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Push or pull? Drivers of female labor force participation during India's economic boom

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India's Economic Boom**

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February 2012

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ABSTRACT

Push or Pull? Drivers of Female Labor Force Participation during India's Economic Boom

In the past twenty years, India's economy has grown at increasing rates and now belongs to the fastest-growing economies in the world. This paper examines drivers of female labor force participation in urban India between 1987 and 2004, showing a much more nuanced picture of female labor force participation than one might expect. Recent trends in employment and earnings suggest that at lower levels of education, female labor force participation is driven by necessity rather than economic opportunities. Unit level estimation results confirm that participation of poorly educated women is mainly determined by economic push factors and social status effects. Only at the highest education levels do we see evidence of pull factors drawing women into the labor force at attractive employment and pay conditions. This affects, by 2004, only a small minority of India's women. So despite India's economic boom, it appears that for all but the very well educated, labor market conditions for women have not improved.

JEL Classification: J21, J22, O12, O15

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1. Introduction

India's economic growth has rapidly increased over the past two decades and future predictions are optimistic. At the same time, fertility has been falling quite rapidly, with the TFR falling to 2.8 in 2005 (UNDP, 2009). Female labor force participation was stagnant for a long time, but started to rise at the turn of the century. Given the positive effect female participation can have on economic growth (Esteve-Volart, 2004; Klasen and Lamanna, 2009), drawing women into the labor force can be a significant source of future growth of the Indian economy. This is particularly the case as higher female participation would be an important component of the so-called demographic dividend. Due to declining fertility, India currently has an advantageous age structure of the population with a growing share of working age people and relatively few dependents. Such a demographic dividend, if accompanied by higher female participation rates, is alleged to have accounted for about a third of East Asia's high per capita growth rates in the period between 1965 and 1990 (Bloom and Williamson, 1998), but hinges on the productive employment of the working age population.

Beyond economic benefits, women's participation in the labor force can be seen as a signal of declining discrimination and increasing empowerment of women (Mammen and Paxson, 2000). However, feminization of the workforce is not necessarily a sign of improvement of women's opportunities and position in society. It can also be a response to recession or increasing insecurity in the labor market, with female labor supply functioning essentially as an insurance mechanism for households (Standing, 1999; Bhalotra and Umaña-Aponte, 2010). The aim of this paper is to determine what drives the labor force participation of women in India. Understanding these determinants is necessary to be able to understand the implications for women's wellbeing and for future growth of the labor force and the economy.

We analyze the period 1983-2005 and focus on the urban sector, which is where most structural change is taking place.¹ To the best of our knowledge, this is the first study of female labor force participation in India that includes unit level data for the year 2004-05 and systematically analyses possible explanations offered in the literature. Furthermore, we pay special attention to the differences between poorly and highly educated women,

¹ This focus is also driven by availability and reliability of data on female employment. More than half of rural working women are self-employed, and changes in rural participation rates are driven by the self-employed. Earnings data are not available for the self-employed, which makes it difficult to analyse the determinants of participation in rural India.

which appears as a highly relevant distinction in the context of India's economic development and female participation rates.

Table 1 summarizes the urban female employment figures for the period 1983-2005. The increase in female labor force participation rate in the period 1999 to 2004, from 21 to 24 per cent, came about after stagnation between 1983 and 1999. In absolute terms, more than five million women entered the urban labor force in the last period, in particular self-employed and regular workers.²

Table 1 –Urban female population by employment status (age group 20-59)

	1983	1987-88	1993-94	1999-2000	2004-05
Self-employed	2,649 (7)	3,249 (7)	3,948 (7)	4,745 (7)	6,675 (8)
Regular	2,641 (7)	3,347 (8)	4,311 (8)	5,364 (8)	7,651(10)
Casual	2,193 (6)	2,225 (5)	3,000 (5)	2,968 (4)	2,953 (4)
Unemployed	530 (1)	785 (2)	976 (2)	909 (1)	1,729 (2)
Labor force	8,013 (22)	9,605 (22)	12,235 (22)	13,985 (21)	19,007 (24)
Out of labor force	29,034 (78)	34,715 (78)	43,537 (78)	53,308 (79)	61,016(76)
Total	37,047(100)	44,325(100)	55,766(100)	67,300(100)	80,031(100)

Note: totals may not add up due to rounding. Numbers are in '000s, percentage of total women in this age group in parentheses. Self-employed includes unpaid family workers, but excludes domestic duties. Regular employees receive salary or wages on a regular basis. Casual workers receive a wage according to the terms of the daily or periodic work contract. *Source:* NSS Employment and Unemployment Survey and Sundaram (2007).

Based on our analysis of recent trends in the structure of employment and real earnings, labor force participation of poorly educated women appears to be driven by necessity rather than opportunities. The share of working women in agriculture and manufacturing self-employment and in domestic services increased, which are often poorly paying and highly insecure jobs. Furthermore, between 1999 and 2004 real earnings for men and women declined. Highly educated women are more likely to work in better paying and more attractive jobs in the services sector, and at the very top real earnings have continued to increase.

A unit level analysis based on the national employment survey sheds further light on the determinants of participation in paid employment. Our results show that income effects strongly affect female participation: women's decision to work is negatively related to the income and employment of household members. An important finding is that the expected positive own-wage effect only applies to highly educated women, who are attracted to the

² Part of the increase in the absolute number of working women reflects the share of women aged 20-59 in the total female population, which has risen from 46 to 54 per cent since 1983. Clearly, demographic changes have also contributed to workforce growth, augmenting the recent jump in participation rates.

labor market by higher expected earnings; for women with less than secondary education we find no effect of market wages on participation in paid employment. This suggests that economic pull factors reflected in earnings opportunities only attract the highly educated minority of urban women into the labor force. Furthermore, own education and education of the household head have a strong negative effect on participation of poorly educated women, suggesting that income and status effects as well as possibly the lack of white collar job opportunities are powerful deterrents to female employment in this group.

The rest of this paper is organized as follows: Section 2 summarizes related literature on development and women's labor force participation. Section 3 discusses previous research on India, and describes in more detail the trends in employment and earnings in India during the recent past. Section 4 presents an empirical model and estimation results for women's participation in paid employment. Finally, Section 5 summarizes the main findings and conclusions.

2. Determinants of female labor force participation

The basic static labor supply model is a starting point for many models of female labor force participation (see Blundell and MaCurdy, 1999). In this model, an increase in the wage rate reduces demand for leisure as its opportunity cost rises, and labor supply will increase. If leisure is a normal good, an increase in a person's or their household members' income will increase the demand for leisure and thus reduce labor supply. These are the well-known substitution and income effects. For a person with positive labor supply, the overall net labor supply effect of an increase in the own wage depends on the relative strength of the substitution and income effect, and is theoretically ambivalent. For a person currently not working, an increase in the wage rate only has a substitution effect, increasing the incentive to work (i.e. a positive effect at the extensive margin). An increase in unearned income (non-labor income or income earned by other household members) reduces labor supply both at the extensive and intensive margin.

2.1. Development and women's participation

Beyond the basic labor supply model, several further factors have been discussed in the analysis of female labor force participation in developing countries. Probably the best-known hypothesis in this literature is the feminization U-curve, which suggests that female labor force participation first declines and then increases as an economy develops (Goldin, 1994; Mammen and Paxson, 2000). The U-curve is the outcome of a combination of

structural change in the economy, income effects, and social stigma against factory work by women. In initial stages of development, education levels rise and employment shifts from agriculture to manufacturing. However, in these initial stages, education increases much more for men than for women. Women's wages and opportunities for work change relatively slowly while unearned income rises fast, so the positive substitution effect of rising female wages is likely to be dominated by a negative income effect. Participation is further reduced because of social stigma against women working outside of the home, including in manufacturing; these effects are held to be particularly strong for married women. Later on, women's education rises as well, while demand for white-collar workers increases with the expansion of the services sector. Higher wages and socially acceptable types of work, and an erosion of a social stigma against female employment, lead to higher female labor force participation. Though the feminization U is sometimes considered a stylized fact, the empirical evidence in support of it is mostly based on cross-country analysis, while panel analyses have produced mixed results (e.g., Çagatay and Özler, 1995; Tam, 2010; Gaddis and Klasen, 2011).

