectively. Overall, 23.1 per cent of working-age women in India had a secondary education or higher in 2010 (17.5 per cent with a secondary education and a further 5.6 per cent with a tertiary-level education). In 2012, 25.7 per cent had completed a secondary or higher level of education (19.5 per cent with a secondary education and 6.2 per cent with a tertiary degree). While still representing only a small share of the female working-age population in India, this is a significant improvement compared with 1994, when only 11 per cent had a secondary or higher level of education (8.6 per cent with a secondary education and 2.4 per cent with a tertiary level education).

Between 2005 and 2010, while the proportion of females with tertiary education grew fastest, the largest increase during this period was among women with secondary-level education (19.8 million), followed by women with primary-level education (14 million). As these two groups have the lowest shares of economically active women, this would tend to contribute to a decline in the overall female labour force participation rate.

Another important determinant of female labour force participation is household income. It is expected that women living in households with increased incomes are less likely to participate in the labour market. This effect has been observed in the literature and it has been argued that higher caste families encourage female seclusion (Das and Desai, 2003). However, this may be mitigated by the fact that household income increases if more household members, including women, participate in the labour market.

As the NSSO only collects wage data for around 40 per cent of all employed, this makes it impossible to infer household income based on wage data. However, the NSSO surveys collect monthly per

capita expenditure (MPCE) for each household, which serves as a proxy for establishing groups by socio-economic class. In order to compare female participation rates by income class based on the NSSO survey data, a measure of real monthly per capita expenditure was derived using headline CPI deflators and the changes in living standards can be observed in Figure 4.[5]

Figure 4: Distribution of the population by monthly per capita expenditure (constant Rs.)
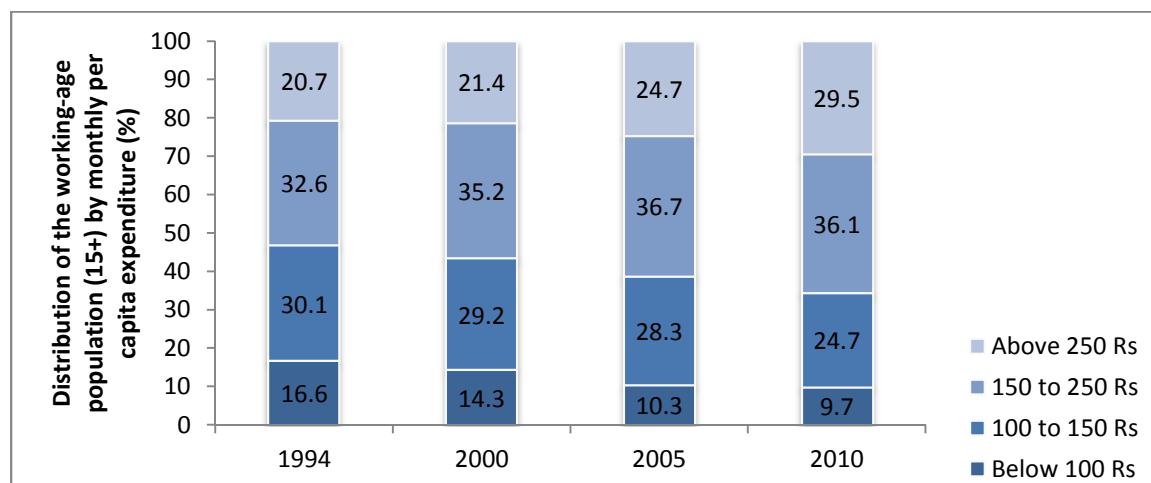
Source: Authors' calculations on the basis of NSS data.

During the past two decades of high average annual economic growth, the proportion of individuals living on less than 100 rupees (in constant prices) declined from 16.6 per cent in 1994 to 9.7 per cent in 2010, with substantial growth in the shares of households in the 150-250 rupee and greater than 250 rupee per-capita consumption groups.

Figure 5 shows that participation rates were highest among the poorest individuals in terms of constant per capita household expenditure and lowest among women living in households with high monthly per capita expenditures. Surprisingly, the differences in participation across income classes diminished considerably in 2010 for both rural and urban women. This may in part be due to an income effect, but this also suggests that measurement issues may have affected estimates of the female labour force. The decline is particularly sharp for poorer women, whose participation rates declined by more than 10 percentage points. In 2010, around 74 per cent of women living below 150 rupees were engaged in agriculture.

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[5] For rural areas, the Consumer Price Index for Agricultural Labourers (CPI AL) is used with base year 1986-87 = 100, and for urban areas, the Consumer Price Index for Urban Non-Manual Employees (CPI UNME) is used with base year 1984-85 = 100. This is consistent with the approach taken by the NSSO (2011).

Figure 5: Female participation rates by monthly per capita expenditures (constant Rs.)
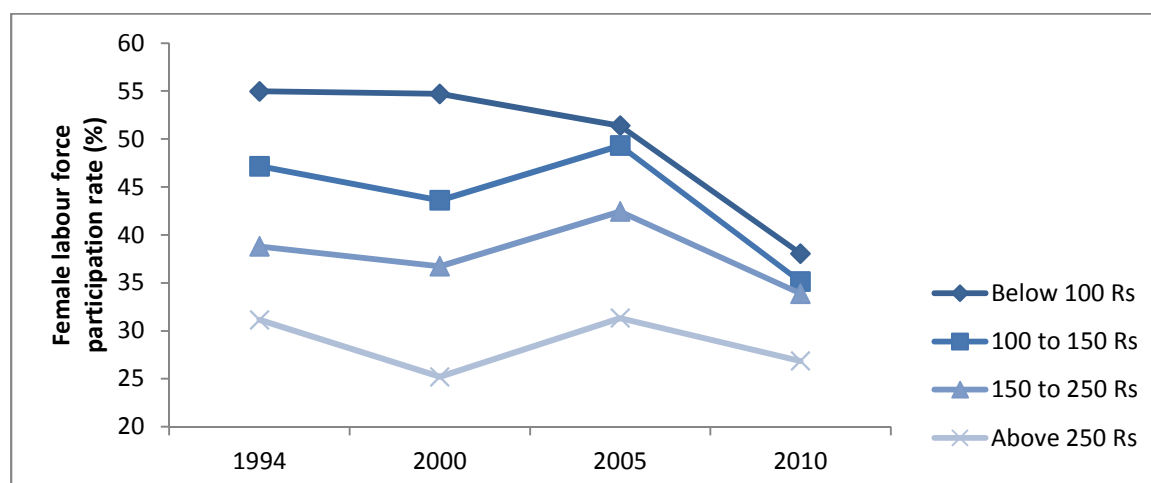
Source: Authors' calculations on the basis of NSS data.

The above trends indicate a number of potential factors that could explain the observed decline in female labour force participation rates in India. One hypothesis is that there are insufficient formal wage employment opportunities for the country's growing population, which has adversely affected employment prospects for both women and men and could have contributed to declining activity rates. Another possibility is that increased educational attendance and higher levels of education among the female population contributed to the decline in participation, though these factors are unlikely to account for the bulk of the decline. Higher household income levels may also have contributed to the decline, however declining participation among poor women also points to potential measurement issues.

4.2 Problems in identifying female employment

In conducting its household surveys on employment and unemployment, the NSSO defines economic activity as the "production of all goods and services for market (i.e. for pay or profit) including those of government services, and, the production of primary commodities for own consumption and own account production of fixed assets" (NSSO, 2011, p. 11). This definition has been consistently applied in each of the four survey periods under consideration (1993-94; 1999-2000; 2004-05; 2009-10) and is broadly in line with the definition adopted by the UN System of National Accounts.[6]

However, contradictory definitions appear to have been adopted when distinguishing between contributing family workers, classified as employed, and individuals engaged exclusively in domestic care work, who are treated as economically inactive. Despite considering activities such as the free collection of uncultivated crops, forestry, firewood, hunting and fishing for own consumption as economic activities, individuals who attended domestic duties and were also engaged in the free collection of goods for household use are classified by the NSSO under code 93, which is considered economically inactive. In addition, it is not clear how survey investigators distinguish between contributing family workers and individuals engaged exclusively in domestic duties within a household. It may be difficult to identify a contributing family worker when work is spread over time

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[6] Unlike the UN System of National Accounts, the processing of primary commodities for own consumption and activities such as begging and prostitution are not treated as economic activities in the Indian NSS.

in an irregular fashion or when multiple jobs are carried out for short durations (Hirway and Jose, 2011).

As a result, a number of individuals may have been classified as inactive in each of the four survey periods under consideration, despite their engagement in market work. In this case, estimates of the labour force participation rate would have suffered from a downward bias. It is expected that this bias would affect women more than men, as evidence from time use surveys in India has shown that women are disproportionately engaged in unpaid work performing domestic duties or care work (Hirway and Antonopoulos, 2010). Particular concern applies to the survey conducted in 2009-10 as it has been reported that this survey round made increasing use of contract workers. These contract workers may not have been trained adequately in classifying individuals according to the definitions adopted by the NSSO.[7] It should be noted here that while this section is concerned with identifying whether measurement issues were a likely contributor to the observed low female labour force participation rates, a separate but closely related issue concerns the continued allocation of women to unpaid work.

Table 1 shows the evolution of the share of the working-age population classified as engaged exclusively in domestic duties (and hence economically inactive) according to the usual principal and subsidiary status. The difference between women and men with regard to the shares estimated to be engaged solely in domestic duties is striking, with less than 1 per cent of working-age men in this category (with little change), as compared with nearly 50 per cent of rural working-age women and over 61 per cent of urban working-age women in 2012.

Table 1: Shares of the working-age population engaged in domestic duties

	1994	2000	2005	2010	2012
Female rural	42.4	43.9	39.8	49.4	49.9
Female urban	60.7	61.9	59.3	62.1	61.1
Male rural	0.4	0.4	0.4	0.5	0.5
Male urban	0.5	0.4	0.4	0.6	0.3

Note: Domestic duties correspond to codes 92 and 93 according to usual principal activity status.

Source: Authors' calculations on the basis of NSS data.

The data show a marked decline in the share of working-age rural women engaged exclusively in domestic duties between 2000 and 2005 (from 43.9 to 39.8 per cent). This trend subsequently reversed sharply after 2005, rising to 49.4 per cent in 2010 and further to 49.9 per cent in 2012. The changes among the urban female population are smaller in magnitude, but directionally the same, except between 2010 and 2012, in which the share of working-age urban women declined slightly. Such a large fluctuation in the share of rural women estimated as engaged in domestic duties between the 2005 and 2010 survey rounds is difficult to explain, more so in light of the comparatively modest changes among the urban female population and among the overall male population.

Table 2 shows the evolution of participation rates for both men and women on the basis of the UPSS definition and of an augmented definition. For the augmented definition we added to the UPSS

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[7] See: http://articles.economictimes.indiatimes.com/2011-06-29/news/29717128_1_nsso-labour-force-chief-statistician.

economically active population those people who were engaged in domestic economically gainful activities such as collection of firewood, poultry, etc.[8] For men, the trends corresponding to both definitions are consistent over the years. However, for women, especially in rural areas, the augmented definition has followed a smoother trajectory as opposed to the UPSS definition. In 2005, the augmented rate declined in rural areas by 0.7 points and it further dropped by 6.2 and 3.2 percentage points in 2010 and 2012, respectively. In contrast, the rural UPSS rate increased in 2005 by 4 percentage points and it dropped by 11.5 and 2 percentage points in 2010 and 2012, respectively.

Table 2: Labour force participation rates (%), UPSS and augmented definition, by sex and area

	UPSS definition					Augmented definition				
	1994	2000	2005	2010	2012	1994	2000	2005	2010	2012
Women										
Rural	49.0	45.4	49.4	37.8	35.8	80.8	77.0	76.3	70.1	66.8
Urban	23.8	20.8	24.4	19.4	20.5	45.2	38.5	39.1	35.9	32.1
All areas	**42.7**	**38.9**	**42.7**	**32.6**	**31.2**	**71.8**	**66.8**	**66.4**	**60.3**	**56.4**
Men										
Rural	87.6	85.3	85.9	82.5	81.3	87.9	85.3	86.2	82.8	81.6
Urban	80.1	78.7	79.2	76.2	76.4	80.2	78.7	79.3	76.3	76.4
All areas	**85.6**	**83.4**	**84.0**	**80.6**	**79.8**	**85.9**	**83.4**	**84.3**	**80.9**	**80.0**

Note: Age group is 15+. The augmented definition for the labour force includes women who are engaged in domestic economic activities.
Source: Authors' calculations on the basis of NSS data.

To investigate this issue further, we divide the rural female working-age population into mutually exclusive labour market status categories, as shown in Figure 6. In addition to the categories of regular employee, employer, own-account worker and contributing family worker (together with the employed population) and the unemployed, we divide the economically inactive female population into four categories: i) those engaged in domestic duties only; ii) those engaged in domestic duties and also engaged in economically gainful activities such as free collection of goods (vegetables, roots, firewood, cattle feed, etc.), sewing, tailoring, weaving, etc. for household use; iii) those that are in education; and iv) those who are unable to work.

