

Female Labour Supply in India 1983-2011

Labour Force and Education in India 1983-2011: Why are Women Less Likely to Participate? A Long-Term View

By Amaresh Dubey, Wendy Olsen, Kunal Sen

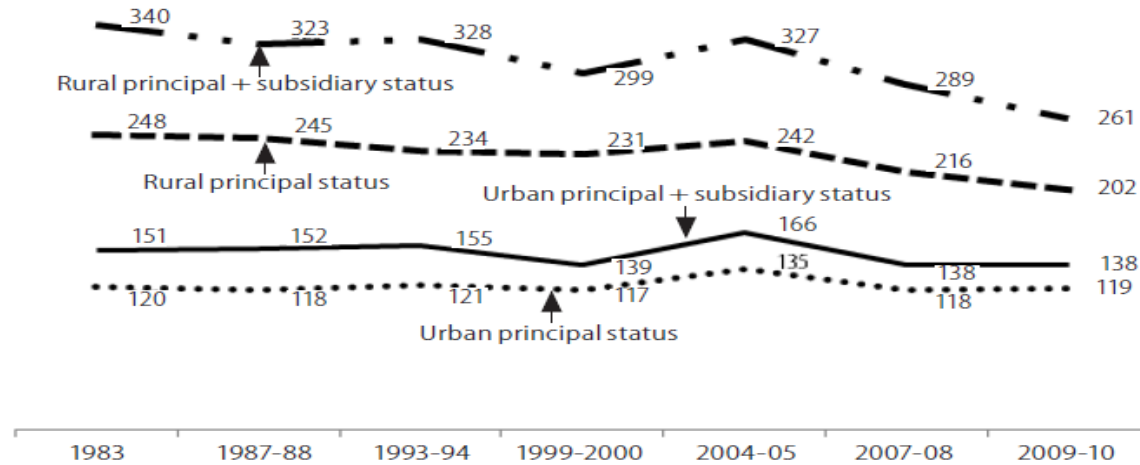
Outline

- The Puzzle: Missing Women
- Possible Models to Aim Toward a Solution
- Tables Showing Drivers of Decline in FLFP
- Regression Results
- Conclusions

A stylized fact about India not Bangladesh:

INDIA EPW 2012

Figure 1: Trends in Female Work Participation Rates (UPS and UPSS)