One might well hypothesize, however, that within a country, there is a U-shape relationship between economic or educational status and women's labor force participation at a given point in time. Among the poorly educated, women are forced to work to survive and can combine farm work with domestic duties, and among the very highly educated, high wages induce women to work and stigmas militating against female employment may be low. Between these two groups, women may face barriers to labor force participation related to both the absence of an urgent need of female employment (the income effect), and the presence of social stigmas associated with female employment.³ This would be consistent with a similar U-shape relationship in gender bias in mortality by education or income groups, where gender bias appears to be largest among the middle groups (e.g. Klasen and Wink, 2003; Drèze and Sen, 2002). In any case, the feminization U hypothesis (at the country or international level) reflects several underlying forces at work, and we aim to unravel these using disaggregated analysis.

Female participation rates may also be determined by the level of employment security. Standing (1999) argues that growing labor market flexibility and diverse forms of

³Attitudes of both men and women towards gender roles can be shaped by factors such as religion (Lehrer, 1995; Amin and Alam, 2008), education, mass communication, and attitudes and behaviour of previous generations (e.g., Farré and Vella, 2007).

insecurity have encouraged greater female labor force participation around the world. Technological change and increasing international competition stimulate employers to focus on a limited number of permanent core workers, while making more use of temporary workers and subcontracting. Women are often more prepared to engage in more flexible, short-term, informal types of employment and as a result relative demand for women increases. Moreover, through reduction in social security and more income insecurity, women are pushed into the labor market. Rising female labor force participation then reflects the erosion of men's position in the labor market, rather than an improvement in women's opportunities.

This view is related to the view of women's labor supply as an insurance mechanism for households (Attanasio *et al.*, 2005). In a recent paper, Bhalotra and Umaña-Aponte (2010) show that in developing countries in Asia and Latin America, female labor force participation rates move counter-cyclically: women move from non-employment into paid and self-employment during recessions. In line with the insurance mechanism theory, they also find that counter-cyclicality is strongest in households with limited alternative sources of insurance against income shocks.

The role of women as caregivers and their high domestic work burden are obviously also important when it comes to the participation decision, as this determines their value within the household. Cunningham (2001) shows that in Mexico, unmarried women without children are as likely to work as men, while labor supply of married women depends on the presence of young children and the level and stability of household income. With declining fertility, the value of nonworking time declines and one would expect female labor force participation rates to rise.⁴

The different views discussed here are not mutually exclusive, and can be summarized in terms of the following hypotheses about determinants of women's labor force participation:

- The woman's expected market wage positively affects participation.
- Unearned income, including income from non-labor sources and other household members, has a negative effect on participation;
- Income and employment insecurity of other household members induces higher participation;

⁴ This need not necessarily be the case, however. As shown by Priebe (2011) in the case of Indonesia, declining fertility might actually reduce female labor force participation rates among poorer parts of the population where fertility decline reduces the need to work.

- Social stigma, possibly related to (own or husband's) education and the type of work (at home or outside, manual or non-manual work), negatively affect female employment;
- Large family size and a high household workload have negative effects.

All of these, except the expected market wage, are determinants of the so-called reservation wage, which can be thought of as the marginal utility of non-work (including childcare and housework): when the expected market wage exceeds the reservation wage, a woman will participate in the labor force. This set-up will be used in the individual-level empirical analysis in section 4.

3. Women's participation in India

There has not been very much research on female labor force participation in India, but it is widely known that the participation rate is low compared to other countries. In 1998 India's Central Statistical Organization conducted a time use survey in six states, for which household duties (household maintenance and care for children, old, and sick household members) were classified as "extended-SNA" activities. Time spent on SNA activities, which are economic activities included in the national accounts, was measured separately. The survey showed that urban women spent about nine hours per week on SNA activities plus 36 hours on extended-SNA activities, against 41 plus three hours weekly, respectively, for men (NCEUS, 2007). Mitra (2005) names the dual burden of conventional productive work and household duties as one of the major constraints to women's labor market choice: male household members typically decide on the location of residence, and women depend on informal networks to find paid employment near their homes.

Besides the double burden of work, social norms restrict women's availability and location of work leading to lower labor force participation (NCEUS, 2007). This may be reflected in the clear U-shaped relationship between women's education and labor force participation in India. Kingdon and Unni (2001) attribute the downward sloping part of this U to the process of Sanskritization: social restrictions on the lifestyles of women tend to become more rigid as households move up in the caste hierarchy (Chen and Drèze, 1992), which would be reinforced by the negative income effect of rising incomes of husbands. Increasing participation at the highest education levels could then reflect modernizing influences that increase women's aspirations, combined with higher returns to education that increase economic incentives for women to work. Bardhan (1986) argues that class, patriarchy, and social hierarchy (caste, ethnicity, and religion) all interact to

shape attitudes towards gender roles. In that sense, the downward sloping part of the U reflects not just Sanskritization, but a general aspiration to upgrade social status or imitate lifestyles of higher status groups. Among higher classes, aspired status groups would be the urban educated with more Western lifestyles, associated with higher female labor force participation rates.

Analyzing regional differences in female participation rates in the 1990s, Ahasan and Pages (2008) find that employment opportunities play an important role especially in rural India, as female wages or expected earnings have a strong positive effect on participation. They also find some evidence for a negative income effect of men's earnings. Besides these classical income and substitution effects, however, the impact of cultural and social factors is not considered in their analysis. Sudarshan and Bhattacharya (2009) find that women's household workload, lack of information, and mobility and safety concerns are important constraints to their participation.⁵ Therefore, the decision to work is mainly determined by the external environment (e.g., childcare arrangements and safety in public spaces) and ideology of the marital household, rather than the woman's individual attributes.

There is some evidence, finally, that women's labor market entry between 1999 and 2004 in rural India was distress-driven: self-employment increased most among the poorest households, real wage growth stagnated, and the workforce feminization was greatest in the farm sector in districts with agricultural distress (Abraham, 2009). The story for urban India may be less gloomy, as job opportunities are likely to be quite different: especially services sector employment is concentrated in urban India. The next section gives a more detailed description of changes in the Indian urban labor market over the past decades.

3.1. Trends in employment and earnings in urban India

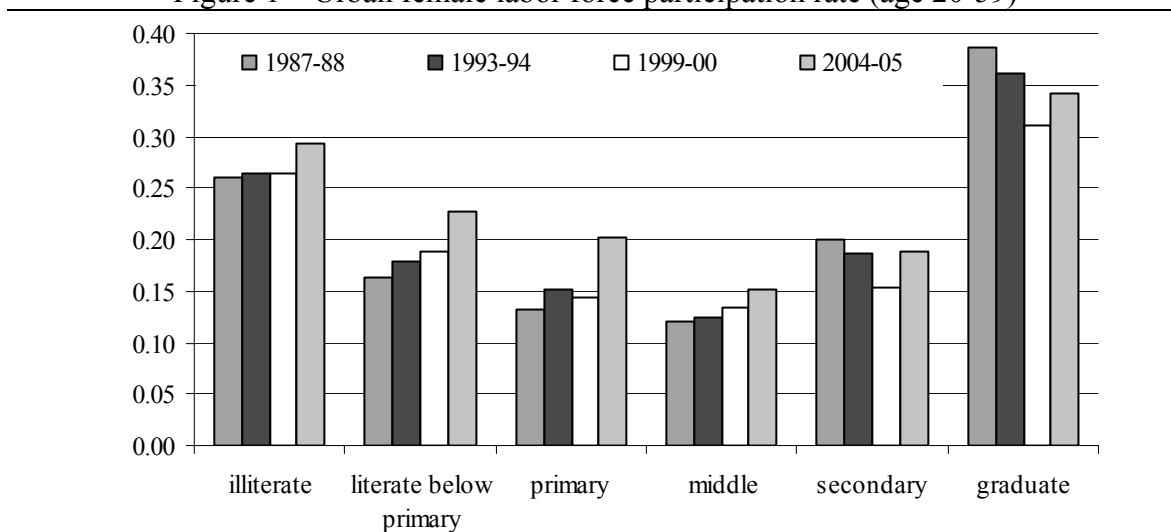
Data on employment and earnings used in this paper are from the 'thick' rounds of the National Sample Survey (NSS) on Employment and Unemployment, the official source of employment and earnings data used by the Government of India. They are for the years 1987-88, 1993-94, 1999-00, and 2004-5.⁶

⁵ Based on a survey among 447 households in Delhi in 2006.