Focusing on first three categories within this disaggregation provides insights into potential changes in measurement methodology across the surveys. First, looking at the economically inactive groups, there is substantial change over time in the share of women engaged in the two "domestic duties" categories. The share of women engaged in domestic duties declined by 4.8 percentage points between 2000 and 2005, then increased by 7.3 percentage points between 2005 and 2010, and

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[8] Respondents were classified as employed if they answered "yes" to any of the following questions: Along with your domestic duties did you more or less regularly carry out during the last 365 days – free collection of fish, small game, wild fruits, vegetables, etc. for household consumption – free collection of firewood, cow-dung, cattle feed, etc. for household consumption– husking of paddy for household consumption (commodities prepared in own farm/free collection) – grinding of food grains for household consumption (commodities prepared in own farm/free collection) – preparation of gur for household consumption (commodities prepared in own farm/free collection) – preservation of meat and fish for household consumption (commodities prepared in own farm/free collection) – making baskets and mats for household use (commodities prepared in own farm/free collection) – bringing water from outside the household premises?

subsequently declined by 3.3 percentage points between 2010 and 2012. The share of women engaged in domestic duties and who undertook some economic activities increased over the period by 0.7 percentage points between 2000 and 2005, by 2.3 percentage points between 2005 and 2010 and by 13.6 percentage points between 2010 and 2012. These two groups together saw a 4.1 percentage point decline between 2000 and 2005, a 9.6 percentage point increase between 2005 and 2010 and a 10.3 percentage point increase between 2010 and 2012.

Figure 6: Distribution of rural female working-age population by labour market status
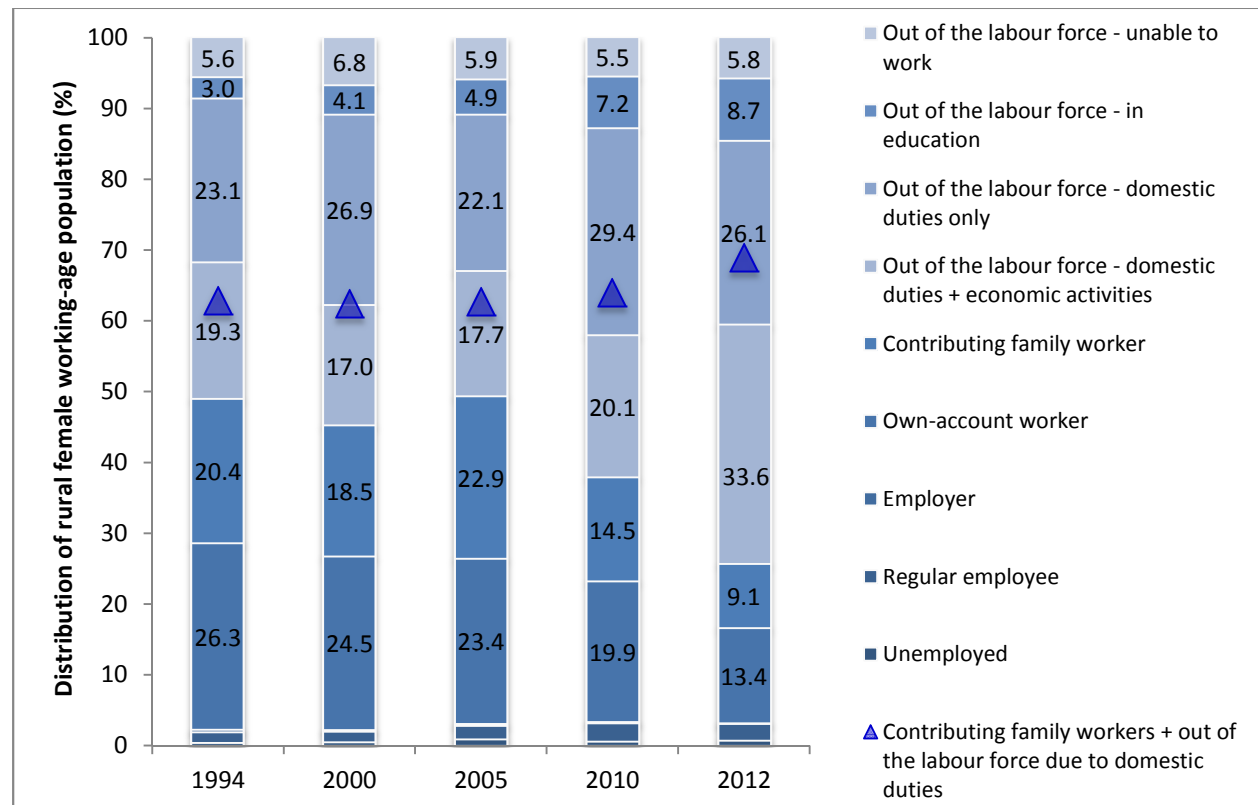
Note: Age group is 15+.
Source: Authors' calculations on the basis of NSS data.

Turning to the economically active categories, the contributing family worker category also saw substantial changes, but in the opposite direction. The share of women engaged as contributing family workers rose by 4.4 percentage points between 2000 and 2005, dropped sharply by 8.3 percentage points between 2005 and 2010 and further dropped by 5.4 percentage points between 2010 and 2012. If we aggregate the contributing workers category together with the two domestic duties categories (shown by the triangles in the figure), they exhibit a gradual increasing trend across the survey periods.

The other categories do not exhibit any confounding trends. The share of female own-account workers in rural India has been on a steady decline, which accelerated somewhat between 2005 and 2010 and further in 2012. The share of women in education has been on an increasing trend that again accelerated from 4.9 per cent in 2005, to 7.2 per cent in 2010 and to 8.7 per cent in 2012. These are both consistent with favourable economic growth that accelerated in recent years in India. The category of women declared unable to work remained fairly stable over time.

These trends point to changes in the way women who were engaged in contributing family work and domestic duties were classified across the survey rounds. Problems in correctly classifying women in either of these three groups comes as little surprise given the conceptual similarities between persons engaged in domestic duties and those working as a contributing family worker. It appears as though in the 2005 survey round, an increased proportion of this aggregated "contributing family worker/domestic duties" group was classified as contributing family workers, which boosted the estimated female labour force in rural India. In contrast, in the 2010 and 2012 survey rounds, an increased proportion of this overall group was classified as attending to domestic duties and not as contributing family workers, which reduced the estimated size of the female workforce. While the available data do not allow for a definitive conclusion on this point, the trends do point to likely changes in the *de facto* measurement methodology employed in the 2005, 2010 and 2012 NSS survey rounds as compared with the earlier rounds.

5. Scenario analysis: estimating the impact of key factors on female labour force participation in India

In this section, through a scenario analysis we investigate in more detail the four main hypotheses of the root causes of the observed decline in female labour force participation in India, which include: i) Increasing attendance in educational institutions; ii) Increased household income; iii) Changes in measurement methodology across surveys; and iv) Insufficient job opportunities for women. The aim is to develop a better quantitative understanding of the extent to which each of the above factors is affecting overall changes in participation rates.

We take each factor in turn, estimating for up to ten different periods (*short-run changes* 1994-2000, 2000-05, 2005-10 and 2010-12; and *longer-run changes* 1994-2005, 1994-2010, 1994-2012, 2000-10, 2000-12 and 2005-12) the effects of changes in the underlying factor on the overall labour force participation rate.[9] First, we describe the methodology utilized in each scenario. Then we present the consolidated results in a summary section.

5.1 Estimating the effect of increased attendance in education on female participation

The proportion of young women aged 15-24 attending education (and not participating in the labour market) has increased dramatically in recent years, rising from only 16.1 per cent of the population in 1994 to 31.9 per cent in 2010 and to 36.7 per cent in 2012 (see Figure 7). This has corresponded with a decline in the overall youth female labour force participation rate, which fell from 35.8 per cent in 1994 to 22.2 per cent in 2010 and 20.2 per cent in 2012. In the first scenario, we wish to estimate the impact that these trends have had on overall female participation in India.

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[9] For scenarios related to household income, we are unable to include the 2012 survey round data due to non-comparable household income estimates.

Figure 7: Youth female education and labour force participation, total and % of population
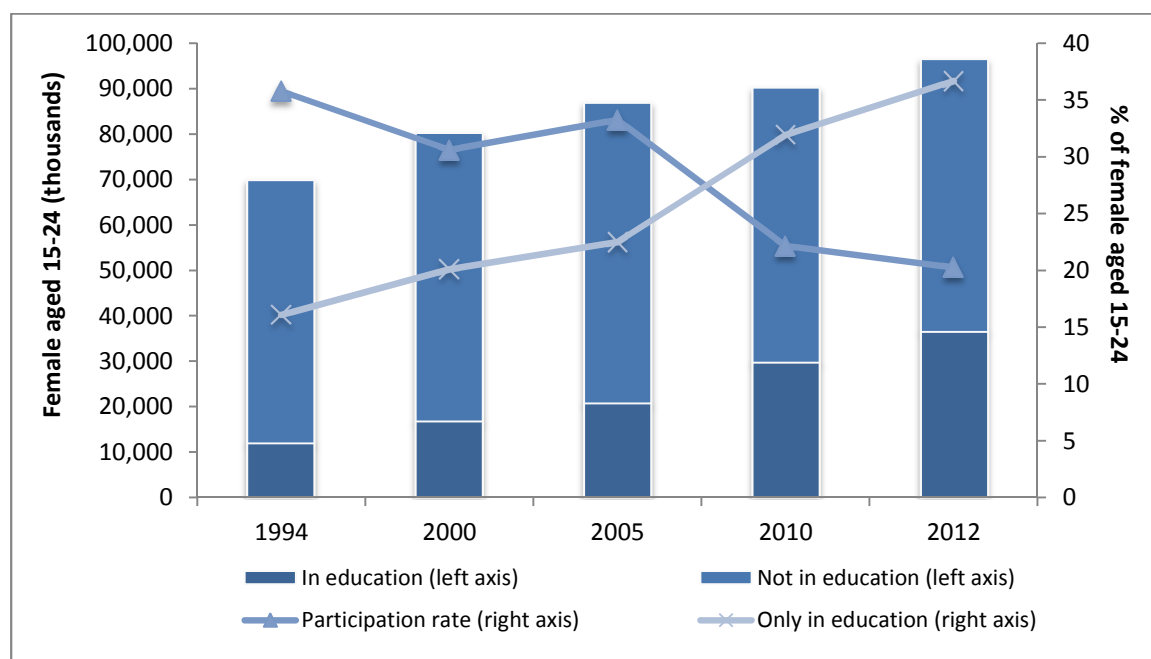
Source: Authors' calculations on the basis of NSS data.

We first calculate the increase in the number of young women in education due to the increase in the education rate (defined here as the proportion of 15-24 year olds attending an educational institution).[10] This is done by taking the difference between the change in the actual number of economically inactive young women attending education and the hypothetical change that would have occurred in this group without an increase in the education rate (i.e. because of population growth). We thus remove the effects of population growth and consider only changes due to an increasing share of young women in education.

To estimate the number of young women who would be working had the education rate remained constant throughout each period, we multiply the labour force participation rates of 15 to 24 year-old females not in education at the end of each period by the estimated additional economically inactive young women attending education in each period due to the higher education rate. The key underlying assumption is that the additional women that are in education and economically inactive as a result of higher education rates would have participated in labour markets to the same extent as 15-24 year-old women not in education, had the education rate not increased.

The results of this exercise are provided in Table 3. Over the entire period 1994 to 2012, we estimate that the increase in the attendance rate for young women resulted in an additional 21 million young women in education in 2012 compared with the scenario of no increase in the education rate. As a result of rising educational attendance rates, there were 6.4 million fewer young women in India's labour force in 2012. The negative impact of increased attendance in education on female labour force participation accelerated starting in 2005 and this has persisted through 2012.

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[10] We focus on young women aged 15 to 24, as this age group comprised approximately 98 per cent of all working-age persons attending education in India throughout each of the four survey periods under analysis.

Table 3: Estimated impact of increased education rate on overall female labour force in India

	Short-run changes						Longer-run changes			
	1994-2000	2000-2005	2005-2010	2010-2012	1994-2005	1994-2010	1994-2012	2000-2010	2000-2012	2005-2012
Young women in education due to increased education rate (millions)	3.8	3.2	9.5	5.7	6.7	15.3	21.0	11.6	17.1	14.8
Young women not in labour force due to increased education rate (millions)	1.4	1.3	3.0	1.8	2.8	4.8	6.4	3.7	5.2	4.5

Source: Authors' estimates on the basis of NSS data.

5.2 Estimating the effect of increased household consumption levels on female participation

India's rapid economic development in recent years has led to increased household incomes, which, in turn, may have reduced female labour force participation, as women in wealthier households tend to have lower participation rates than women in poorer households. Accordingly, through this scenario, we estimate the impact that the shift in the income distribution of households has had on overall female participation in India. We restrict this decomposition to women aged 25 and above. This is done in order to avoid double-counting the effects due to increased educational attendance of women aged 15 to 24, as increased household consumption and increased education are likely to be strongly and positively correlated.

For the end year of each period under consideration, we calculate a hypothetical labour force disaggregated by household consumption group (below 100 rupees, 100 to 150, 150 to 250, and above 250), by multiplying the labour force participation rates for each consumption group from the beginning of each period by the population for each consumption group at the end of each period. We then divide the hypothetical labour force by the actual female population aged 25 and above in the respective year to obtain hypothetical labour force participation rates. Finally, we subtract the hypothetical labour force participation rate at the end of each period by the actual labour force participation rate at the beginning of the period in order to obtain the estimate of the overall change in the adult female labour force participation rate that is due to a shift in the population to higher household consumption levels.