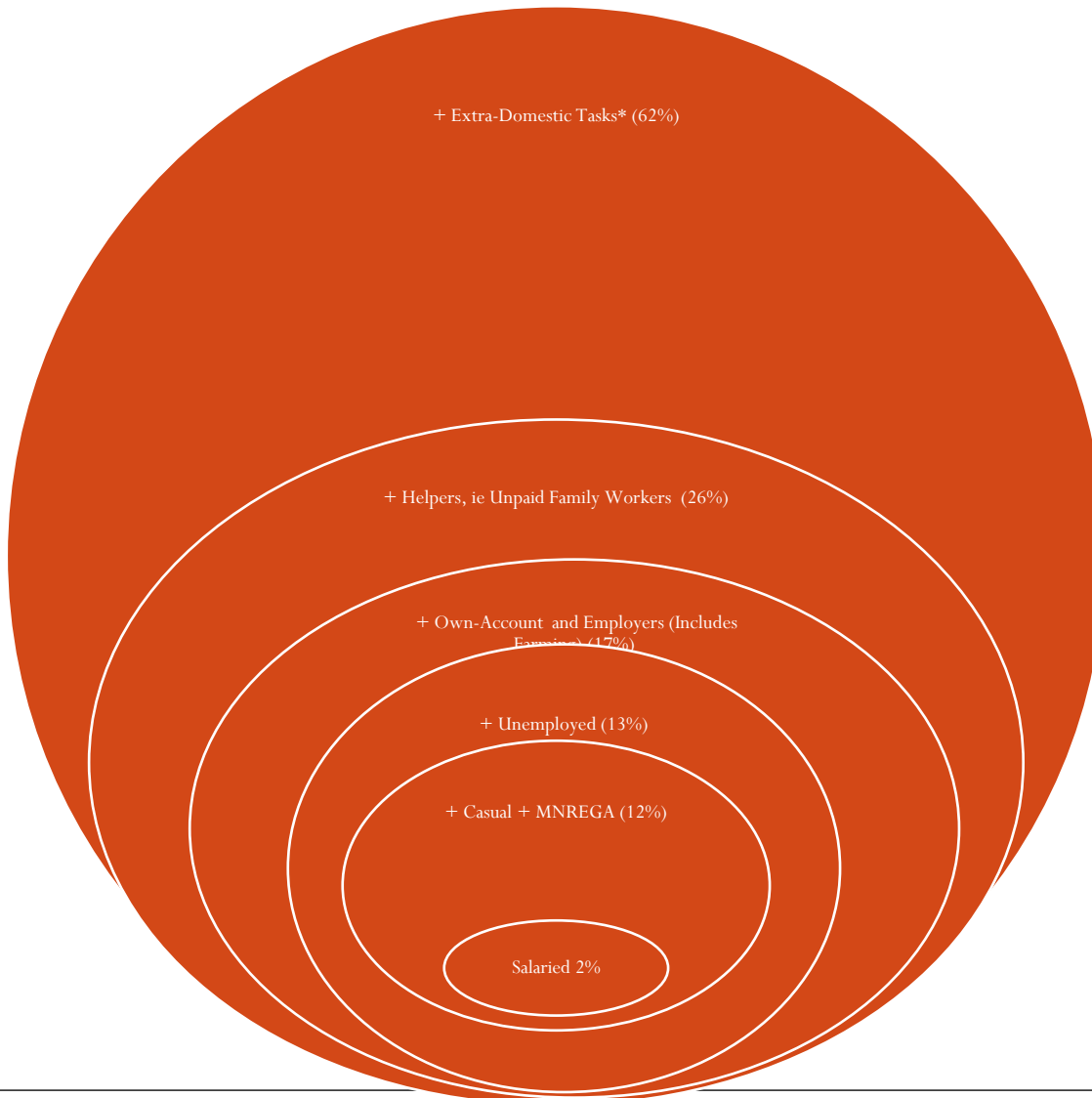


Source: *Employment and Unemployment Reports*, various rounds, NSSO.