⁶ All figures in this paper are based on principal usual status activities. Usual status is based on a reference period of one year, in which principal activity is the activity in which the respondent spent the majority of time. Subsidiary activity is not taken into account in the present paper, as it affects less than five percent of the adult urban female population and comparability over time is questionable: before the 2004-05 survey,

Figure 1 shows the labor force participation rate of urban women at different education levels between 1987 and 2004. It shows the clear U-shape of female participation by educational levels, which is visible in each of the years; the low point is always among those with middle educational achievement. As far as time trends are concerned, between 1987 and 1999 the urban female labor force participation rate increased somewhat for women below secondary education, while participation among highly educated women declined. In the period 1999-2004, participation rates increased at all educational levels.

Figure 1 – Urban female labor force participation rate (age 20-59)



Source: NSS Employment and Unemployment Survey

One needs to note that the population shares of the different educational groups changed considerably, which, given different levels of participation across the groups, could partly account for the overall trends reported in Table 1. Between 1987 and 2004, the share of illiterate women in urban areas declined from 42 to 27 per cent, while the share of women with secondary or graduate level education increased from 15 to 23 per cent and from 8 to 15 per cent, respectively. The population shares of the other groups changed relatively little. Since there was, on aggregate, a shift from one high-participation group (illiterate) to two other high-participation groups (secondary and graduate), these population shifts hardly affected the overall female participation rate.

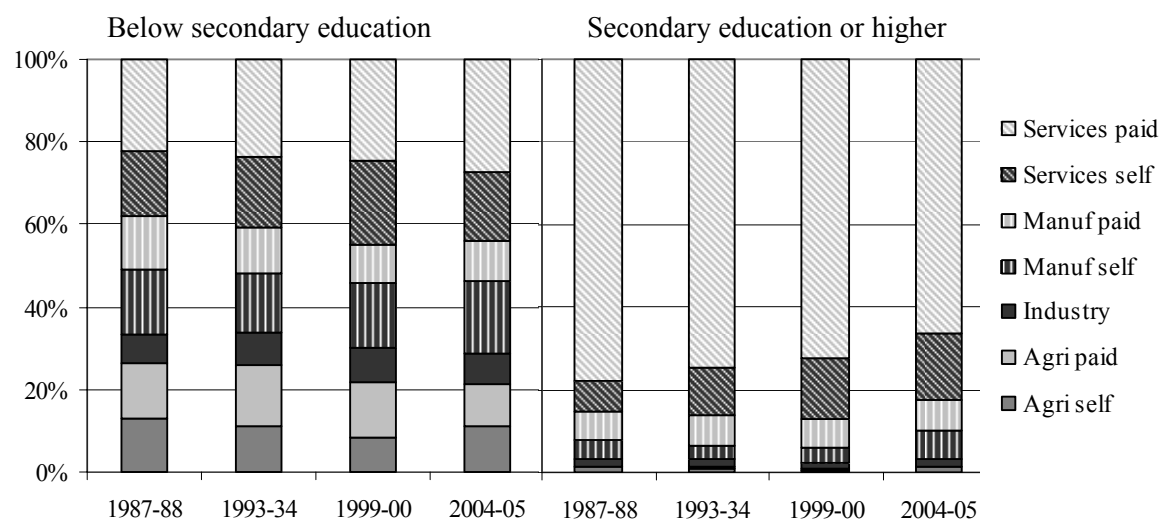
Table A.1 in the Appendix shows the distribution of women with low and high education across different types of work and industries. A summary representation of these data –grouping regular and casual paid work together and showing only the distribution of

there was no lower bound on the number of hours spent on a particular activity to be considered as subsidiary activity, but in 2004-05 the minimum was set at 30 days of the reference year.

women within the workforce – is shown in Figure 2. One notes that below secondary education, female employment is distributed widely across sectors and types of employment (paid and self-employment), while the vast majority of highly educated women is paid employee in the services sector. Also noticeable is a high share of self-employment within all sectors, suggesting considerable informal sector activities (including home-based work) of these urban women.

For women with less than secondary education level, the participation rate was roughly constant prior to 1999, but employment shifted from agriculture⁷ and manufacturing to the services sector. After 1999, the participation rate increased and the growing importance of services continued, but there was also an increase in the share of workers in manufacturing. The participation rate among women with secondary and higher education declined between 1987 and 1999, when especially regular employment in the services sector declined. Between 1999 and 2004, employment in services increased again and grew most in absolute terms, while the share of the female workforce in manufacturing increased.

Figure 2 – Urban female workforce by status and industry (age 20-59)



Source: NSS Employment and Unemployment Survey. Also see Appendix table A.1.

A closer look at the growth of female employment in manufacturing and services reveals some interesting patterns. First, the rising share of women in manufacturing after

⁷ In the NSS urban sample, five to ten percent of households owns more than one hectare of land, and most female agricultural employment is in crop growing. Most likely, therefore, urban agriculture is concentrated in the relatively small towns or peri-urban areas, but we do not have more detailed information on the exact nature of it.

1999 (at all educational levels) is driven by an increase in self-employment in this sector, which is very much concentrated in the wearing apparel industry. According to a study of the industry in Tiruppur, a city in South India, and in Delhi, the boom in garment exports in the 1990s attracted many women, who remain concentrated in the lowest paying activities and occupy a highly invisible part of the value chain as home-based workers. Home-based workers receive piece-rate payment and constitute an important buffer for demand fluctuations, thus facing huge income variations (Singh and Sapra, 2007). This description of workforce informalization is in line with Standing (1999), who argues it pushes rather than pulls women into the labor force.

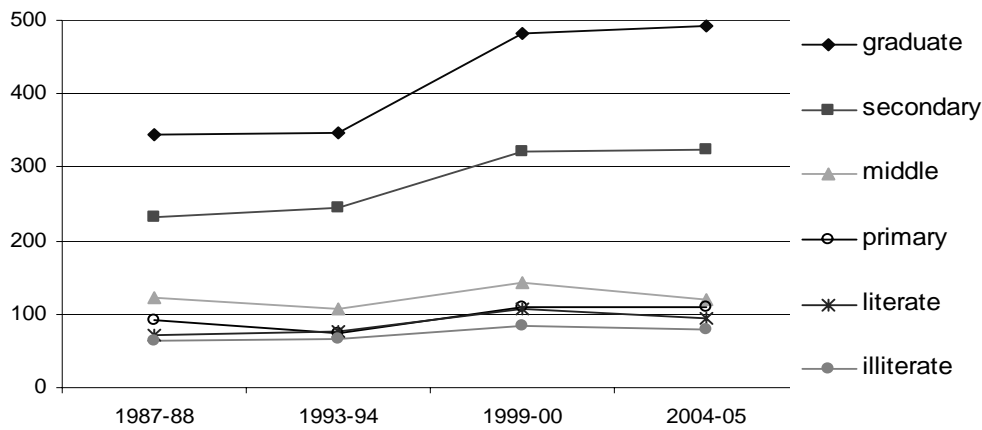
Among the poorly educated women with regular paid employment in the services sector, the share working in private households (maids, cooks, etc.) increased from 44 to 62 per cent between 1999 and 2004. That is, almost one million women joined the labor force as domestic servants, which is a group of legally and socially vulnerable workers. They are not covered by existing legislation and are easy victims of exploitation due to their invisibility, lack of education and, often, migration background (Ramirez-Machado, 2003; NCEUS, 2007).

Among the highly educated women in the services sector, the share in public administration declined from 16 to 11 per cent during 1999-2004, while the share of both domestic servants and software consultants increased from less than half percent to over two per cent each. Among the highly educated self-employed women in services, the share in retail declined from 31 to 18 per cent, while the largest increases were in 'adult and other education' (15 to 20 per cent) and 'other services' (7 to 11 per cent).

Earnings are one of the key determinants of labor force participation. Figure 3 shows women's real weekly earnings by education level for the four survey years. One shortcoming of the NSS data is the fact that it does not record earnings data for self-employed workers. The average weekly earnings reported here are therefore shown for employees only.⁸ Real weekly earnings increased in the period 1993-1999 but stagnated or even declined afterwards, except for workers with graduate or higher education. The level of earnings is substantially higher for men (not shown), but the pattern of change is similar.

⁸ Earnings are spatially deflated and in 1987-88 Rupees, based on the Labour Bureau Consumer Price Index for Industrial Workers and Deaton (2003). No adjustment is made for hours worked.