It is worth noting that this scenario has been designed to isolate the effect of the population shift into higher consumption groups, while omitting the effects of changes in participation rates within household consumption groups that occurred over each period. This omission is important, as changes in participation rates within household consumption groups are likely to have resulted from a combination of the other factors under consideration.

5.3 Estimating the effect of measurement changes on official female participation rates

An attempt at estimating the size of the potential bias affecting the female labour force participation rate due to changes in measurement methodology was made using answers to follow-up questions for women classified as being engaged in domestic duties. Among those, women who more or less regularly carried out economically gainful activities (e.g. free collection of fish, small game, vegetables, firewood, etc. for household consumption) were identified. The augmented female labour

force participation rate was obtained by adding these individuals to the active population for all five survey rounds under consideration as described in section 4.2. In order to produce an adjustment factor for the total female labour force participation rate, we produce an augmented rate for both rural and urban India.

Figure 8 shows the actual and augmented female labour force participation rate series over the five survey periods, along with the difference between the two series in each year, expressed in percentage points. The two series follow the same trend with the exception of the 2005 survey, in which the actual female participation rate increased by 3.9 percentage points (over the 2000 survey estimate) while the adjusted series declined by 0.4 percentage points. This resulted in a steep narrowing of the gap between the two series to only 23.6 percentage points in 2005, versus 27.9 percentage points in 2010. The actual labour force participation rate declined by 10.1 percentage points between 2005 and 2010 compared to a more modest decline of 6 percentage points in the adjusted series. This resulted in a widening of the gap between the two series to 27.8 percentage points. The gap between the two series narrowed to 25.2 percentage points between 2010 and 2012, as the actual female participation rate declined by 1.3 percentage points while the augmented rate fell by 3.9 percentage points.

Across rural and urban areas, the 2005 survey round appears to be an outlier in both cases, particularly in rural areas. In rural areas, the actual female participation rate rose by 4 percentage points between 2000 and 2005, while the augmented rate declined by 0.7 percentage points. In urban areas, the two series were directionally the same, but the change in the actual rate (3.6 percentage points) far exceeded the change in the augmented rate (0.7 percentage points). There was a notable divergence in the two series in urban areas between 2010 and 2012, with the actual participation rate rising by 1.1 percentage points and the augmented rate declining by 3.7 percentage points. There was no divergence in this period in rural areas.

Figure 8: Comparison of actual and adjusted female labour force participation rates, by region
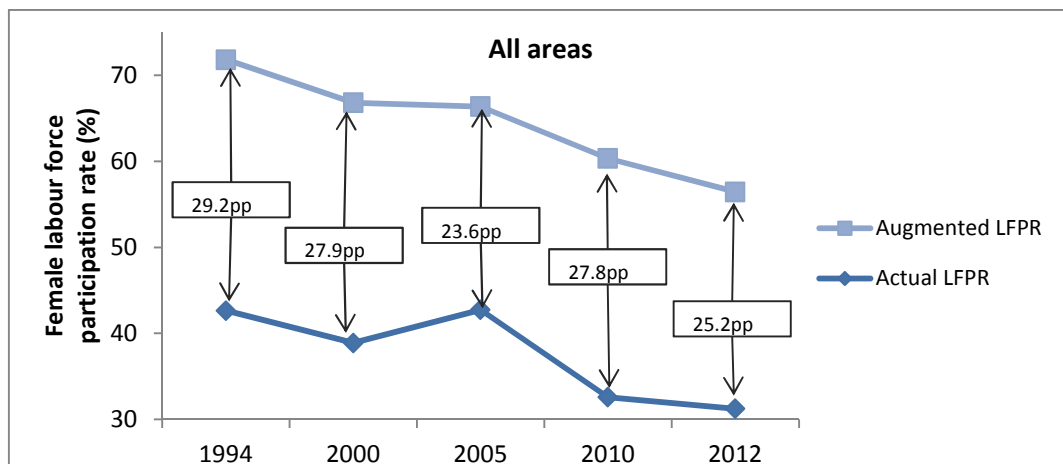
Figure 8 continued
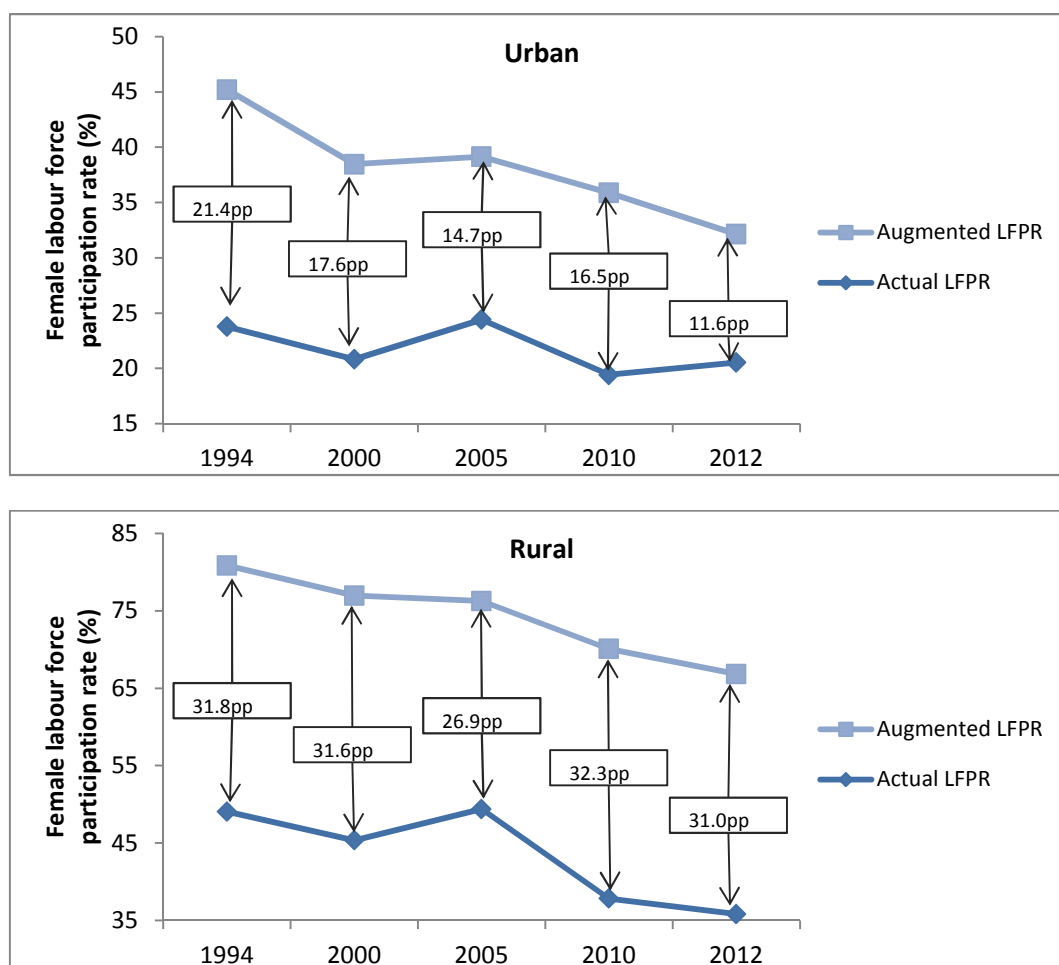
Note: pp = percentage point.

Source: Authors' estimates on the basis of NSS data.

To produce an estimate of the changes in female labour force participation rates that are due to changes in measurement precision, we calculate the change in the actual and adjusted labour force participation rates in each period and subtract the change in the adjusted labour force participation rate from the change in the actual participation rate. The difference between the changes in the two indicators is taken as our estimate of the portion of the observed change in the actual participation rate that is due to changes in the way economic activities are measured in different NSS rounds. The underlying assumption is that the trends in the two surveys should not differ and that divergences in the two series are due to changes in measurement precision.

5.4 Summary of scenarios

We calculate the change in labour force participation rates due to changes in underlying employment opportunities and other factors as the residual effect. The latter is consistent with our fourth hypothesis, namely that there are insufficient job opportunities for women. Therefore, we subtract the estimated contributions of each of the above factors from the total observed change in the participation rate.

Table 4 provides the summary of our estimate of the contribution of each of the key factors described above on overall female labour force participation in India for each period in the analysis. It is

important to note that the estimates provided in Table 4 are based on a number of assumptions (described in each of the scenario descriptions above) and are not intended to be precise measurements of the impact of these factors on female labour force participation rates. Rather, the figures should be considered as indicative of directions and general magnitudes.

Table 4: Summary of scenarios: estimated impact of key factors on changes in female participation rates, percentage point contributions

	Short-run changes						Longer-run changes			
	1994-2000	2000-2005	2005-2010	2010-2012	1994-2005	1994-2010	1994-2012	2000-2010	2000-2012	2005-2012
Total change in female participation rate (percentage points)	**-3.8**	**3.9**	**-10.1**	**-1.3**	**0.1**	**-10.1**	**-11.4**	**-6.3**	**-7.6**	**-11.5**
Increased attendance in educational institutions (percentage points)	-0.5	-0.4	-0.9	-0.5	-0.9	-1.4	-1.7	-1.1	-1.4	-1.2
Increased household consumption levels (percentage points)	-0.8	-1.0	-0.9		-1.6	-2.4		-2.0		
Changes in measurement of economic activities (percentage points)	1.2	4.3	-4.1	2.5	5.5	1.4	4.0	0.2	2.7	-1.6
Changes in employment opportunities and other (percentage points)	-3.7	1.0	-4.2		-2.9	-7.7		-3.5		

Source: Authors' calculations on the basis of NSS data.

We first examine the most recent period for which we are able to estimate contributions of all four factors, 2005 to 2010. Our estimates indicate that the magnitude of the effect of increased attendance in educational institutions has been fairly modest in most periods, particularly between the 2005 and 2010 survey rounds. In this period, we estimate that increased attendance rates accounted for 0.9 percentage points of the 10.1 percentage point drop in overall participation rates, or only around 9 per cent of the total decline. The finding that increased attendance in education has had only a fairly modest impact on overall female participation in most periods comes as little surprise given the large declines in female participation rates across all age groups.

The shift in the distribution toward higher household consumption levels also had a negative impact on overall participation rates in India in each of the periods under investigation. This is estimated to have accounted for around 9 per cent of the total decline in female participation between 2005 and 2010. Thus, we estimate that the effects of increased education and higher levels of household consumption together account for around 18 per cent of the total decline in female participation over this period.

We estimate that measurement methodology changes accounted for 4.1 percentage points of the decline observed in the period from 2005 to 2010, or 40 per cent of the total change. Adding in the 18 per cent decline due to increased education and higher household income, we estimate that around 42 per cent of the decline in female participation was due to a general lack of employment opportunities for women and other factors.

Looking at other periods for which estimates are available for all scenarios, Table 4 reveals an important pattern with regard to measurement effects: every period in which we find that changes in measurement methodology played a predominant role either started or concluded with the 2005 NSS survey round. In each of the three survey periods that include the 2005 survey, the estimated measurement effect has been large. For the periods that do not utilize the 2005 survey data (1994 to

2000, 1994 to 2010 and 2000 to 2010) we find only a fairly modest measurement methodology effect. One potential conclusion from this analysis is that the way in which women's economic activities were measured in the 2005 survey round may have differed in comparison with the other survey rounds, leading to an upward bias in the female labour force participation rates estimated in 2005.

Given the consistency between the standard and augmented participation rate series in the 1994, 2000 and 2010 survey rounds, we focus on these three rounds to derive a final set of estimates of the contributions of different factors to the observed decline in female participation. The results are provided in Figure 9, which includes the decomposition for three periods: the full period from 1994 to 2010, along with 1994 to 2000 and 2000 to 2010. As the measurement effect is small in each of these periods, we disregard this and provide the decomposition only for the three factors under consideration: education, household consumption, and employment opportunities and other factors.

Figure 9: Summary of scenario analysis, estimated percentage point contributions to changes in female participation rates, selected periods
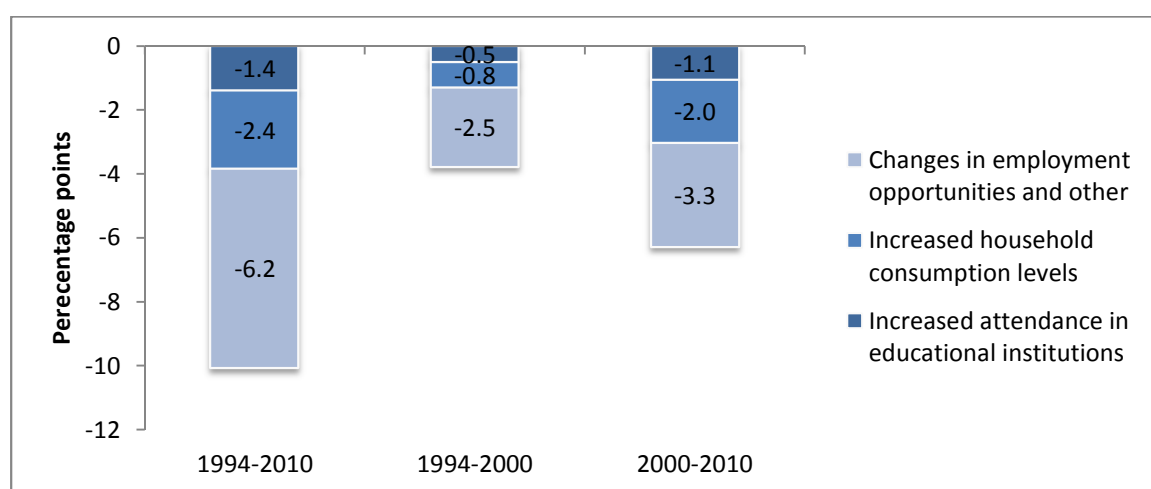
Source: Authors' estimates on the basis of NSS data.