Figure 3 – Average real weekly earnings (in Rs.) for urban females age 20-59



Source: NSS Employment and Unemployment Survey

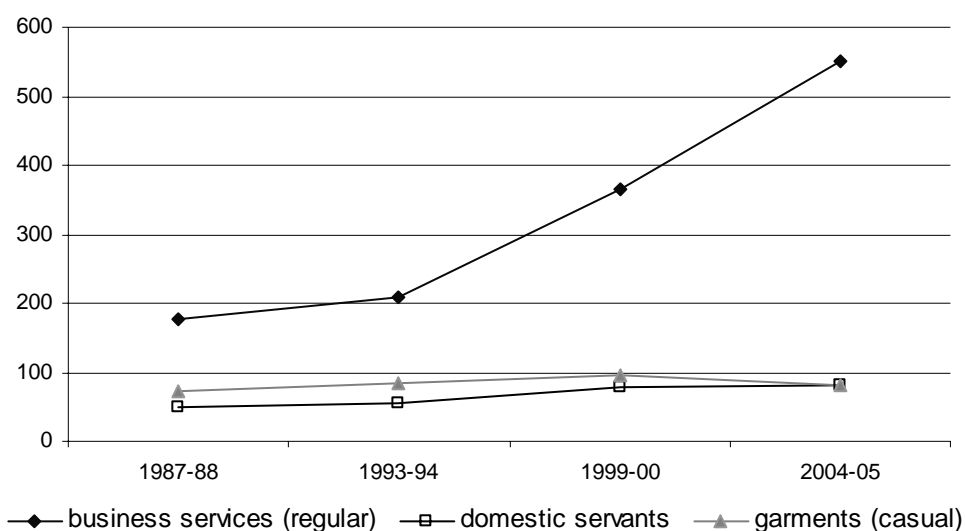
How is this picture of real wage changes reconcilable with the rosy picture of India's recent economic growth? Several studies have indicated that India's current growth pattern, dominated by skill-intensive services, does not generate employment for the large low-skilled labor force (Bosworth *et al.*, 2007; Krueger, 2007; Pieters, 2010). Informalization of the workforce may make it easier for the low-skilled population to find remunerative work, but also means that job security is extremely poor and wages are low and volatile. This is in stark contrast with the fast-rising wages for high-skilled workers in the services sector (see, e.g., Kijima, 2006). Figure 4 gives a telling illustration, showing real weekly earnings of regular employees in business services, domestic servants, and casual workers in the garments industry. Since 1993-94, the gap between the first and the two latter groups has widened enormously.

Overall, the picture emerging from the employment survey data looks different for poorly versus highly educated women. For at least a part of the latter group there seem to be attractive employment opportunities in private and public services, while the former increasingly work as domestic servants and home workers in the garments industries, and thereby constitute a very vulnerable group with low earnings and little security.

As the education level of women and their spouses are correlated, poorly educated women face a double impact of the recent decline in real wages: the decline in unearned (husband's) income works as a 'push-factor', inducing her to work, but at the same time, the decline in her own market wage would reduce her incentive to work. With the recent rise in participation rates, it seems that push-factors dominate the decision of poorly educated women to work. On the other hand, more attractive employment opportunities exist for highly educated women, who have higher earnings potential and increasing

earnings at the very top, and are less likely to face declining unearned income of partners. This will be analyzed more formally in the next section.

Figure 4 – Average real weekly earnings selected industries, urban females (20-59)



Note: real weekly earnings in 1987-88 Rupees. *Source:* NSS Employment and Unemployment Survey

4. Empirical model and estimation results

In light of the employment structure and changes in real earnings for different levels of education and in different industries, the main question is to what extent participation of women is affected by negative income effects, positive own wage effects, and some sort of insurance mechanism to cope with increasing insecurity in the labor market. We hypothesize that poorly educated women's participation is largely driven by income and insurance considerations, whereas highly educated women respond more to opportunities reflected in market wages. To test this, we use unit-level data to analyze the determinants of labor force participation separately for women with low and high education.

4.1. Probability of women's participation

We analyze women's participation decision at the individual level, based on a sample of urban women aged 20 to 59, excluding women who are enrolled in education or unable to work due to disability, and women who are head of their household.⁹ Self-employed women are dropped from the sample due to the non-availability of self-employment

⁹ About six per cent of women in the sample (roughly 2,500 observations in each survey round) is head of her household. They are excluded because we want to estimate the effect of women's own education separately from household head's education, which proxies for household wealth and status effects.

earnings data: the expected market wage can only be estimated for employees. We do check the robustness of results with respect to this restriction of the sample in Section 4.3.

The probability P_{it} of woman i in year t being employed is estimated using a binary probit model, which is estimated separately for each year, for women below secondary education and for women with secondary or higher education.

$$p_{it} = F(\alpha_{rt} + \beta_t \ln \hat{w}_{it} + \gamma_t Z_{it}), \quad (1)$$

where F is the standard normal cumulative distribution function. The model includes a region fixed effect α_{rt} , which controls for regional level participation determinants such as the region's sectoral structure.¹⁰ Other explanatory variables are the log expected market wage $\ln \hat{w}_{it}$, and a vector Z_{it} consisting of:

- Unearned income per capita (other household members' real weekly earnings, divided by household size)
- Security of unearned income (the share of unearned income earned through regular employment)
- Underemployment of male adult household members (whether male household members were without work for one or more months during the reference year)
- Marital status
- The number of children in the household by age group (0-4 and 5-14 years old)
- Social group (whether a person belongs to a scheduled caste or tribe, SCST)
- Religion
- Own education level and education level of the household head

Since wages are observed only for employed women, we need to impute wages for those not employed. To this end, we estimate a standard wage equation with Heckman selection bias correction (Heckman, 1979). Real weekly earnings are regressed on age, its square, and education level, controlling for sample selection:

$$\ln w_{it} = b_{0t} + b_{1t} Age_{it} + b_{2t} Age_{it}^2 + b_{3jt} Edu_{jit} + b_{4t} \lambda_{it} + u_{it}, \quad (2)$$

where w_{it} is real weekly earnings, Edu_{ji} is a vector of dummy variables for education level, and λ_{it} is the sample selection correction term. The latter is obtained (as the inverse Mills ratio) from a probit model for participation. This selection equation is equal to equation (1), except that the expected market wage is replaced by age and age squared:

$$p_{it} = F(a_{rt} + b_{1t} Age_{it} + b_{2t} Age_{it}^2 + c_t Z_{it}). \quad (3)$$

¹⁰ In India, the region is one administrative level below the state and is comprised of multiple districts. The sample contains 61 regions.

The wage model (equations 2 and 3) is identified on the variables in Z_{it} , except for education, which is included in both the wage equation and the selection equation. Estimation results are shown in Appendix table A.2, for the wage equation, and A.3, for the selection equation. For all women in the sample, the expected log wage $\ln \hat{w}_{it}$ used in the estimation of equation (1) is then the linear prediction based on equation (2) (without the sample selection term). The own wage effect is thus identified through age and its square, which have been used more often in female labor supply analyses. For example, Heim (2007) uses higher order terms of age and education as identifying variables, and Blau and Kahn (2007) present grouped estimations where age group (in some specifications interacted with education group) is used as identifying variable for the own wage effect. Furthermore, our results and conclusions are robust to adding regional dummies as identifying variables for the own wage effect.

Implicit in the empirical model is the assumption that women's participation decision is made conditional on men's, so we do not consider joint utility maximization or bargaining within the household. Furthermore, some of the covariates are likely to be endogenous in the sense that there might be underlying factors simultaneously affecting the covariates and the dependent variable. This might particularly be the case for marital status and number of children. We would plausibly assume that such endogeneity would bias the coefficients on marital status and children downwards (as the marriage decision and the decision to have children might be jointly determined with the decision not to work). When interpreting the coefficients, these potential biases should be kept in mind.¹¹

The explanatory variables in the participation model of equation (1) are all measured using the NSS survey data, but some of these are not directly observable. To measure unearned income ($y_{unearned}$), the earnings of self-employed household members are imputed based on the earnings of employees. It appears this imputation serves the purpose of measuring unearned income per capita well, as the results are very similar when households with at least one self-employed adult are excluded from the samples. In the final estimation, we therefore rely on the imputed earnings for households where other members are self-employed in order to retain as many observations as possible.

¹¹ Own education might also be jointly determined with the labor force participation decision. But since we control for the own wage, education is included precisely as a proxy for the labor market orientation of the woman, rather her human capital; so we are not treating the coefficient of own education as a causal mechanism of human capital, but as an indicator of work orientation.

As a proxy for income security, we include the share of unearned income that is earned through regular employment (*Regshare_y*). This is based on the notion that regular employment provides more stable and secure income than other types of work. Additionally, in the surveys for 1999-2000 and 2004-05, working persons report for how many months during the reference year they were without work. This is used to measure underemployment, as an indicator variable that is equal to one if at least one working male household member reports one or more months without work.¹²

Marital status and the number of children are included to capture family obligations which are likely to negatively affect female labor force participation (as noted above, there might be endogeneity issues here). Social group and religion are proxies for attitudes towards women's work. Members of a scheduled caste or tribe (*SCST*) are expected to be more likely to work, as these are the lowest social classes in India, in which there is no economic room to withdraw women from the labor force and to emulate higher classes (Bardhan, 1986). Religiosity in general has been related to a more traditional view of women's role (Jaeger, 2010; Seguino, 2011); previous studies have found that Muslim women in India have lower participation rates than women of other religions (Das and Desai, 2003). We therefore include dummy variables indicating whether the woman is Hindu (the reference category), Muslim, Christian, or of another or no religion.

Finally, we control for own education level and the household head's education level. Household head education captures the socio-economic status of the household, but also proxies for household wealth (in addition to unearned income, which includes only current weekly earnings of household members). If higher status leads to more restrictions on women and higher wealth reduces the need for women to work, the education level of the head should have a strong negative effect on participation, except for the very top: graduates may have a more 'modern' attitude towards women's work. Own education is included as an indicator of work orientation and to capture non-wage compensation for work (see Blau and Kahn, 2007), so one would expect a positive effect of own education on participation. However, since there is a strong (unconditional) U-shaped relationship between women's education and participation in India (see Figure 1), it might well be the case that own education has a negative effect on participation in the low-education sample (women with primary or middle school level work less than illiterates). Since the U-shape has been ascribed to changing attitudes related to household status, combined with effects

¹² Data on this subject in 1987-88 are not comparable with the more recent survey rounds.

of unearned income and women's own earnings potential, it remains an empirical question whether the effect of own education is still U-shaped after separately controlling for own wage, unearned income, household head education, and other covariates.

Table 2 – Average values, low education sample

	1987-88		1999-00		2004-05	
	mean	st.dev.	mean	st.dev.	mean	st.dev.
Employee	0.09	0.29	0.09	0.29	0.12	0.33
ln(\hat{w})	3.70	0.21	4.00	0.12	4.03	0.12
ln(y_unearned)	3.48	1.06	3.73	1.16	3.69	1.12
Regshare_y	0.41	0.47	0.36	0.45	0.33	0.44
Underemployment			0.16	0.37	0.18	0.39
Age	35.14	10.81	36.04	10.49	36.23	10.62
Illiterate	0.51	0.50	0.45	0.50	0.43	0.49
Literate below primary	0.13	0.34	0.13	0.33	0.13	0.33
Primary school	0.20	0.40	0.18	0.39	0.19	0.40
Middle school	0.16	0.36	0.24	0.43	0.25	0.43
Married	0.89	0.31	0.90	0.29	0.90	0.30
Children 0-4	0.78	0.98	0.63	0.92	0.63	0.92
Children 5-14	1.42	1.40	1.33	1.42	1.23	1.35
SCST	0.16	0.37	0.21	0.41	0.23	0.42
Hindu	0.74	0.44	0.74	0.44	0.76	0.43
Muslim	0.20	0.40	0.21	0.41	0.20	0.40
Christian	0.02	0.14	0.02	0.14	0.02	0.13
Other religion	0.04	0.19	0.04	0.19	0.03	0.17
Illiterate household head	0.26	0.44	0.26	0.44	0.26	0.44
Literate below prim h.h.	0.16	0.37	0.14	0.35	0.14	0.35
Primary h.h.	0.19	0.40	0.15	0.35	0.17	0.38
Middle h.h.	0.16	0.36	0.19	0.39	0.19	0.39
Secondary h.h.	0.18	0.38	0.21	0.41	0.19	0.39
Graduate h.h.	0.05	0.23	0.06	0.23	0.05	0.21
N	29593		26026		24015	

Source: NSS Employment and Unemployment Survey.

Tables 2 and 3 summarize the data for the final samples, which include only paid employees and women out of the labor force.¹³ In the period between 1987 and 1999, predicted real wages (that is, the fitted value based on equation 2) and unearned income increase. But in both samples, the predicted real wage stagnates or even declines between the last two rounds, and the same is observed for unearned income. Over time, especially

¹³ Unemployed women (two per cent of the combined samples) are excluded, though theoretically they should be considered part of the labor force. In India, as in other developing countries, the difference between unemployed (in the labor force) and non-workers (out of the labor force) bears little empirical relevance. Results are very similar, however, when we include the unemployed in the sample.

between 1987 and 1999 one sees a declining share of unearned income earned through regular employment, suggesting increasing income insecurity in households. The level of this insecurity is higher in the low-education sample. Underemployment is also higher among the poorly educated, and increases slightly in the last period. The number of children per household declines over time and is, in each year, lower among highly education women (though the difference is not statistically significant). Scheduled castes and tribes (SCST) and Muslims are relatively overrepresented in the low education sample, and while the SCST share rises over time, the religious composition of both samples has hardly changed.

Table 3 – Average values, high education sample

	1987-88		1999-00		2004-05	
	mean	st.dev.	mean	st.dev.	mean	st.dev.
Employee	0.19	0.39	0.15	0.36	0.16	0.37
ln(\hat{w})	5.16	0.40	5.36	0.49	5.25	0.53
ln(y_unearned)	4.22	1.21	4.38	1.36	4.39	1.34
Regshare_y	0.57	0.47	0.50	0.48	0.47	0.47
Underemployment			0.06	0.23	0.06	0.23
Age	32.01	9.07	33.68	9.50	34.04	9.81
Secondary school	0.65	0.48	0.64	0.48	0.64	0.48
Graduate or higher	0.35	0.48	0.36	0.48	0.36	0.48
Married	0.86	0.35	0.88	0.32	0.88	0.33
Children 0-4	0.59	0.85	0.49	0.77	0.51	0.77
Children 5-14	1.00	1.17	0.91	1.15	0.85	1.08
SCST	0.04	0.19	0.07	0.25	0.08	0.28
Hindu	0.82	0.38	0.81	0.39	0.81	0.39
Muslim	0.06	0.24	0.09	0.28	0.09	0.28
Christian	0.04	0.20	0.04	0.19	0.03	0.18
Other religion	0.07	0.26	0.06	0.25	0.07	0.25
Below secondary h.h.	0.23	0.42	0.22	0.41	0.25	0.43
Secondary h.h.	0.37	0.48	0.38	0.49	0.40	0.49
Graduate h.h.	0.40	0.49	0.40	0.49	0.36	0.48
N	9428		14655		12068	

Source: NSS Employment and Unemployment Survey.

4.2. Estimation results

Table 4 shows the average estimated marginal effects for the low- and high-education samples, indicating the change in the probability of being employed due to a unit change in the explanatory variable.

An important result is the marginal effect of the predicted own wage: it is almost zero and insignificant for women with low education, but significantly positive for the highly educated. The positive wage effect in the high-education sample is a clear sign that, once women have at least secondary education, higher earnings potential increases the probability of participation. One can see the effect falls over time, which Blau and Khan (2007) and Goldin (1990), for the case of US women, interpret as an increase in women's labor market attachment.