We find that over the full 1994-2010 period, increased education and household consumption levels accounted for 3.8 percentage points (38 per cent) of the 10.1 percentage point decline in female participation, with diminished employment opportunities and other factors contributing the remaining 6.2 percentage points (62 per cent). The effect of increased education and household consumption increased from the 1994-2000 period to the 2000-2010 period, together accounting for 3.0 percentage points (48 per cent) of the decline between 2000 and 2010 versus 1.3 percentage points (34 per cent) between 1994 and 2000. We estimate that the impact of diminished employment opportunities and other factors on female participation rates accounted for 3.3 percentage points of the decline between 2000 and 2010 (52 per cent) versus 2.5 percentage points (66 per cent) between 1994 and 2000.

Table 5: Indicators on employment growth by occupation and sex, 1994 to 2010

Employment by occupational category ('000s)		Total employed (both sexes), 2010	Change in total employment, 1994-2010 (thousands)	Percentage change in total employment, 1994-2010 (%)	Female share in total employment, 1994 (%)	Female share in total employment, 2010 (%)	Female share of employment growth, 1994-2010 (%)
Major Division	**Subdivision**						
Legislators, Senior Officials and Managers	Customer service clerks	469	73	18.5	13.5	12.9	9.3
	Managers	20,644	12,384	149.9	25.3	13.9	6.3
Professionals	Physical, mathematical and engineering science professionals	1,990	1,160	139.7	9.1	10.3	11.1
	Life science and health professional	1,181	359	43.7	30.5	29.6	27.5
	Teaching professionals	3,825	1,671	77.6	28.6	38.7	51.8
	Other professionals	7,283	5,604	333.8	8.0	10.7	11.5
Technicians and Associate Professionals	Physical and engineering science associate professionals	1,365	-459	-25.2	14.7	10.7	26.7
	Life science and health associate professionals	1,270	773	155.7	38.1	46.5	52.0
	Teaching associate professionals	4,825	4,525	1507.4	71.5	45.7	44.0
	Other associate professionals	3,992	-1,730	-30.2	14.3	12.1	19.2
Clerks	Office clerks	6,145	1,784	40.9	14.5	15.0	16.3
	Customer service clerks	1,213	593	95.8	11.9	22.6	33.8
Service Workers and Shop and Market Sales Workers	Personal and protective services workers	9,310	3,852	70.6	17.5	19.9	23.2
	Models, salespersons and demonstrators	18,316	2,133	13.2	14.2	12.0	-4.1
Skilled Agricultural and Fishery Workers	Market-oriented skilled agricultural and fishery workers	126,656	-17,860	-12.4	36.2	35.1	44.1
Craft and related Trades Workers	Extraction and building trade workers	17,391	8,004	85.3	11.0	8.1	4.7
	Metal, machinery and related trades workers	7,135	2,361	49.4	2.4	4.5	8.6
	Precision, handicraft, printing and related trades workers	3,432	-408	-10.6	22.9	22.4	27.6
	Other craft and related trades workers	16,347	7,742	90.0	48.1	42.1	35.5

Employment by occupational category ('000s)		Total employed (both sexes), 2010	Change in total employment, 1994-2010 (thousands)	Percentage change in total employment, 1994-2010 (%)	Female share in total employment, 1994 (%)	Female share in total employment, 2010 (%)	Female share of employment growth, 1994-2010 (%)
Major Division	Subdivision						
Plant and Machine Operators and Assemblers	Stationary plant and related operators	1,177	235	24.9	7.3	8.0	10.9
	Machine operators and assemblers	4,248	-4,915	-53.6	34.1	15.5	50.2
	Drivers and mobile plant operators	9,142	5,923	184.0	1.8	1.0	0.5
Elementary Occupations	Sales and services elementary occupations	10,951	7,040	180.0	45.8	34.3	27.9
	Agricultural, fishery and related labourers	84,225	20,143	31.4	42.6	37.2	20.2
	Labourers in mining, construction, manufacturing and transport	31,615	20,835	193.3	13.4	19.2	22.3
Workers not Classified by Occupations		1,506	-1,094	-42.1	40.6	22.6	65.5

Note: The occupational categories are based on the National Classification of Occupations, Revision 2004. For further details, see:
http://dget.nic.in/nco/jobdescription/welcome.html.

Source: Authors' estimates on the basis of NSS data.

5.5 Is occupational segregation limiting employment growth for India's women?

A possible explanation for lack of available job opportunities for women is that men benefit disproportionately from increased demand for highly skilled workers. This is likely in India as men remain more skilled and more educated on average than women. In addition, occupational and sectoral segregation by gender may have confined women to search for market work in particular sectors and occupations, in line with prevailing social norms. If the sectors and occupations in which women are more likely to work have not registered much employment growth, this could limit employment opportunities for women, posing a barrier to their participation.

Indeed, a comparison of male and female employment by occupation (see Table 5) shows that female employment growth between 1994 and 2010 largely took place in occupations that were not growing overall. Excluding occupations which saw employment declines, these 10 occupations accounted for around 90 per cent of all employment growth.

The data reveal a large degree of gender-based occupational segregation in India. Less than 19 per cent of the new employment opportunities generated in India's 10 fastest growing occupations were taken up by women. The share of women increased in only 3 out of these 10 occupations over this period: other professionals, personal and protective services workers, and labourers in mining, construction, manufacturing and transport, while it declined in the other 7 occupations. Three occupations which are not among the fastest growing, but in which the female share of total employment in the occupation grew substantially include teaching professionals, life science and health associate professionals, and customer service clerks.

To get a sense as to how the country's large degree of occupational segregation may be affecting overall employment opportunities for women, a scenario was devised in which a distribution of women was assigned across occupations in India in 1994 equal to the actual distribution of men across occupations in that year. Using the actual employment by occupation as a benchmark, women's hypothetical share in employment in that occupation was calculated. This share was then multiplied by the actual employment growth in each occupation over the period from 1994 to 2010. The scenario therefore shows the amount of employment growth that women would have enjoyed in each occupation had female employment been distributed across occupations in the same manner as men and had women accounted for a share of future employment growth in each occupation equal to their initial (hypothetical) share. While this is a highly stylized example, it illustrates the extent to which women have suffered from occupational segregation in terms of reduced employment opportunities. Under this scenario, female employment in India would have grown by 29.3 million between 1994 and 2010, 20.7 million more than the actual female employment growth of 8.7 million (Table 6). This points to large potential benefits from policies aimed at reducing occupational segregation in India such as challenging gender stereotypes and promoting skills development for women in industries and occupations with the greatest potential for employment growth.

In conclusion, excluding survey periods that involve the 2005 survey round, we find that changes in female participation cannot be explained by measurement changes across NSS survey rounds. Over the period from 1994 to 2010, as well as in the sub-periods from 1994 to 2000 and 2000 to 2010, we find that while increased education and higher levels of per-capita household consumption have been important factors contributing to the decline in female participation rates in India, other factors such as occupational segregation have played an even greater role.

Table 6: Employment growth scenario accounting for occupational segregation, 1994 to 2010

Employment by occupational category		Actual female change in employment, 1994-2010 (thousands)	Hypothetical female employment change, 1994-2010 (thousands)	Difference (thousands)
Major Division	**Subdivision**			
Legislators, Senior Officials and Managers	Legislators and senior officials	7	30	24
	Managers	783	4,430	3,648
Professionals	Physical, mathematical and engineering science professionals	129	505	376
	Life science and health professional	99	119	21
	Teaching professionals	866	571	-295
	Other professionals	646	2,468	1,823
Technicians and Associate Professionals	Physical and engineering science associate professionals	-123	-188	-65
	Life science and health associate professionals	402	229	-172
	Teaching associate professionals	1,992	617	-1,375
	Other associate professionals	-332	-710	-378
Clerks	Office clerks	292	731	439
	Customer service clerks	201	250	50
Service Workers and Shop and Market Sales Workers	Personal and protective services workers	893	1,522	628
	Models, salespersons and demonstrators	-87	877	963
Skilled Agricultural and Fishery Workers	Market-oriented skilled agricultural and fishery workers	-7,878	-5,457	2,421
Craft and related Trades Workers	Extraction and building trade workers	379	3,410	3,031
	Metal, machinery and related trades workers	203	1,103	900
	Precision, handicraft, printing and related trades workers	-113	-151	-38
	Other craft and related trades workers	2,746	1,923	-823
Plant and Machine Operators and Assemblers	Stationary plant and related operators	25	104	79
	Machine operators and assemblers	-2,467	-1,551	917
	Drivers and mobile plant operators	29	2,785	2,755
Elementary Occupations	Sales and services elementary occupations	1,967	1,826	-141
	Agricultural, fishery and related labourers	4,071	5,537	1,465
	Labourers in mining, construction, manufacturing and transport	4,644	8,645	4,002
Workers not Classified by Occupations		-716	-311	405

Source: Authors' calculations based on NSS data.

6. Econometric analysis

6.1 Theoretical framework

In this section we present the results of an econometric model of female participation in India, with the aim of providing additional details on some of the underlying factors driving trends in participation and clarifying key policy areas for promoting employment opportunities for India's women. For this purpose, we use a pooled probit model based on individual, household, and regional

labour supply determinants is developed and applied to the four survey years.[11] A heteroskedastic probit model is applied to account for unobserved variation in the distribution of employment opportunities across survey years and in preferences concerning market work across socio-economic groups. Finally, the hypotheses developed in the previous section are evaluated using the Oaxaca-Blinder decomposition for non-linear models. Based on the review of the literature in section 3, the econometric model of female labour force participation in India includes individual, household as well as local labour market characteristics. Individual characteristics, which are expected to determine labour supply, are a woman's highest level of educational attainment, her marital status and her age.

With regard to household characteristics, household religion, caste membership, size, primary source of income, monthly per capita expenditure (MPCE), cultivation of land, whether the household head is a woman, and the presence of children aged 0 to 5 are considered to play an important role. For instance, household size, higher MPCE as well as the presence of young children should increase a woman's reservation wage, all other things being equal. On the other hand, the cultivation of land and a female household head are both indicators for female participation in market work.

Finally, local labour market opportunities may be assessed using dummies for geographical location and measures for the local female-male sex ratio and the extent of occupational segregation (geographic regions are provided in

Table A1). It is expected that regions with a lower sex ratio (indicating a lower social status of women) impose more constraints on female participation in market work and assign a higher value to female domestic work. Thus, we would expect to find a positive relation between a region's sex ratio and the probability of female labour force participation.

With regard to occupational segregation, it is expected that this has a negative relation with the probability of female labour force participation. That is, a higher degree of occupational segregation should result in fewer employment opportunities for women, as they are restricted in their choice of occupation and industry. This, in turn, would reduce the likelihood for women to participate.

We construct an index for occupational segregation based on Duncan's index of dissimilarity, which reflects differences in the proportion of men and women in different occupational categories across regions.

Duncan's index is computed as follows:

$$I_r = \frac{1}{2} \sum_{o=1}^{O} \left| \frac{M_o}{M} - \frac{F_o}{F} \right| \tag{1}$$

for any $r=1,...,R$ and $o=1,...,=O$,

where M_o is the proportion of men in occupation o, F_o the proportion of women in the same occupation, M the total number of men employed across all occupations o and F the total number of women employed across all occupations in region r. The resulting figure may be interpreted as the percentage of women that would have to change occupations for the distribution of men and women across occupations to be equal in a particular region r. A separate index is calculated for each region.

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[11] As mentioned earlier, the most recent survey (2012) is excluded from the econometric analysis because the MPCE variable is not comparable with the previous years.

Agricultural occupations are excluded in the computation of the index based on findings in the literature on occupational gender segregation and economic development. As observed by Foster and Rosenzweig (2008), the process of economic development may be understood as the "shift of labour out of the agricultural sector". Thus, we would expect development to lead to an overall decline in employment opportunities in the agricultural sector. In this case, shares of female employment in the agricultural and the non-agricultural sector may exhibit opposing trends.

Due to the lack of data on female market wages, the wage is not part of the participation model even though it is an important determinant of the participation decision. Indeed, the NSSO datasets only contain wage observations for around 40 per cent of all employed in every survey year. However, the level of educational attainment may be understood as a proxy for the expected market wage, as it reflects the value assigned to a woman's human capital and is closely correlated with the market wage (Heckman, 1979).

The model is estimated separately for rural and urban areas. In addition, a separate regression is performed on the 2010 survey in order to estimate how the MGNREGA programme has affected female participation since 2005.

6.2 Data utilised in econometric analysis

The econometric analysis is based on the four previously discussed sets of survey data from the NSSO.[12] In constructing the final dataset for the econometric analysis, observations for individuals aged below 15 and above 64 were dropped, as well as observations for male individuals. The female population aged 65 and above has grown from less than 20 million in 1994 to nearly 33 million in 2010, comprising an increasing share (8 per cent in 2010) of the overall female population aged 15 and above. At the same time, women aged 65 and above have the lowest labour force participation rates. As we wish to focus on identifying factors underlying female labour force participation trends, we exclude this group from the econometric analysis. In addition, outlier observations with regard to real monthly per capita expenditure were dropped from the final dataset (that is, observations with MPCE at real values that are above 1000 rupees).[13] In addition, observations for which any of the variables of interest were missing were also dropped. As a result, the final sample consists of 674,605 women. Table A2 in the appendix summarises the construction of the dataset, while Table A5 provides summary statistics of the final dataset.

6.3 Results from econometric analysis

We present the main results of the econometric analysis separately for rural and urban areas. For each, we compare the results from the probit model, the heteroskedastic probit model and the Oaxaca-Blinder decomposition. We then briefly discuss the results of regressions using the augmented labour force participation rate described in section 4.

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[12] In order to take the complex sampling design into account, the empirical analysis was performed using the "svyset" command in Stata.

[13] As a robustness check, we also ran the regressions including these outliers and found no significant impact on the results.

Rural areas

The pooled probit model for rural areas shows that women with pre-primary to secondary education, and women aged between 15 and 19 are less likely to participate in the labour market than other women (see Appendix Table B1). When looking at household characteristics, women belonging to Muslim households, to households of type "other" or self-employed in non-agriculture, to households in the top MPCE class, and those belonging to larger households also have a lower likelihood of participating in the labour market. These results confirm that the probability of participation is positively associated with age but this relationship is less strong after a certain age (e.g. 55 years and above). The results also confirm that having no schooling increases the probability of participating as compared to other education levels except the tertiary education level, indicating a U-curve relationship between education and participation. In addition, belonging to a scheduled tribe or caste and belonging to a household where the head is a female and the household cultivates some land increases the probability of women's participation in the labour market. Having a child of less than five years old or living in a household with many members has a negative effect on this probability. Moreover, a woman in a rural household with low consumption expenditure is more likely to be economically active compared to a woman from higher levels of household expenditure. These results confirm that women belonging to households that derive their primary income from agricultural activities are most likely to participate in the labour market. Thus, the decline in agricultural activity associated with economic development is likely to have had an important impact on rural female labour force participation in India.[14]

With respect to regional characteristics (see Appendix Table B2), women living in regions with a lower sex ratio and a higher index of occupational segregation have lower predicted probabilities of participation in market work, as expected. This indicates that perceptions of women's status in society and discrimination in terms of limited access for women to different types of occupations matter in rural India in terms of the likelihood of women to be economically active. Rural women in the West and North of India have higher participation rates than women in the South of India. These results hold across all four survey years with varying intensity, though both effects were greatest in the 2010 survey. The negative impact of occupational segregation increased over the four survey periods, with the estimated effect in 2010 more than double that of 1994 in the standard probit and more than triple in the heteroskedastic probit.

The pooled model indicates a statistically significant effect for the dummies for two survey years, 2005 and 2010 (see Appendix Table B2). More specifically, after controlling for other factors in the model, the year 2005 exhibits an upward shift effect, while the year 2010 exhibits a downward shift effect, potentially suggesting a bias in these survey years. This could have occurred because of changes in measurement methodology, and is consistent with the findings reported in section 5 – namely that changes in measurement methodology in which an increased share of women engaged in domestic duties may have been classified as contributing family workers in 2005 whereas in 2010 an increased share of these women were classified as economically inactive.

When focusing on the year 2010 and comparing it with previous survey years, it appears that women aged 55 to 64 were more likely to engage in market work than women aged 15 to 19. This may be due to the younger cohorts staying in education longer. Surprisingly, the coefficients controlling for

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[14] Based on the World Bank's World Development Indicators, agriculture value added for India in 1994 was 28.3 per cent of GDP, which dropped to 23 per cent in 2000, to 18.8 per cent in 2005, to 18 per cent in 2010 and to 17.4 per cent in 2012.

household expenditure levels are not statistically significant in 2010. This contradicts the U-shape relation and suggests that all other things being equal, women in affluent households were equally as likely to engage in market work as women from poorer households, which differed from prior years. Again, this may point to methodological changes in measuring what activities are counted as employment versus domestic duties. Finally, women living in the North of India were significantly more likely to participate in the labour market than women from the South of India in 2010, a contrast to the three prior survey rounds.

The comparison of the standard probit model with the heteroskedastic probit model shows that unobserved residual variance across socio-economic groups and survey years does matter (see Appendix Table B3). In particular, the results imply that the residual variance is highest among women with tertiary education and for the age group 55-64 years. This means that preferences for market work among women with tertiary education are more heterogeneous than among women with lower educational attainment. This heterogeneity may be due to conflicts between a woman's higher expected market wage and household norms pertaining to female seclusion amongst higher castes, as noted by Eswaran *et al*. (2013). Another explanation for this heterogeneity is the conflict between higher expected market wages and the lack of job opportunities in certain areas. The survey in 2010 generally exhibits more residual variance than previous survey years. This could also be a sign of a decrease in available job opportunities or a sign of underlying measurement issues. However, the source of the effect cannot be directly assessed.

The Oaxaca-Blinder decompositions were carried out to compare changes across consecutive survey years (see Appendix Table B4). Thus, the surveys in 1994 and 2000; 2000 and 2005; and 2005 and 2010 were compared with one another. The results show the proportion of the change in the average probability of participation between two surveys that is explained by changes in the characteristics of the population (e.g. more women acquiring literacy), the "characteristics effect", and by changes in the likelihood of labour force participation based on the returns to these characteristics in terms of making women more or less likely to participate (e.g. women with secondary education becoming more/less likely to participate in the labour market). The latter change is denoted as the "coefficients effect" and represents more fundamental changes to preferences and/or the extent of employment opportunities. As can be seen in Appendix Table B4, coefficient effects accounted for a much larger proportion of the differences in mean participation probabilities across the different survey years. This finding is not surprising as the surveys were conducted with a 5-year interval and it is expected that a number of structural changes took place within these 5-year periods.

Between 1994 and 2000, changes in the characteristics of working-age women accounted for an estimated 1 percentage point (28 per cent) of the observed decline in female participation, while changes in the coefficients accounted for 2.7 percentage points (72 per cent). Between 2000 and 2005, changes in the coefficients accounted for 5.6 percentage points (133 per cent) of the observed increase in female participation, whereas changes in the characteristics of working-age women contributed negatively (-33 per cent). Between 2005 and 2010, changes in coefficients accounted for 10.4 percentage points (84 per cent) of the observed decline in female participation, with changes in characteristics accounting for 16 per cent. The large coefficients effect of more than 100 per cent between 2000 and 2005 once again raises questions regarding potential measurement methodology issues that may have contributed to a bias in female participation estimates in 2005.

A separate probit regression for the survey in 2010 (see Appendix Table B5) was performed to assess the importance of the MGNREGA programme. The results show that women belonging to a household that obtained work in the MGNREGA programme were more likely to participate in the

labour market, all else being equal. Part of this positive effect is likely due to women taking up work themselves through the MGNREGA programme. Another explanation for this result is that those households that got MGNREGA work were among the poorest households and thus women belonging to these households could not afford to stay outside of the labour market.

Urban areas

In urban areas, (see Appendix Table B6) there is a negative effect on the predicted probability of participation from being married (much more important as compared to rural areas), which holds in both the standard and the heteroskedastic probit models. Other characteristics, which decrease the predicted probability of participation for urban women are: primary and secondary education (as compared to illiteracy); being aged 15 to 19 (as compared to older age cohorts); the presence of a child in the household; living in a household that is either Hindu or Muslim;[15] belonging to a household of type salaried or other based on the most important source of household income (as compared to belonging to a household of type self-employed); belonging to a household defined as middle or top economic class in terms of consumption (as compared to the lowest consumption class); and belonging to a larger household in terms of number of household members.[16]

Klasen and Pieters (2012) suggest that women in urban areas with tertiary education participate in the labour market because they are able to find appealing employment and earnings opportunities while women with less education participate because of economic difficulties. Our results are similar. We find that only well-educated women have a higher probability to participate in the labour market than women with no education in urban areas in India. Thus, economic development in urban areas creates opportunities for highly educated women.

Occupational segregation is significant for only some survey periods (1994 and 2005 for both the standard and heteroskedastic probit models), while the sex ratio has a significant impact in all four survey periods (see Appendix Table B7). With respect to location, only urban women living in Central India had statistically significantly lower participation probabilities across all four survey years than women in the South.

A comparison of the standard and heteroskedastic probit model for urban areas shows less striking differences than for the rural areas. As the variance model (see Appendix Table B8) shows, the highest residual variance is found among the youngest women in urban areas, while both illiterate and women with tertiary education exhibit a similar amount of residual variance. This may suggest that women with no education struggle more in finding market work in urban than in rural areas. Both the 2005 and 2010 survey years exhibit more residual variance than the 1994 and 2000 survey years.

The Oaxaca-Blinder decomposition (see Appendix Table B9) again demonstrates the greater relative importance of structural, "coefficient effect" changes in explaining changes in urban female participation. In each of the three periods, nearly all of the change in female urban participation was accounted for by changes in the coefficients.

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[15] The effect of living in a Muslim household remains significant, but the estimated effect is less than in rural areas.

[16] For rural areas households were classified as self-employed in non-agriculture, agricultural labour, other labour, self-employed in agriculture or "other". In urban areas households were classified as self-employed, regular salaried, casual labour or "other".

Results using the adjusted/augmented labour force participation rate definition[17,18]

In general, most results from regressions using the adjusted labour force participation rate in place of the UPSS rate are consistent with the findings above. However, there are a few interesting contrasts that provide additional insights. Marriage in rural areas is associated with a greater likelihood to participate based on the augmented participation rate, whereas it is associated with a lower likelihood to participate based on the UPSS (see Appendix Table B10). This may reflect a tendency for married women to take on a traditional domestic role that often includes economic activities that are not considered to be employment based on the UPSS definition. In contrast, in urban areas, the effect of marriage is negative for both the augmented and UPSS participation rates (see Appendix Table B10).

Tertiary education takes on the opposite sign in urban areas with the augmented participation rate than in those based on the UPSS. That is, taking domestic duties into account, women with tertiary education are less likely than their uneducated counterparts to participate. This may reflect that a disproportionate number of women engaged in domestic duties of an economic nature are uneducated in urban India.

In contrast to UPSS participation, belonging to a Muslim household is not negatively associated with women's participation based on the augmented rate. This may reflect social norms that inhibit women from Muslim households from engaging in economic activities outside the home, while allowing for economic activities domestically.

Similarly, in contrast to the previous results, Appendix Table B11shows that rural women living in regions with a lower sex ratio have higher predicted probabilities of participation in the labour market or domestic economically gainful activities. This would seem to indicate that prevailing social norms and/or discrimination are keeping women away from taking up economic activities outside the home and instead leading them to take up domestic activities.

Appendix Table B12 shows that in contrast with the previous results, in terms of year dummies, only the coefficient on the 2010 survey round is statistically significant for both rural and urban areas, whereas for the 2005 survey round it is significant for rural areas. In general, the 2010 survey round shows the most residual variance, particularly in urban areas.

Looking at the Blinder-Oaxaca decompositions, for both rural and urban areas and across every period, the "characteristics effects" explain more of the change in participation rates than was found to be the case in the UPSS regressions (see Appendix Table B13). The differences are most notable in the periods 2000-05 and 2005-10, which is to be expected if measurement methodology could be affecting the UPSS participation rates in the 2005 and 2010 survey rounds.

7. Conclusions and policy recommendations

This paper has attempted to shed light on the causes behind the recent sharp decline in female labour force participation in India, paradoxically coinciding with a period of rapid economic growth, and to identify factors underpinning the long-term stagnation in female participation. Through an examination of labour market trends, a series of scenario exercises, and econometric analysis, we have analysed four prominent hypotheses of the root causes of declining female participation, including

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[17] The full set of regressions using the augmented definition is available from the authors upon request.

[18] For the augmented definition, see note for for Table 2.

women's increased attendance in educational institutions, increased household income, changes in measurement methodology across survey rounds and insufficient job opportunities for women, stemming from factors such as social status and occupational segregation.

In our scenario exercises, we estimate that the effects of increased education and higher levels of household consumption together accounted for around 18 per cent of the total decline in female participation between 2005 and 2010. We estimate that around 42 per cent of the decline in female participation was due to a general lack of employment opportunities for women and other factors, while changes in measurement methodology between survey rounds accounted for the remaining 40 per cent of the observed decline. Over the full 1994-2010 period, we estimate that increased education and household consumption levels accounted for 38 per cent of decline in female participation, with diminished employment opportunities and other factors contributing the remaining 62 per cent.

Through a stylised scenario designed to provide insights into the adverse effect that occupational segregation has on women's employment opportunities, we estimate that female employment in India could have grown by an additional 20.7 million between 1994 and 2010 in the absence of occupational segregation, far exceeding the actual female employment growth of 8.7 million. Due to a number of factors including social norms, women in India have limited choice in terms of occupation. And as they are disproportionately engaged in occupations experiencing little to no employment growth, this has limited their overall opportunities to seek and find employment.

The econometric results indicate that religion and social perceptions of women, women's level of education, household size and income, and the presence of young children in the household all influence the likelihood of India's women to participate in the labour market. We find that structural characteristics in the labour market have played a more important role than changes in the underlying characteristics of the female working-age population in influencing participation rates. These structural barriers, such as norms that inhibit women's labour market options, in conjunction with a consistent decline in agricultural employment, are likely to be key factors in explaining the long-term stagnation in female participation rates.