Table 4 –Probit average marginal effects

Pr(employee)	low education sample			high education sample		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
ln(\hat{w})	-0.01 [0.02]	-0.01 [0.04]	0.00 [0.04]	0.22*** [0.02]	0.11*** [0.01]	0.06*** [0.01]
ln(y_unearned)	-0.02*** [0.00]	-0.02*** [0.00]	-0.03*** [0.00]	-0.03*** [0.00]	-0.02*** [0.00]	-0.03*** [0.00]
Regshare_y	0.02** [0.01]	0.01 [0.01]	0.02* [0.01]	0.13*** [0.01]	0.09*** [0.01]	0.10*** [0.01]
Underemployed		0.02*** [0.01]	0.04*** [0.01]		0.04** [0.02]	0.00 [0.01]
Married	-0.06*** [0.01]	-0.07*** [0.01]	-0.09*** [0.01]	-0.20*** [0.01]	-0.16*** [0.01]	-0.19*** [0.01]
Children0-4	-0.02*** [0.00]	-0.02*** [0.00]	-0.03*** [0.01]	-0.02*** [0.01]	-0.02*** [0.01]	-0.04*** [0.01]
Children 5-14	0.00 [0.00]	0.00 [0.00]	0.01** [0.00]	-0.01** [0.00]	-0.01* [0.00]	0.00 [0.00]
SCST	0.07*** [0.01]	0.06*** [0.01]	0.06*** [0.01]	0.05 [0.03]	0.07*** [0.01]	0.06*** [0.02]
Muslim	-0.04*** [0.01]	-0.07*** [0.01]	-0.08*** [0.01]	-0.03 [0.02]	0 [0.02]	-0.03 [0.02]
Christian	0.05*** [0.02]	0.02 [0.02]	-0.01 [0.02]	0.14*** [0.03]	0.09** [0.03]	0.08* [0.04]
Other non-Hindu	-0.01 [0.01]	-0.05*** [0.01]	-0.02 [0.02]	-0.04 [0.03]	-0.02 [0.02]	-0.01 [0.03]
Literate below primary	-0.03*** [0.01]	-0.04*** [0.01]	-0.03*** [0.01]			
Primary	-0.05*** [0.01]	-0.05*** [0.01]	-0.05*** [0.01]			
Middle	-0.05*** [0.01]	-0.06*** [0.01]	-0.07*** [0.01]			
Graduate				0.06** [0.02]	0.11*** [0.01]	0.12*** [0.02]
Illiterate h.h.	0.11*** [0.01]	0.11*** [0.01]	0.11*** [0.01]			

Table continues on next page

Table 4, continued

Pr(employee)	low education sample			high education sample		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
Literate below primary h.h.	0.06*** [0.01]	0.06*** [0.01]	0.06*** [0.01]			
Primary h.h.	0.04*** [0.01]	0.05*** [0.01]	0.06*** [0.01]			
Middle h.h.	0.03*** [0.01]	0.03*** [0.00]	0.04*** [0.01]	-0.01 [0.01]	0.01 [0.01]	0.02* [0.01]
Graduate h.h.	0.04*** [0.01]	0.02* [0.01]	0.02 [0.01]	-0.02* [0.01]	-0.01 [0.01]	0.01 [0.01]
N	29593	26026	24015	9428	14655	12068
Pseudo R-sq	0.22	0.21	0.21	0.18	0.17	0.20

Note: Reference category for religion is Hindu; for own education is Illiterate (low education sample) or Secondary (high-education sample); and for household head education is Secondary. In the high education sample, the category *Middle* for household head education includes all levels below secondary. Region dummies are included in the estimation. Robust standard errors between brackets, note that standard errors do not account for the estimation of the own wage. Significance levels: *p<.10; **p<.05; ***p<.01. Marginal effects are calculated using Stata's `-margins-` command.

As expected, unearned income reduces women's participation. Its effect is the same in both samples, though one might expect it to be stronger in the low-education sample, where the average level of income is lower. A plausible explanation for these results is that unearned income measures only weekly earnings, and the more permanent component of household income (including wealth) is captured by the household head's education level. Head's education has a negative effect on participation in the low-education sample, up to secondary education. That is, the lower the head's education, the higher the participation probability of the index woman. Graduate level education of the household head has a positive effect in the first two years analyzed, which is a sign that social status effects also play a role. Higher status appears to reduce women's labor force participation in line with the Sanskritization process, but at the highest education levels the attitudes towards women's employment are more modern (Chen and Drèze, 1992; Kingdon and Unni, 2001). Importantly, the effect of own education is also strongly negative in the low-education sample: the downward sloping part of the U-shaped relationship between education and participation remains after controlling for own wages, unearned income, and household head education. Note that if one presumed endogeneity issues here, one would expect that the coefficients on own education are biased upwards; thus this central finding is unlikely to be affected by endogeneity. One explanation for this persistent negative effect of own education is suggested by Das and Desai (2003), who argue that women

have a stronger preference for white collar jobs as their education increases, and participation declines because these types of jobs are very scarce. But it may also be a status effect of the Sanskritization process that is captured by own education and not only the household head's.

In the high-education sample there is no clear effect of household head education, while the own education level has a positive effect on participation. Together with the own-wage effects, these results point out that highly educated women, in contrast to the poorly educated, are pulled into the workforce by greater earnings opportunities and their education increases work orientation or aspirations. This is in line with the more standard models of labor supply and just like the decline of the own wage effect over time, the rising effect of own education corresponds to rising labor force attachment of women with graduate level education. Moreover, with India' booming high-skilled services (like software consultancy), graduate level education is likely to open up rather attractive, non-manual, employment opportunities for women.

Turning to employment and income insecurity, we find that participation increases with the share of unearned income from regular employment, especially among highly educated women. This contrasts with the idea that women are less likely to work if their unearned income is more secure. A possible explanation is that having household members with regular employment provides the necessary network or information for women to find paid employment themselves. It could also reduce entry barriers to paid employment through familiarity with employers, reducing families' safety concerns (Sudarshan and Bhattacharya, 2009).

Underemployment of male household members, an alternative measure of insecurity facing the household, does increase the probability of women's participation: for a given level of unearned income, if a male household member is without work for at least one month of the year, a woman is two to four percentage points more likely to work. The effect is strongest, and slightly increasing over time, in the low-education sample. This is some evidence in favor of the insurance hypothesis, whereby women's labor supply is used to cope with income insecurity of the household.

The household composition effects show that married women are less likely to work, especially among highly educated women. Having young children reduces participation in both samples, while older children have only a very small negative effect in the high-education sample: possibly, only highly educated women can afford to stay at home with older children, but the effect of older children disappears in 2004-05. As endogeneity is

likely to be an issue, the effects of marriage and children may be biased downwards and one should be careful to interpret these effects as causal.

Women belonging to a Scheduled Caste or Tribe are more likely to work for pay, and religion matters in both samples, but to different degrees. Muslim women are less likely to work, which is in line with previous studies (e.g., Das and Desai, 2003) but we clearly see that education mitigates the difference between Muslim and non-Muslim women. Christian women are more likely to work especially among the highly educated women.

All in all, both groups of women respond to unearned income and especially the poorly educated are pushed to work by underemployment of household members. The marginal effect of own wage and own education are clear signals that highly educated women are drawn into the labor force by higher earnings potential and are able to materialize greater work orientation and aspirations, whereas poorly educated women are not. Education of the household head remains an important participation determinant for the women with less than secondary education, whose labor force participation therefore appears to be mainly driven by economic push factors and social status effects.

4.3. Self-employment

As explained above, self-employed women have been excluded from the unit level analysis because their earnings are not available and one cannot reliably estimate expected market earnings for this group.¹⁴ In order to check whether this has a big impact on the probit results, the participation model is re-estimated without the predicted wage (instead, age and age squared are included directly in the participation model). This model is then estimated separately for each year and education group, both with and without the self-employed in the sample. While we cannot conclude anything regarding the own wage effect on participation in self-employment, the other results do not appear to depend on the exclusion of self-employed women.

The results excluding the own wage effect, but still restricting the sample to exclude self-employed women (not shown), indicate that own education picks up the own wage effect for the highly educated: it has a higher marginal effect, slightly declining over time.

¹⁴ In the preceding estimations, self-employed earnings are imputed for *other* household members in order to calculate unearned income. As mentioned in Section 4.1, the resulting measure of unearned income gives the same results compared to excluding any households with self-employed members from the sample. However, this is not deemed sufficient indication that one can use the same imputation for women's own wage: self-employment earnings are only a part of unearned income while they would constitute the entire own wage of self-employed women, which is thus much more sensitive to the imputation method.

Age has a positive effect, somewhat higher for the highly educated, and age squared has a negative effect. Estimates of the other marginal effects hardly differ.

Adding the self-employed to the sample, most of the results are similar to before, including the strong negative income effect of other household members' earnings, and the negative (positive) effect of own education in the low (high) education sample (see Appendix Table A.4 for the estimates). But there are also some interesting changes in some of the marginal effects. First, the negative effect of marriage is stronger in each year and in both educational groups. Second, the negative effect of household head's education becomes stronger in the low-education sample. If household head's education is taken as a proxy for status, this result is a bit surprising. Since self-employed women most often work within the own dwelling, it should be less subject to social stigma. One would thus expect that including self-employment reduces the negative effect of head's education. With the effect increasing, it might be more related to household wealth and the necessity of women's work in the poorest households.