Indeed, we find that a multitude of factors have contributed to the recent, sharp decline and long-term stagnation in labour force participation rates among India's working-age women. Some of these factors, such as increased attendance in education and higher household income levels, are without doubt a net positive for society and a reflection of India's rapid economic development. The largest issue over the long-run, however, has been a lack of employment opportunities for India's women. Persistent informality and slow growth in wage and salaried employment are limiting employment prospects of both women and men in the labour market. But India's women have additional disadvantages stemming from social norms, including gender-based discrimination and occupational segregation. These findings point to large potential benefits from policies aimed at reducing occupational segregation in India such as discouraging discriminatory employment practices and promoting skills development for women in industries and occupations with the greatest potential for employment growth. Further analytical work in this area is clearly needed.

As measurement issues also appear to have played a role in changes in female participation estimates across survey rounds, our findings indicate a need for a careful investigation by the NSSO into measurement of female activities, particularly with regard to difficulties in differentiating between domestic duties and contributing family work. Reliable measurement, including the design of further time use surveys, across future survey rounds will be essential for the design of policies and programmes to enhance employment opportunities for India's women.

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Appendix A – Sample description

Table A1: Geographic dummies and states covered

Location	States
South	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Lakshadweep, Puducherry
North-East	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura
Central	Bihar, Madhya Pradesh, Uttal Pradesh, Chattisgarh, Jharkhand, Uttarakhand
West	Goa, Gujarat, Maharashtra, Dadra and Nagar Haveli, Daman and Diu
East	Orissa, West Bengal, Andaman and Nicobar Islands
North	Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Chandigarh, Delhi

Table A2: Determination of the final dataset for econometric analysis

Final Sample	1994	2000	2005	2010	*Net Affected Number*	Number Remaining	2012
Total	564,639	596,686	602,836	459,784		**2,223,945**	456,999
Age: 15-64	345,470	366,396	379,201	302,870	*830,008*	**1,393,937**	303,365
Female	167,908	178,961	187,076	149,048	*710,944*	**682,993**	150,047
MPCE real<1000	164,797	177,795	185,384	147,177	*7,840*	**675,153**	…
Missing education	164,701	177,619	185,302	147,159	*372*	**674,781**	150,038
Missing household type	164,701	177,619	185,226	147,062	*173*	**674,608**	150,009

Note: 2012 is not included in the regressions.
Source: Authors' calculations on the basis of NSS data.

Table A3: Female population and labour force participation rates (LFPR)

Women	1994		2000		2005		2010		2012	
Rural areas	Population	LFPR (%)	Population	LFPR (%)	Population	LFPR (%)	Population	LFPR (%)	Population	LFPR (%)
all aged 15+	181,475,969	49.0	212,916,521	45.4	233,185,295	49.4	248,410,467	37.8	263,472,205	35.8
aged 15-24	51,313,262	42.0	58,460,331	36.3	63,563,808	38.2	64,304,872	25.4	67,692,354	22.7
aged 25-34	45,078,556	55.7	53,085,205	52.5	56,105,849	56.1	58,880,579	41.9	60,765,213	39.9
aged 35-54	56,442,358	59.2	66,857,691	56.5	75,973,979	61.9	83,421,063	49.4	89,345,516	47.6
aged 55+	28,641,793	31.2	34,513,295	28.3	37,541,659	32.9	41,803,952	28.2	45,669,122	26.8
Urban areas										
all aged 15+	61,470,754	23.8	76,299,648	20.8	84,587,121	24.4	98,977,331	19.4	112,682,309	20.5
aged 15-24	18,480,753	18.4	21,859,154	15.4	23,329,948	19.7	25,854,171	14.2	28,674,013	14.5
aged 25-34	15,415,903	26.5	18,972,821	23.0	20,136,568	28.4	23,947,979	23.0	27,406,661	25.6
aged 35-54	18,996,538	30.9	24,450,144	27.9	28,391,458	30.4	33,203,780	25.2	38,233,107	26.2
aged 55+	8,577,561	14.8	11,017,529	12.3	12,729,147	13.5	15,971,402	10.5	18,368,529	10.7
All areas										
all aged 15+	242,946,723	42.7	289,216,169	38.9	317,772,416	42.7	347,387,798	32.6	376,154,514	31.2
aged 15-24	69,794,015	35.8	80,319,484	30.6	86,893,757	33.3	90,159,043	22.2	96,366,367	20.2
aged 25-34	60,494,459	48.2	72,058,027	44.7	76,242,417	48.8	82,828,558	36.4	88,171,874	35.5
aged 35-54	75,438,896	52.1	91,307,835	48.8	104,365,437	53.3	116,624,843	42.5	127,578,623	41.2
aged 55+	37,219,354	27.4	45,530,823	24.4	50,270,806	28.0	57,775,355	23.3	64,037,650	22.2

Source: Authors' calculations on the basis of NSS data.

Table A4: Male population and labour force participation rates (LFPR)

Men	1994		2000		2005		2010		2012	
Rural areas	**Population**	**LFPR (%)**	**Population**	**LFPR (%)**	**Population**	**LFPR (%)**	**Population**	**LFPR (%)**	**Population**	**LFPR (%)**
all aged 15+	186,303,490	87.6	216,440,704	85.3	234,481,448	85.9	253,962,240	82.5	267,358,777	81.3
aged 15-24	55,186,186	73.2	61,932,854	68.4	66,851,468	68.9	71,720,515	56.7	74,558,115	52.8
aged 25-34	42,800,356	98.4	49,132,219	98.2	50,893,469	98.5	54,154,613	98.2	55,149,220	97.6
aged 35-54	59,118,643	98.5	70,604,455	97.9	79,497,148	98.2	85,885,143	98.6	92,467,790	98.5
aged 55+	29,198,304	77.2	34,771,177	71.4	37,239,362	73.0	42,201,969	73.4	45,183,652	73.4
Urban areas										
all aged 15+	67,732,457	80.1	82,945,307	78.7	91,896,621	79.2	106,490,000	76.2	119,618,834	76.4
aged 15-24	21,075,062	57.3	24,966,975	54.8	27,344,898	57.0	29,871,422	46.3	32,910,940	45.4
aged 25-34	16,348,614	97.0	19,433,501	96.6	21,403,516	97.1	24,682,339	96.5	27,892,197	96.9
aged 35-54	21,905,550	97.7	28,019,815	97.4	30,887,753	97.4	36,504,453	97.9	40,819,466	97.9
aged 55+	8,403,231	58.1	10,525,016	52.4	12,260,454	51.7	15,431,786	49.9	17,996,231	52.4
All areas										
all aged 15+	254,035,947	85.6	299,386,011	83.4	326,378,069	84.0	360,452,240	80.6	386,977,611	79.8
aged 15-24	76,261,248	68.8	86,899,829	64.5	94,196,367	65.5	101,591,937	53.7	107,469,055	50.5
aged 25-34	59,148,971	98.0	68,565,720	97.7	72,296,985	98.1	78,836,952	97.7	83,041,418	97.4
aged 35-54	81,024,193	98.3	98,624,270	97.8	110,384,901	98.0	122,389,596	98.4	133,287,255	98.3
aged 55+	37,601,535	72.9	45,296,192	67.0	49,499,816	67.8	57,633,755	67.1	63,179,883	67.4

Source: Authors' calculations on the basis of NSS data.

Table A5: Summary statistics

Variable/Year		Rural Mean	Urban Mean	Variable/Year		Rural Mean	Urban Mean
Participation	1994	0.513	0.248	Aged 20-24	1994	0.152	0.156
	2000	0.477	0.218		2000	0.146	0.148
	2005	0.518	0.256		2005	0.145	0.148
	2010	0.395	0.203		2010	0.137	0.142
	2012	0.389	0.218		2012	0.112	0.130
Married	1994	0.778	0.702	Aged 25-34	1994	0.266	0.268
	2000	0.775	0.703		2000	0.268	0.268
	2005	0.765	0.699		2005	0.259	0.259
	2010	0.754	0.704		2010	0.255	0.263
	2012	0.783	0.722		2012	0.247	0.262
No schooling	1994	0.693	0.345	Aged 35-54	1994	0.333	0.328
	2000	0.630	0.299		2000	0.338	0.343
	2005	0.564	0.263		2005	0.350	0.356
	2010	0.472	0.218		2010	0.361	0.361
	2012	0.471	0.208		2012	0.403	0.389
Pre-Primary	1994	0.087	0.091	Aged 55-64	1994	0.099	0.083
	2000	0.088	0.081		2000	0.098	0.082
	2005	0.094	0.074		2005	0.098	0.088
	2010	0.097	0.065		2010	0.106	0.095
	2012	0.105	0.068		2012	0.120	0.105
Primary	1994	0.164	0.275	Hindu	1994	0.856	0.791
	2000	0.198	0.280		2000	0.845	0.780
	2005	0.234	0.302		2005	0.836	0.783
	2010	0.274	0.271		2010	0.840	0.787
	2012	0.256	0.258		2012	0.834	0.777
Secondary	1994	0.051	0.210	Muslim	1994	0.090	0.144
	2000	0.074	0.239		2000	0.100	0.151
	2005	0.095	0.251		2005	0.109	0.153
	2010	0.137	0.306		2010	0.110	0.151
	2012	0.143	0.305		2012	0.120	0.162
Tertiary	1994	0.006	0.079	Scheduled tribe	1994	0.104	0.030
	2000	0.010	0.101		2000	0.106	0.037
	2005	0.013	0.110		2005	0.102	0.032
	2010	0.021	0.140		2010	0.109	0.029
	2012	0.024	0.161		2012	0.107	0.032
At least one child aged 0-5 in the household	1994	0.506	0.412	Scheduled caste	1994	0.199	0.121
	2000	0.491	0.389		2000	0.209	0.138
	2005	0.461	0.375		2005	0.207	0.150
	2010	0.381	0.325		2010	0.217	0.145
	2012	0.365	0.312		2012	0.203	0.141

Table A5: Summary statistics (cont.)

Variable/Year		Rural Mean	Urban Mean	Variable/Year		Rural Mean	Urban Mean
Monthly per capita expenditure (MPCE) group - *Low*	1994	0.130	0.112	Household type: *self-employed*	1994		0.382
	2000	0.098	0.106		2000		0.381
	2005	0.070	0.081		2005		0.425
	2010	0.074	0.074		2010		0.405
	2012				2012		0.408
Monthly per capita expenditure (MPCE) group - *Middle*	1994	0.801	0.807	Household type: *regular wage/salary worker*	1994		0.434
	2000	0.831	0.802		2000		0.415
	2005	0.844	0.796		2005		0.408
	2010	0.818	0.772		2010		0.391
	2012				2012		0.419
Monthly per capita expenditure (MPCE) group - *High*	1994	0.069	0.080	Household type: *casual labour*	1994		0.127
	2000	0.071	0.092		2000		0.137
	2005	0.086	0.123		2005		0.114
	2010	0.108	0.154		2010		0.140
	2012				2012		0.115
Household type: *self-employed in non-agriculture*	1994	0.127		Household type: *other*	1994		0.057
	2000	0.134			2000		0.067
	2005	0.162			2005		0.053
	2010	0.160			2010		0.064
	2012	0.164			2012		0.057
Household type: *agricultural labour*	1994	0.278		Sex ratio	1994	0.954	0.943
	2000	0.301			2000	0.965	0.946
	2005	0.243			2005	0.982	0.966
	2010	0.246			2010	0.974	0.962
	2012	0.199			2012	0.981	0.973
Household type: *other labour*	1994	0.074		Female being the head of the household	1994	0.092	0.111
	2000	0.075			2000	0.100	0.105
	2005	0.103			2005	0.107	0.119
	2010	0.144			2010	0.111	0.121
	2012	0.231			2012	0.115	0.131
Household type: *self-employed in agriculture*	1994	0.425		Index of occupational segregation (excl. agriculture), Duncan ID	1994	0.388	0.378
	2000	0.371			2000	0.377	0.364
	2005	0.398			2005	0.391	0.387
	2010	0.353			2010	0.401	0.394
	2012	0.369			2012	0.400	0.393
Household type: *other*	1994	0.097		South	1994	0.235	0.293
	2000	0.120			2000	0.229	0.285
	2005	0.093			2005	0.225	0.276
	2010	0.097			2010	0.223	0.292
	2012	0.038			2012	0.224	0.286

Table A5: Summary statistics (cont.)

Variable/Year		Rural Mean	Urban Mean	Variable/Year		Rural Mean	Urban Mean
North-East	1994	0.041	0.019	Land cultivation	1994	1.679	0.229
	2000	0.038	0.018		2000	1.479	0.212
	2005	0.042	0.018		2005	1.956	1.198
	2010	0.044	0.020		2010	1.855	1.155
	2012	0.044	0.018		2012	1.277	0.194
Central	1994	0.358	0.241	*Worked* at Mahatma Gandhi National Rural Employment Guarantee (MGNREG)	1994		
	2000	0.367	0.251		2000		
	2005	0.363	0.234		2005		
	2010	0.371	0.238		2010	0.249	
	2012	0.371	0.229		2012	0.101	
West	1994	0.127	0.209	*Sought but did not work* at Mahatma Gandhi National Rural Employment Guarantee (MGNREG)	1994		
	2000	0.129	0.212		2000		
	2005	0.125	0.214		2005		
	2010	0.121	0.216		2010	0.194	
	2012	0.120	0.229		2012	0.033	
East	1994	0.135	0.104	*Did not seek work* at Mahatma Gandhi National Rural Employment Guarantee (MGNREG)	1994		
	2000	0.127	0.096		2000		
	2005	0.131	0.105		2005		
	2010	0.124	0.089		2010	0.530	
	2012	0.125	0.093		2012	0.062	
North	1994	0.104	0.134	**Number of observations**	**1994**	**103,267**	**61,434**
	2000	0.109	0.139		**2000**	**108,416**	**69,203**
	2005	0.114	0.154		**2005**	**121,078**	**64,148**
	2010	0.116	0.146		**2010**	**89,254**	**57,808**
	2012	0.116	0.145		**2012**	**79,236**	**54,056**
Household size	1994	5.609	5.446				
	2000	5.729	5.513				
	2005	5.572	5.344				
	2010	5.286	5.062				
	2012	5.080	4.935				

Note: The dataset used for this table is the one used in the regressions but it includes the survey year 2012 although this survey was dropped from the final regressions.

The dataset used in the regressions refers to women only, aged 15-64, excluding outliers such as mpce>1000 rupees, and missing values.

Source: Authors' calculations on the basis of NSS data.

Appendix B - Regression Results

Rural areas

Table B1: Standard and heteroskedastic probit for women in rural areas – individual and household characteristics

Variable	Model		Variable	Model	
	Probit	**Heteroskedastic Probit**		**Probit**	**Heteroskedastic Probit**
Married	-0.034***	-0.019	Hindu	0.022	0.030
Pre-primary, 1994	-0.307***	-0.305***	Muslim	-0.312***	-0.394***
Pre-primary, 2000	-0.257***	-0.306***	Scheduled Tribe	0.491***	0.632***
Pre-primary, 2005	-0.240***	-0.274***	Scheduled Caste	0.131***	0.174***
Pre-primary, 2010	-0.140***	-0.185***	Child aged 0-5	-0.030***	-0.036***
Primary, 1994	-0.555***	-0.584***	Middle income, 1994	-0.169***	-0.181***
Primary, 2000	-0.459***	-0.573***	Middle income, 2000	-0.409***	-0.465***
Primary, 2005	-0.354***	-0.427***	Middle income, 2005	-0.083***	-0.100***
Primary, 2010	-0.235***	-0.339***	Middle income, 2010	-0.038	-0.058
Secondary, 1994	-0.669***	-0.804***	Top income, 1994	-0.235***	-0.249***
Secondary, 2000	-0.611***	-0.891***	Top income, 2000	-0.633***	-0.750***
Secondary, 2005	-0.505***	-0.674***	Top income, 2005	-0.195***	-0.253***
Secondary, 2010	-0.539***	-0.934***	Top income, 2010	-0.062	-0.084
Tertiary, 1994	-0.030	-0.052	Agricultural labour, 1994	0.284***	0.284***
Tertiary, 2000	-0.131**	-0.417**	Agricultural labour, 2000	0.321***	0.403***
Tertiary, 2005	-0.052	-0.075	Agricultural labour, 2005	0.331***	0.401***
Tertiary, 2010	-0.124**	-0.764***	Agricultural labour, 2010	0.384***	0.570***
Age 20-24, 1994	0.228***	0.246***	Other labour, 1994	0.058*	0.033
Age 20-24, 2000	0.285***	0.369***	Other labour, 2000	-0.069**	-0.084**
Age 20-24, 2005	0.256***	0.311***	Other labour, 2005	0.041	0.051
Age 20-24, 2010	0.375***	0.575***	Other labour, 2010	0.051	0.070
Age 25-34, 1994	0.435***	0.464***	Self-employed in agriculture, 1994	0.032	0.006
Age 25-34, 2000	0.525***	0.682***	Self-employed in agriculture, 2000	0.066**	0.093***
Age 25-34, 2005	0.578***	0.713***	Self-employed in agriculture, 2005	0.137***	0.165***
Age 25-34, 2010	0.642***	1.004***	Self-employed in agriculture, 2010	0.120***	0.214***
Age 35-54, 1994	0.426***	0.454***	Other type, 1994	-0.397***	-0.468***
Age 35-54, 2000	0.540***	0.699***	Other type, 2000	-0.432***	-0.583***
Age 35-54, 2005	0.621***	0.767***	Other type, 2005	-0.532***	-0.726***
Age 35-54, 2010	0.711***	1.092***	Other type, 2010	-0.462***	-0.727***
Age 55-64, 1994	-0.174***	-0.197***	Female head	0.432***	0.559***
Age 55-64, 2000	-0.051	-0.060	Household size	-0.041***	-0.051***
Age 55-64, 2005	0.029	0.058	Land cultivation	0.314***	0.401***
Age 55-64, 2010	0.239***	0.392***			
Observations	422,015				
Population	811,960,272				
F-statistic	221.850***	20.090***			

* p<0.05; ** p<0.01; *** p<0.001

Robust standard errors

Source: Authors' estimates on the basis of NSS data.

Table B2: Standard and heteroskedastic probit for women in rural areas – regional characteristics

Variable	Model	
	Probit	Heteroskedastic Probit
Sex ratio, 1994	1.368***	1.463***
Sex ratio, 2000	1.475***	1.930***
Sex ratio, 2005	0.284	0.210
Sex ratio, 2010	1.816***	2.730***
Occupational segregation, 1994	-0.941***	-0.888***
Occupational segregation, 2000	-0.510**	-0.750***
Occupational segregation, 2005	-1.129***	-1.395***
Occupational segregation, 2010	-1.921***	-2.899***
North-East, 1994	-0.651***	-0.905***
North-East, 2000	-0.587***	-0.983***
North-East, 2005	-0.691***	-1.022***
North-East, 2010	-0.427***	-0.887***
Central, 1994	-0.665***	-0.693***
Central, 2000	-0.524***	-0.638***
Central, 2005	-0.606***	-0.745***
Central, 2010	-0.508***	-0.690***
West, 1994	0.146***	0.133***
West, 2000	0.252***	0.297***
West, 2005	0.081**	0.078*
West, 2010	0.097**	0.161**
East, 1994	-0.698***	-0.803***
East, 2000	-0.715***	-0.984***
East, 2005	-0.717***	-0.958***
East, 2010	-0.467***	-0.802***
North, 1994	-0.063*	-0.062
North, 2000	0.042	0.058
North, 2005	0.044	0.057
North, 2010	0.265***	0.402***
Year: 2000	-0.322	-0.591*
Year: 2005	0.881***	1.153***
Year: 2010	-0.924***	-1.657***
Constant	-0.626***	-0.763***

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Robust standard errors

These results are based on the same regressions as in Table B1.

Source: Authors' estimates on the basis of NSS data.

Table B3: Variance model from heteroskedastic probit for rural women

Variable	Variance model from heteroskedastic probit
Pre-primary	0.011
Primary	0.059***
Secondary	0.234***
Tertiary	0.965***
Age 15-19	0.097***
Age 20-24	0.077***
Age 25-34	-0.045***
Age 55-64	0.183***
MPCE	-0.000**
North-East	0.361***
Central	-0.013
West	-0.044
East	0.192***
North	0.085***
Year: 2000	0.166***
Year: 2005	0.137***
Year: 2010	0.282***

* p<0.05; ** p<0.01; *** p<0.001

Robust standard errors

These results are based on the same regressions as in Table B1.

Source: Authors' estimates on the basis of NSS data.

Table B4: Blinder-Oaxaca decomposition for rural areas

	1994-2000	2000-2005	2005-2010
Year 1	0.514***	0.478***	0.520***
Year 2	0.478***	0.520***	0.396***
Difference	0.036***	-0.042***	0.124***
Characteristics effect	0.010***	0.013***	0.021***
Coefficients effect	0.027***	-0.056***	0.104***

* p<0.05; ** p<0.01; *** p<0.001

Source: Authors' estimates on the basis of NSS data.

Table B5: Probit for rural areas in 2010 including MGNREGA effect

Variable	Probit	Variable	Probit
Married	-0.134***	Agricultural labour	0.316***
Pre-primary	-0.139***	Other labour	0.005
Primary	-0.221***	Self-employed in agriculture	0.153***
Secondary	-0.513***	Other type	-0.445***
Tertiary	-0.100*	Female head	0.488***
Age 20-24	0.439***	Household size	-0.033***
Age 25-34	0.733***	Land cultivation	0.222***
Age 35-54	0.807***	Sex ratio	1.707***
Age 55-64	0.318***	Occupational segregation	-2.084***
Hindu	-0.051	North-East	-0.430***
Muslim	-0.325***	Central	-0.462***
Scheduled Tribe	0.278***	West	0.183***
Scheduled Caste	0.075**	East	-0.474***
Child aged 0-5	-0.008	North	0.238***
Middle income	-0.029	Household got work in MGNREGA	0.392***
Top income	-0.019	Constant	-1.413***
Observations	89,254		
Population	230,478,384		
F-statistic	99.260***		

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Robust standard errors

Source: Authors' estimates on the basis of NSS data.

Urban areas

Table B6: Standard and heteroskedastic probit for women in urban areas – individual and household characteristics

Variable	Model Probit	Heteroskedastic Probit	Variable	Model Probit	Heteroskedastic Probit
Married	-0.440***	-0.398***	Hindu	-0.089***	-0.064***
Pre-primary, 1994	-0.207***	-0.203***	Muslim	-0.262***	-0.235***
Pre-primary, 2000	-0.224***	-0.237***	Scheduled Tribe	0.251***	0.205***
Pre-primary, 2005	-0.191***	-0.228***	Scheduled Caste	0.176***	0.147***
Pre-primary, 2010	-0.129***	-0.147***	Child aged 0-5	-0.143***	-0.116***
Primary, 1994	-0.413***	-0.233***	Middle income, 1994	-0.321***	-0.249***
Primary, 2000	-0.442***	-0.267***	Middle income, 2000	-0.557***	-0.430***
Primary, 2005	-0.356***	-0.237***	Middle income, 2005	-0.302***	-0.259***
Primary, 2010	-0.244***	-0.122***	Middle income, 2010	-0.230***	-0.146***
Secondary, 1994	-0.382***	-0.031	Top income, 1994	-0.436***	-0.208***
Secondary, 2000	-0.444***	-0.075**	Top income, 2000	-0.676***	-0.376***
Secondary, 2005	-0.430***	-0.096***	Top income, 2005	-0.448***	-0.232***
Secondary, 2010	-0.453***	-0.078*	Top income, 2010	-0.367***	-0.081
Tertiary, 1994	0.277***	0.227***	Salaried, 1994	-0.130***	-0.072***
Tertiary, 2000	0.214***	0.189***	Salaried, 2000	-0.133***	-0.070***
Tertiary, 2005	0.146***	0.149***	Salaried, 2005	-0.082***	-0.026
Tertiary, 2010	0.131***	0.141***	Salaried, 2010	-0.023	0.008
Age 20-24, 1994	0.459***	1.192***	Casual labour, 1994	0.269***	0.259***
Age 20-24, 2000	0.356***	1.177***	Casual labour, 2000	0.143***	0.142***
Age 20-24, 2005	0.495***	1.299***	Casual labour, 2005	0.159***	0.183***
Age 20-24, 2010	0.624***	1.619***	Casual labour, 2010	0.178***	0.171***
Age 25-34, 1994	0.698***	1.559***	Other type, 1994	-0.753***	-0.577***
Age 25-34, 2000	0.650***	1.620***	Other type, 2000	-0.724***	-0.564***
Age 25-34, 2005	0.737***	1.673***	Other type, 2005	-0.924***	-0.718***
Age 25-34, 2010	0.849***	2.022***	Other type, 2010	-0.830***	-0.625***
Age 35-54, 1994	0.734***	1.563***	Female head	0.465***	0.379***
Age 35-54, 2000	0.753***	1.674***	Household size	-0.041***	-0.039***
Age 35-54, 2005	0.708***	1.641***	Land cultivation	0.326***	0.259***
Age 35-54, 2010	0.849***	2.002***			
Age 55-64, 1994	0.167***	0.883***			
Age 55-64, 2000	0.149***	0.920***			
Age 55-64, 2005	0.144**	0.893***			
Age 55-64, 2010	0.319***	1.228***			
Observations	252,593				
Population	291,766,551				
F-statistic	99.35***	15.250***			

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Robust standard errors

Source: Authors' estimates on the basis of NSS data.

Table B7: Standard and heteroskedastic probit for women in rural areas – regional characteristics

Variable	Model	
	Probit	Heteroskedastic Probit
Sex ratio, 1994	1.164***	0.847***
Sex ratio, 2000	0.870***	0.752***
Sex ratio, 2005	2.024***	1.600***
Sex ratio, 2010	1.171***	0.777***
Occupational segregation, 1994	-0.535***	-0.409***
Occupational segregation, 2000	0.117	0.074
Occupational segregation, 2005	-0.587***	-0.422***
Occupational segregation, 2010	-0.433**	-0.266
North-East, 1994	-0.106*	-0.029
North-East, 2000	-0.151***	-0.055
North-East, 2005	-0.006	0.041
North-East, 2010	-0.099	-0.014
Central, 1994	-0.310***	-0.180***
Central, 2000	-0.402***	-0.251***
Central, 2005	-0.204***	-0.144***
Central, 2010	-0.297***	-0.229***
West, 1994	-0.063*	-0.010
West, 2000	-0.125***	-0.040
West, 2005	0.038	0.065*
West, 2010	0.03	0.049
East, 1994	-0.138***	-0.053
East, 2000	-0.337***	-0.204***
East, 2005	-0.07	-0.019
East, 2010	-0.102	-0.073
North, 1994	-0.196***	-0.082**
North, 2000	-0.246***	-0.119***
North, 2005	0.000	0.045
North, 2010	-0.103	-0.067
Year: 2000	0.257	-0.024
Year: 2005	-0.894***	-0.881***
Year: 2010	-0.527	-0.783***
Constant	-0.907***	-1.647***

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Robust standard errors

These results are based on the same regressions as in Table B6.