Finally, the marginal effect of the regular-earnings share of unearned income declines and even becomes negative in the low-education sample: the probability of paid employment increases with the regular employment of household members, but the probability of self-employment apparently does not. This is in line with our interpretation that regular employees in the household have a network effect or familiarity effect enhancing opportunities for paid employment, but not self-employment, of women.

An important note here is that the determinants of self-employment may be different from those of paid employment, because self-employed women typically contribute to a family business and thus often carry out their 'market work' inside the household. As noted above, social stigmas are likely to be weaker for self-employment. Furthermore, restrictions related to the double burden of household work and market work are also rather different between paid employment and self-employment. Besides our inability to estimate an own-wage effect on participation in self-employment, therefore, a more general caveat of the present paper is the fact that the basic labor supply model may not give us much insight into women's participation in self-employment. In urban India, however, the majority of working women has paid employment, so our main analysis should present a good picture of the drivers of female labor force participation in urban India.

5. Summary and conclusions

While India's economy has grown at increasingly high rates over the past decades, the female labor force participation rate has increased only since the start of the 21st century. This paper examines trends and drivers of female labor force participation in urban India between 1987 and 2004, paying special attention to differences between lowly and highly educated women, based on the National Sample Survey of Employment and Unemployment.

Changes in the structure of employment and real earnings in urban India suggest that increased participation of women with less than secondary schooling was driven more by necessity than improved opportunities. After 1999, the share of women with low education working as domestic servant and in agriculture and manufacturing self-employment increased, the latter concentrated in the garments industry. Domestic servants and homeworkers in the garments industry have been characterized by their invisibility, vulnerability, and meager and highly volatile earnings (NCEUS, 2007; Singh and Sapra, 2007). Coinciding with substantial growth in these types of employment, real earnings declined for workers with less than secondary education.

For the urban population with low education, therefore, the labor market trends are in line with the view of Standing (1999). He argues that female labor force participation is driven by the erosion of men's position in the labor market, rather than improvements in women's opportunities: as economies liberalize and become more globally integrated, workers face more insecurity. Our unit level analysis in section 4 shows that participation of women with less than secondary education is indeed not affected by their own earnings potential, but predominantly driven by economic push factors including underemployment of men in the household, and income and social status of the household (in line with Kingdon and Unni, 2001; Sudarshan and Bhattacharya, 2009).

The picture for highly educated women looks different. Real earnings of men and women with graduate level education did still rise after 1999, though at a slower rate than before. Among highly educated women, self-employment in manufacturing and services became more important, but regular employment in services increased as well. These women, or at least a part of them, have access to more attractive jobs in terms of visibility, security, and earnings. Given India's structure of growth, which is in large part driven by skill-intensive services, this should hardly be surprising. The unit level estimation results indeed show that highly educated women, as opposed to the poorly educated, are drawn into the labor force by higher expected wages. Their own education, moreover, has a

positive effect on participation, while household head's education has no effect. Overall, the highly educated women behave more in line with the standard models of labor supply.

To conclude, our analysis indicates that the impressive economic performance of the Indian economy is, if anything, only creating attractive labor market opportunities for highly educated women. The urban labor market for women (and men) with low education does not seem to be improving at all, and there is no evidence that their labor force participation in recent times is a positive reflection of India's fast economic growth. It always remains debatable whether increased participation in low-paying and informal jobs should be seen as improvements compared to non-participation. For whatever reason women decide to work, it does allow them to contribute to household income. One could surely also argue that home workers in the garments industry, for example, contribute to India's economic success. As Bhalotra and Umaña-Aponte (2010) argue, however, distress-driven participation in a highly flexible labor market is unlikely to contribute to women's empowerment. Since for Indian women with little education, push factors and household social status are major determinants of participation, while own earnings potential plays no role, their participation can hardly be considered a sign of emancipation. Furthermore, our results indicate that the benefits of India's demographic dividend may be limited, as high economic growth apparently does not translate into higher participation for most of the urban female population.

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Appendix

Table A.1 - Urban females (age 20-59) by employment status and industry

Below secondary education		1987-88	1993-94	1999-00	2004-05
Agriculture	Self-employed	870 (2.5)	876 (2.2)	744 (1.7)	1,265 (2.5)
	Regular	35 (0.1)	37 (0.1)	56 (0.1)	73 (0.1)
	Casual	861 (2.5)	1,173 (2.9)	1,124 (2.6)	1,080 (2.1)
Manufacturing	Self-employed	1,024 (3.0)	1,137 (2.9)	1,383 (3.1)	2,004 (4.0)
	Regular	362 (1.1)	312 (0.8)	517 (1.2)	641 (1.3)
	Casual	508 (1.5)	570 (1.4)	316 (0.7)	430 (0.9)
Other industry	Self-employed	12 (0.0)	16 (0.0)	11 (0.0)	11 (0.0)
	Regular	58 (0.2)	58 (0.1)	51 (0.1)	48 (0.1)
	Casual	393 (1.2)	567 (1.4)	683 (1.6)	757 (1.5)
Services	Self-employed	1,046 (3.1)	1,388 (3.5)	1,802 (4.1)	1,896 (3.8)
	Regular	1,054 (3.1)	1,274 (3.2)	1,432 (3.3)	2,450 (4.9)
	Casual	431 (1.3)	617 (1.5)	760 (1.7)	620 (1.2)
Workforce		6,654(19.4)	8,023(20.1)	8,879(20.2)	11,273(22.4)
Unemployed		285 (0.8)	207 (0.5)	158 (0.4)	362 (0.7)
Other		27,364(79.8)	31,612(79.4)	34,926(79.4)	38,672(76.9)
Total		34,304(100)	39,838(100)	43,965(100)	50,308(100)

Secondary education or higher		1987-88	1993-94	1999-00	2004-05
Agriculture	Self-employed	25 (0.3)	32 (0.2)	21 (0.1)	78 (0.3)
	Regular	2 (0.0)	1 (0.0)	3 (0.0)	5 (0.0)
	Casual	5 (0.0)	14 (0.1)	12 (0.1)	12 (0.0)
Manufacturing	Self-employed	98 (1.0)	111 (0.7)	168 (0.7)	437 (1.5)
	Regular	138 (1.4)	203 (1.3)	263 (1.1)	410 (1.4)
	Casual	4 (0.0)	22 (0.1)	27 (0.1)	29 (0.1)
Other industry	Self-employed	5 (0.1)	6 (0.0)	9 (0.0)	14 (0.0)
	Regular	29 (0.3)	41 (0.3)	35 (0.1)	74 (0.2)
	Casual	6 (0.1)	5 (0.0)	12 (0.1)	3 (0.0)
Services	Self-employed	154 (1.5)	363 (2.3)	609 (2.6)	971 (3.3)
	Regular	1,654(16.5)	2,361(14.8)	3,008(12.9)	3,952(13.3)
	Casual	9 (0.1)	13 (0.1)	36 (0.2)	24 (0.1)
Workforce		2,130(21.3)	3,173(19.9)	4,201(18.0)	6,009(20.2)
Unemployed		498 (5.0)	769 (4.8)	754 (3.2)	1,364 (4.6)
Other		7,392(73.8)	11,984(75.2)	18,381(78.8)	22,349(75.2)
Total		10,020 (100)	15,928 (100)	23,335 (100)	29,724 (100)

Note: Numbers are in thousands, the percentage of total is given in parentheses. Agriculture includes forestry and fishing. Other industry includes mining, construction, and utilities. Self-employment includes own account workers, home workers, employers, and unpaid family workers. Regular employees receive salary or wages on a regular basis. Casual workers receive a wage according to the terms of the daily or periodic work contract. "Other" includes all non-labor force and a small number of women who work but do not report their industry.

Source: NSS Employment and Unemployment Survey, population totals from Sundaram (2007).

Table A.2 – Wage equation, estimation results

ln w	Below secondary education			Secondary or higher education		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
Age	0.03** [0.01]	0.03* [0.01]	0.03** [0.01]	0.12*** [0.01]	0.11*** [0.01]	0.09*** [0.02]
Age sq.	0.00 [0.00]	0.00 [0.00]	-0.00* [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00** [0.00]
Illiterate	Ref.	Ref.	Ref.			
Literate	0.12* [0.05]	0.17*** [0.05]	0.15*** [0.04]			
Primary	0.15** [0.05]	0.13** [0.05]	0.13*** [0.04]			
Middle	0.53*** [0.06]	0.26*** [0.05]	0.25*** [0.04]			
Secondary				Ref.	Ref.	Ref.
Graduate				0.52*** [0.04]	0.50*** [0.04]	0.60*** [0.05]
Constant	2.81*** [0.21]	3.34*** [0.22]	3.28*** [0.18]	2.50*** [0.24]	2.60*** [0.27]	2.66*** [0.27]
Lambda	0.22*** [0.04]	0.21*** [0.04]	0.14*** [0.03]	0.16*** [0.04]	0.16*** [0.05]	0.21*** [0.05]
N	2264	2182	2623	1755	2125	1891

Note: Dependent variable is log real weekly earnings. Lambda is the sample selection bias correction term (see Heckman, 1979). Standard errors are in brackets, significance levels: *p<.10; **p<.05; ***p<.01

Table A.3 – Wage model selection equation, estimation results

Pr(employee)	Below secondary education			Secondary or higher education		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
Age	0.09*** [0.01]	0.11*** [0.01]	0.10*** [0.01]	0.20*** [0.02]	0.14*** [0.01]	0.13*** [0.01]
Age sq.	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]
Illiterate						
Literate	-0.20*** [0.04]	-0.24*** [0.04]	-0.20*** [0.04]			
Primary	-0.39*** [0.04]	-0.40*** [0.04]	-0.36*** [0.04]			
Middle	-0.41*** [0.05]	-0.48*** [0.04]	-0.48*** [0.04]			
Secondary				Ref.	Ref.	Ref.
Graduate				0.72*** [0.04]	0.78*** [0.03]	0.74*** [0.03]

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Table A.3, continued

Pr(employee)	Below secondary education			Secondary or higher education		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
ln(y_uneared)	-0.17*** [0.01]	-0.12*** [0.01]	-0.16*** [0.01]	-0.13*** [0.02]	-0.08*** [0.01]	-0.13*** [0.01]
Regshare_y	0.16*** [0.03]	0.05 [0.03]	0.10*** [0.03]	0.55*** [0.04]	0.50*** [0.03]	0.51*** [0.04]
Illiterate h.h.	0.80*** [0.05]	0.82*** [0.05]	0.70*** [0.05]			
Literate h.h.	0.53*** [0.05]	0.55*** [0.05]	0.45*** [0.05]			
Primary h.h.	0.42*** [0.05]	0.49*** [0.05]	0.45*** [0.05]			
Middle h.h.	0.30*** [0.06]	0.28*** [0.05]	0.35*** [0.05]	-0.03 [0.05]	0.09* [0.04]	0.09* [0.04]
Secondary h.h.						
Graduate h.h.	0.45*** [0.07]	0.28*** [0.08]	0.14 [0.08]	-0.08 [0.04]	-0.04 [0.03]	0.06 [0.04]
Married	-0.53*** [0.04]	-0.59*** [0.04]	-0.66*** [0.04]	-0.98*** [0.05]	-0.92*** [0.05]	-1.04*** [0.05]
Children0-4	-0.11*** [0.02]	-0.18*** [0.02]	-0.17*** [0.02]	-0.09*** [0.03]	-0.10*** [0.02]	-0.20*** [0.03]
Children 5-14	-0.04*** [0.01]	-0.04*** [0.01]	0.00 [0.01]	-0.09*** [0.02]	-0.07*** [0.02]	-0.03 [0.02]
SCST	0.44*** [0.03]	0.39*** [0.03]	0.31*** [0.03]	0.24** [0.08]	0.32*** [0.05]	0.25*** [0.05]
Muslim	-0.36*** [0.04]	-0.62*** [0.04]	-0.60*** [0.04]	-0.14 [0.08]	0.05 [0.06]	-0.15* [0.06]
Christian	0.34*** [0.07]	0.17* [0.08]	-0.04 [0.08]	0.54*** [0.08]	0.39*** [0.06]	0.35*** [0.07]
Other non-Hindu	-0.05 [0.08]	-0.40*** [0.09]	-0.13 [0.08]	-0.18* [0.07]	-0.08 [0.06]	-0.06 [0.07]
constant	-2.49*** [0.19]	-2.53*** [0.20]	-1.91*** [0.19]	-3.66*** [0.27]	-3.33*** [0.24]	-2.44*** [0.25]
N	29618	26429	24067	9515	14695	12119

Note: Table shows estimated probit coefficients, with robust standard errors in brackets. Region dummies are included in the estimation, but not reported. Significance levels: *p<.10; **p<.05; ***p<.01

Table A.4 – Probit average marginal effects, sample including self-employed

Pr(work)	low education sample			high education sample		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
ln(y_unearned)	-0.02*** [0.00]	-0.02*** [0.00]	-0.02*** [0.00]	-0.03*** [0.00]	-0.01*** [0.00]	-0.02*** [0.00]
Regshare_y	-0.04*** [0.01]	-0.07*** [0.01]	-0.06*** [0.01]	0.09*** [0.01]	0.06*** [0.01]	0.04*** [0.01]
Underemployed		0.01 [0.01]	0.02*** [0.01]		0.04** [0.02]	0.02 [0.02]
Age	0.02*** [0.00]	0.02*** [0.00]	0.02*** [0.00]	0.04*** [0.00]	0.03*** [0.00]	0.03*** [0.00]
Age ²	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]
Married	-0.10*** [0.01]	-0.11*** [0.01]	-0.15*** [0.01]	-0.22*** [0.01]	-0.21*** [0.01]	-0.24*** [0.02]
Children0-4	-0.02*** [0.00]	-0.02*** [0.00]	-0.02*** [0.00]	-0.03*** [0.01]	-0.02*** [0.01]	-0.05*** [0.01]
Children 5-14	0.00 [0.00]	0.00 [0.00]	0.01* [0.00]	-0.02*** [0.00]	-0.01** [0.00]	0.00 [0.00]
SCST	0.07*** [0.01]	0.05*** [0.01]	0.04*** [0.01]	0.05 [0.03]	0.06*** [0.01]	0.06*** [0.02]
Muslim	-0.07*** [0.01]	-0.09*** [0.01]	-0.09*** [0.02]	-0.01 [0.02]	0 [0.02]	-0.05** [0.02]
Christian	0.03* [0.01]	-0.01 [0.02]	-0.02 [0.02]	0.14*** [0.04]	0.08* [0.04]	0.08* [0.04]
Other non-Hindu	-0.02 [0.01]	-0.07*** [0.02]	-0.03 [0.02]	-0.04 [0.03]	-0.02 [0.02]	-0.01 [0.03]
Literate	-0.04*** [0.01]	-0.04*** [0.01]	-0.05*** [0.01]			
Primary	-0.06*** [0.01]	-0.07*** [0.01]	-0.06*** [0.01]			
Middle	-0.07*** [0.01]	-0.08*** [0.01]	-0.08*** [0.01]			
Graduate				0.18*** [0.01]	0.17*** [0.01]	0.15*** [0.01]
Illiterate h.h.	0.16*** [0.02]	0.14*** [0.01]	0.13*** [0.01]			
Literate h.h.	0.09*** [0.01]	0.09*** [0.01]	0.09*** [0.01]			
Primary h.h.	0.07*** [0.01]	0.08*** [0.01]	0.08*** [0.01]			

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Table A.4, continued

Pr(work)	low education sample			high education sample		
	1987-88	1999-00	2004-05	1987-88	1999-00	2004-05
Middle h.h.	0.04*** [0.01]	0.04*** [0.01]	0.06*** [0.01]	0.02 [0.01]	0.02 [0.01]	0.04*** [0.01]
Graduate h.h.	0.03 [0.02]	0 [0.01]	-0.01 [0.02]	-0.01 [0.01]	-0.01 [0.01]	0.01 [0.01]
N	32104	28889	26722	9759	15229	12882
Pseudo R-sq	0.18	0.16	0.16	0.16	0.15	0.16

Note: Reference category for religion is Hindu; for own education is Illiterate (low education sample) or Secondary (high-education sample); and for household head education is Secondary. In the high education sample, the category *Middle* for household head education includes all levels below secondary. Region dummies are included in the estimation. Robust standard errors between brackets, note that standard errors do not account for the estimation of the own wage. Significance levels: *p<.10; **p<.05; ***p<.01.