Source: Authors' estimates on the basis of NSS data.

Table B8: Variance model from heteroskedastic probit for urban women

Variable	Variance model from heteroskedastic probit
Pre-primary	0.045
Primary	-0.124***
Secondary	-0.317***
Tertiary	0.027
Age 15-19	0.829***
Age 20-24	0.221***
Age 25-34	-0.050*
Age 55-64	0.384***
MPCE	-0.001***
North-East	-0.088*
Central	-0.094***
West	-0.063**
East	-0.096***
North	-0.059
Year: 2000	0.018
Year: 2005	0.124***
Year: 2010	0.149***

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Robust standard errors

These results are based on the same regressions as in Table B6.

Source: Authors' estimates on the basis of NSS data.

Table B9: Blinder-Oaxaca decomposition for urban areas

	1994-2000	2000-2005	2005-2010
Year 1	0.248***	0.218***	0.257***
Year 2	0.218***	0.257***	0.204***
Difference	0.030***	-0.038***	0.053***
Characteristics effect	-0.001	-0.005**	0.000***
Coefficients effect	0.031***	-0.033***	0.052***

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Source: Authors' estimates on the basis of NSS data.

Table B10. Standard and heteroskedastic probit for augmented definition – individual and household characteristics

			Rural areas		
Variable	Probit	Heteroskedastic Probit	Variable	Probit	Heteroskedastic Probit
Married	0.384***	0.438***	Hindu	0.158***	0.201***
Pre-primary, 1994	-0.237***	-0.114**	Muslim	0.037	0.072**
Pre-primary, 2000	-0.201***	-0.112**	Scheduled Tribe	0.428***	0.451***
Pre-primary, 2005	-0.173***	-0.081	Scheduled Caste	0.145***	0.159***
Pre-primary, 2010	-0.145***	-0.062	Child aged 0-5	0.037***	0.032***
Primary, 1994	-0.559***	-0.633***	Middle income, 1994	-0.143***	-0.090***
Primary, 2000	-0.461***	-0.559***	Middle income, 2000	-0.335***	-0.300***
Primary, 2005	-0.396***	-0.541***	Middle income, 2005	-0.166***	-0.127***
Primary, 2010	-0.224***	-0.376***	Middle income, 2010	-0.050	-0.033
Secondary, 1994	-0.932***	-1.015***	Top income, 1994	-0.318***	-0.160***
Secondary, 2000	-0.794***	-0.907***	Top income, 2000	-0.649***	-0.595***
Secondary, 2005	-0.710***	-0.915***	Top income, 2005	-0.442***	-0.369***
Secondary, 2010	-0.693***	-0.941***	Top income, 2010	-0.240***	-0.205**
Tertiary, 1994	-0.572***	-0.287	Agricultural labour, 1994	0.371***	0.368***
Tertiary, 2000	-0.615***	-0.489***	Agricultural labour, 2000	0.410***	0.409***
Tertiary, 2005	-0.470***	-0.364**	Agricultural labour, 2005	0.453***	0.506***
Tertiary, 2010	-0.481***	-0.581***	Agricultural labour, 2010	0.339***	0.423***
Age 20-24, 1994	0.291***	0.446***	Other labour, 1994	0.209***	0.209***
Age 20-24, 2000	0.405***	0.540***	Other labour, 2000	0.123***	0.112***
Age 20-24, 2005	0.373***	0.546***	Other labour, 2005	0.222***	0.242***
Age 20-24, 2010	0.534***	0.692***	Other labour, 2010	0.193***	0.247***
Age 25-34, 1994	0.379***	0.462***	Self-employed agriculture, 1994	0.085***	0.085***
Age 25-34, 2000	0.522***	0.595***	Self-employed agriculture, 2000	0.124***	0.128***
Age 25-34, 2005	0.604***	0.756***	Self-employed agriculture, 2005	0.150***	0.187***
Age 25-34, 2010	0.721***	0.881***	Self-employed agriculture, 2010	0.111***	0.158***
Age 35-54, 1994	0.330***	0.479***	Other type, 1994	-0.231***	-0.246***
Age 35-54, 2000	0.489***	0.624***	Other type, 2000	-0.317***	-0.343***
Age 35-54, 2005	0.594***	0.821***	Other type, 2005	-0.335***	-0.403***
Age 35-54, 2010	0.745***	0.974***	Other type, 2010	-0.315***	-0.395***
Age 55-64, 1994	-0.295***	-0.163***	Female head	0.249***	0.246***
Age 55-64, 2000	-0.172***	-0.107***	Household size	-0.053***	-0.065***
Age 55-64, 2005	-0.030	0.068	Land cultivation	0.280***	0.318***
Age 55-64, 2010	0.250***	0.340***			
Observations	422,015				
Population	811,960,272				
F-statistic	238.15***	33.04***			

Table B10: Standard and heteroskedastic probit for augmented definition – individual and household characteristics (cont.)

			Urban areas		
Variable	**Probit**	**Heteroskedastic Probit**	**Variable**	**Probit**	**Heteroskedastic Probit**
Married	-0.054***	-0.070***	Hindu	-0.058***	-0.065***
Pre-primary, 1994	-0.267***	-0.254***	Muslim	-0.125***	-0.145***
Pre-primary, 2000	-0.250***	-0.261***	Scheduled Tribe	0.298***	0.295***
Pre-primary, 2005	-0.181***	-0.185***	Scheduled Caste	0.257***	0.262***
Pre-primary, 2010	-0.174***	-0.223***	Child aged 0-5	-0.049***	-0.041***
Primary, 1994	-0.509***	-0.493***	Middle income, 1994	-0.380***	-0.413***
Primary, 2000	-0.469***	-0.475***	Middle income, 2000	-0.608***	-0.645***
Primary, 2005	-0.421***	-0.431***	Middle income, 2005	-0.480***	-0.526***
Primary, 2010	-0.267***	-0.338***	Middle income, 2010	-0.411***	-0.512***
Secondary, 1994	-0.766***	-0.667***	Top income, 1994	-0.577***	-0.528***
Secondary, 2000	-0.753***	-0.680***	Top income, 2000	-0.829***	-0.752***
Secondary, 2005	-0.689***	-0.614***	Top income, 2005	-0.723***	-0.664***
Secondary, 2010	-0.545***	-0.580***	Top income, 2010	-0.628***	-0.640***
Tertiary, 1994	-0.365***	-0.391***	Salaried, 1994	-0.062***	-0.063***
Tertiary, 2000	-0.339***	-0.410***	Salaried, 2000	-0.055**	-0.051**
Tertiary, 2005	-0.252***	-0.298***	Salaried, 2005	-0.042	-0.042*
Tertiary, 2010	-0.189***	-0.299***	Salaried, 2010	-0.010	-0.012
Age 20-24, 1994	0.480***	0.451***	Casual labour, 1994	0.483***	0.460***
Age 20-24, 2000	0.379***	0.363***	Casual labour, 2000	0.341***	0.345***
Age 20-24, 2005	0.492***	0.477***	Casual labour, 2005	0.417***	0.425***
Age 20-24, 2010	0.693***	0.777***	Casual labour, 2010	0.297***	0.351***
Age 25-34, 1994	0.549***	0.526***	Other type, 1994	-0.502***	-0.508***
Age 25-34, 2000	0.482***	0.480***	Other type, 2000	-0.424***	-0.433***
Age 25-34, 2005	0.559***	0.560***	Other type, 2005	-0.647***	-0.642***
Age 25-34, 2010	0.800***	0.909***	Other type, 2010	-0.551***	-0.643***
Age 35-54, 1994	0.487***	0.464***	Female head	0.357***	0.370***
Age 35-54, 2000	0.474***	0.461***	Household size	-0.045***	-0.048***
Age 35-54, 2005	0.467***	0.461***	Land cultivation	0.368***	0.363***
Age 35-54, 2010	0.757***	0.853***			
Age 55-64, 1994	-0.059	-0.135***			
Age 55-64, 2000	-0.151***	-0.297***			
Age 55-64, 2005	-0.038	-0.175***			
Age 55-64, 2010	0.316***	0.183**			
Observations	252,593				
Population	291,766,551				
F-statistic	119.07***	14.07***			

Note: For the augmented definition, see note for Table 2.

* p<0.05; ** p<0.01; *** p<0.001

Source: Authors' estimates on the basis of NSS data.

Table B11: Standard and heteroskedastic probit for augmented definition – regional characteristics

Variable	Rural areas		Urban areas	
	Probit	Heteroskedastic Probit	Probit	Heteroskedastic Probit
Sex ratio, 1994	-0.352*	-0.462**	1.477***	1.351***
Sex ratio, 2000	-0.322	-0.484*	1.222***	1.203***
Sex ratio, 2005	-1.022***	-1.337***	2.154***	2.118***
Sex ratio, 2010	-0.152	-0.282	1.162***	1.367***
Occupational segregation, 1994	-0.736***	-0.792***	-1.525***	-1.428***
Occupational segregation, 2000	-0.310	-0.326	-0.511**	-0.498**
Occupational segregation, 2005	-1.083***	-1.282***	-1.375***	-1.329***
Occupational segregation, 2010	-1.817***	-2.273***	-0.463**	-0.547**
North-East, 1994	-0.186***	-0.434***	0.098	0.096
North-East, 2000	-0.021	-0.265***	0.002	-0.012
North-East, 2005	-0.056	-0.359***	0.359***	0.328***
North-East, 2010	0.435***	0.239***	0.251***	0.309***
Central, 1994	-0.479***	-0.487***	-0.319***	-0.302***
Central, 2000	-0.328***	-0.353***	-0.376***	-0.397***
Central, 2005	-0.490***	-0.567***	-0.216***	-0.243***
Central, 2010	-0.227***	-0.284***	-0.178***	-0.259***
West, 1994	-0.162***	-0.285***	-0.386***	-0.360***
West, 2000	-0.005	-0.118**	-0.283***	-0.289***
West, 2005	-0.209***	-0.352***	-0.139***	-0.141***
West, 2010	0.045	-0.025	-0.092*	-0.133**
East, 1994	-0.050	-0.108**	0.123**	0.122***
East, 2000	0.022	-0.035	0.027	0.033
East, 2005	0.012	-0.024	0.338***	0.342***
East, 2010	0.420***	0.480***	0.254***	0.288***
North, 1994	-0.184***	-0.253***	-0.397***	-0.362***
North, 2000	-0.067	-0.135**	-0.431***	-0.412***
North, 2005	-0.052	-0.136***	-0.123*	-0.106
North, 2010	0.218***	0.208***	-0.308***	-0.375***
Year: 2000	-0.360	-0.250	-0.071	-0.118
Year: 2005	0.473	0.864**	-0.955**	-0.996***
Year: 2010	-0.795***	-0.495	-0.800**	-1.020***
Constant	1.512***	1.622***	-0.117	0.008

Note: For the augmented definition, see note for Table 2.

* p<0.05; ** p<0.01; *** p<0.001

Source: Authors' estimates on the basis of NSS data.

Table B12: Variance model from heteroskedastic probit for augmented definition

Variable	Variance model from heteroskedastic probit	
	Rural areas	**Urban areas**
Pre-primary	0.109***	0.070*
Primary	-0.080***	0.043
Secondary	-0.144***	-0.031
Tertiary	0.459***	0.291***
Age 15-19	-0.207***	-0.060
Age 20-24	0.021	-0.030
Age 25-34	-0.046*	-0.065**
Age 55-64	0.104**	0.286***
MPCE	0.001***	-0.001***
North-East	-0.288***	0.175**
Central	0.054**	0.161***
West	-0.119***	0.149***
East	-0.025	0.013
North	-0.096***	0.109**
Year: 2000	0.025	0.038
Year: 2005	0.109**	0.051
Year: 2010	0.169***	0.223***

Note: For the augmented definition, see note for Table 2.

* p<0.05; ** p<0.01; *** p<0.001

Source: Authors' estimates on the basis of NSS data.

Table B13: Blinder-Oaxaca decomposition for augmented definition

	Rural areas			Urban areas		
	1994-2000	**2000-2005**	**2005-2010**	**1994-2000**	**2000-2005**	**2005-2010**
Year 1	0.840***	0.804***	0.795***	0.471***	0.404***	0.413***
Year 2	0.804***	0.795***	0.727***	0.404***	0.413***	0.379***
Difference	0.036***	0.008**	0.068***	0.067***	-0.009	0.034***
Characteristics effect	0.015***	0.017***	0.015***	0.004	0.005	0.010***
Coefficients effect	0.021***	-0.009**	0.053***	0.063***	-0.014**	0.025***

Note: For the augmented definition, see note for Table 2.

* p<0.05; ** p<0.01; *** p<0.001

Source: Authors' estimates on the basis of NSS data.