WOMEN AT THE LEAD FOR A FUTURE WITH A BETTER QUALITY OF LIFE
FOR ALL PEOPLE BY AN EQUAL OPPORTUNITY SOCIETY

Keywords: Employment, India, human capital, missing women

Traditional and Wider Concepts of Labour Force Participation

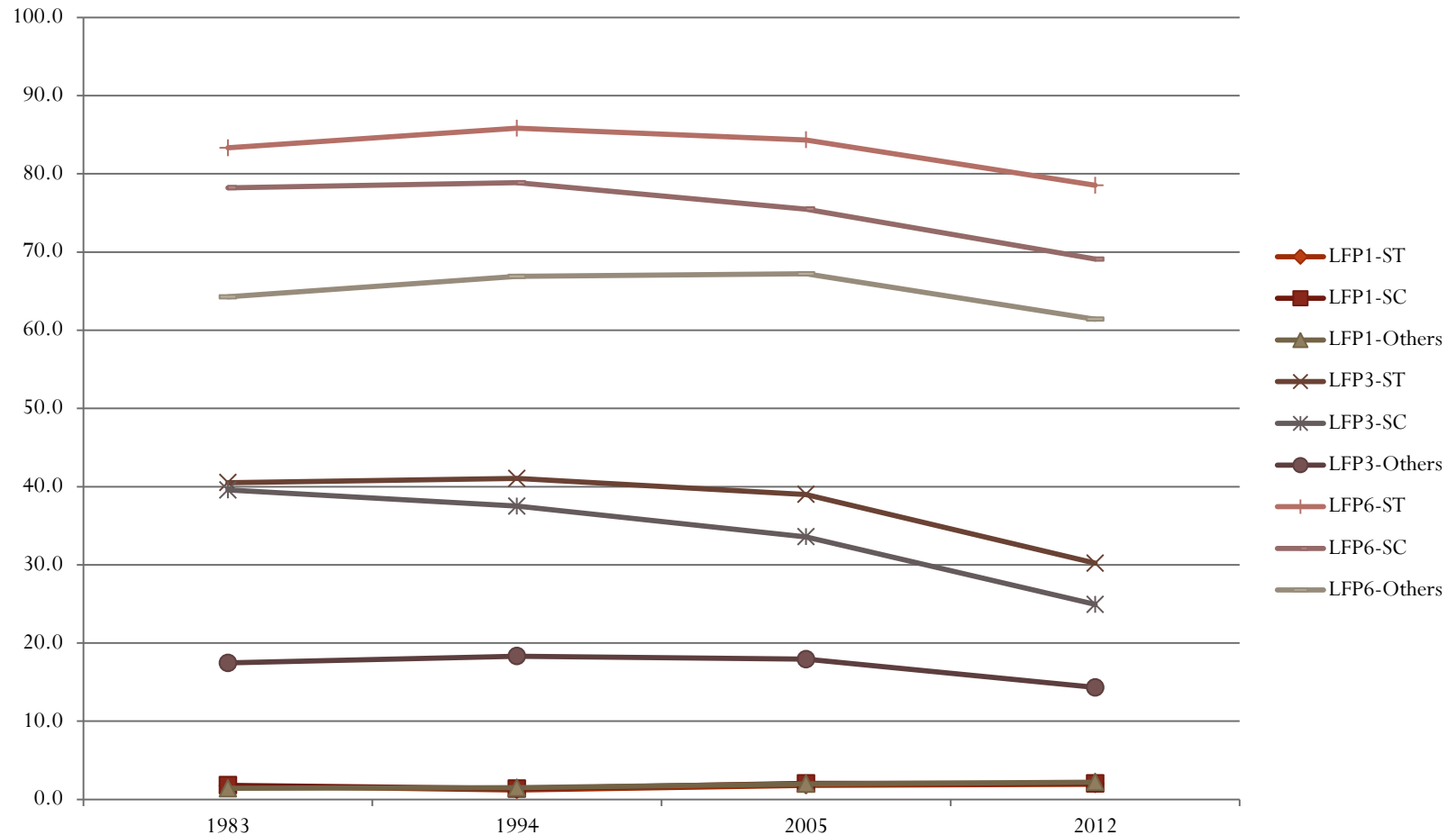


- Source: NSS EUS 2011. Figures shown are for Principal Occupation but the results shown in the tables here include Subsidiary as well. The definition for extra-domestic tasks is “attended domestic duties and was also engaged in free collection of goods (vegetables, roots, firewood, cattle- feed, etc.) sewing, tailoring, weaving, etc. for household use (93);”, NSSO, 2001: page 6.

Work vs extra-domestic work?

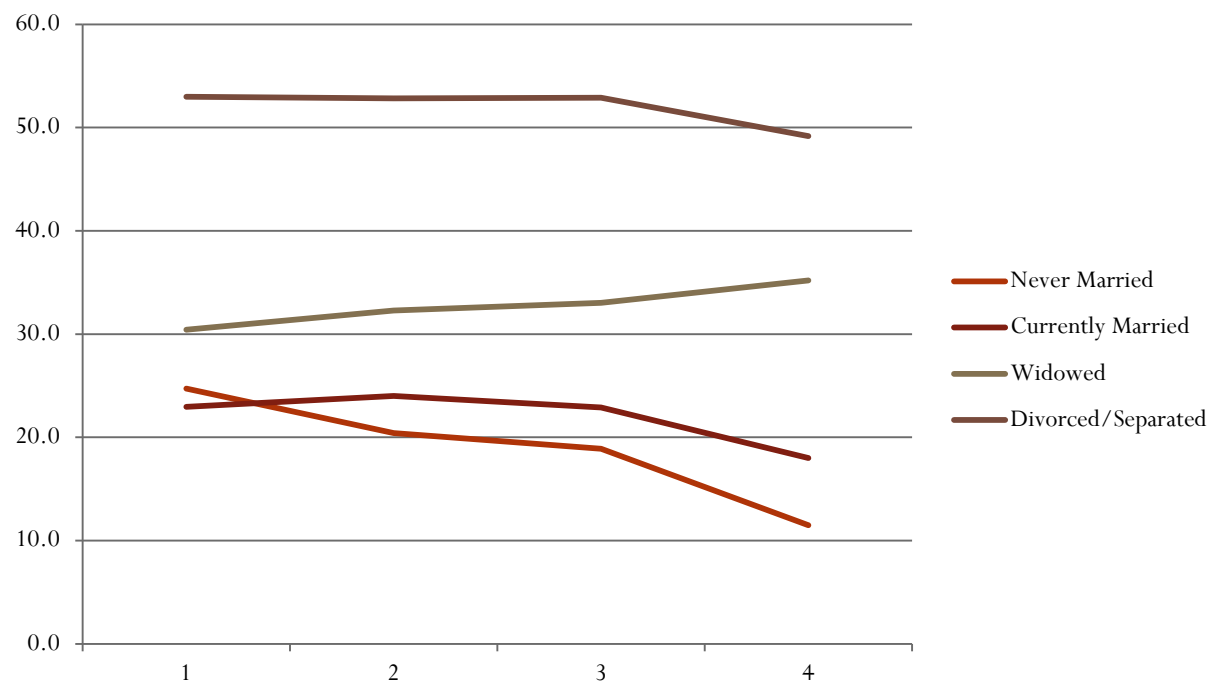
- Mukhopadyay and Tendulkar (2006) refer to “extended work participation” (EWP) (2006: 4).
- This is definition 6 in our schema – WIDE work.
- The standard definition is number 4 in our scheme – MEDIUM work.
- The narrowest definition is too tight for the rural economy.

Decline in Labour Supply in 2011/12



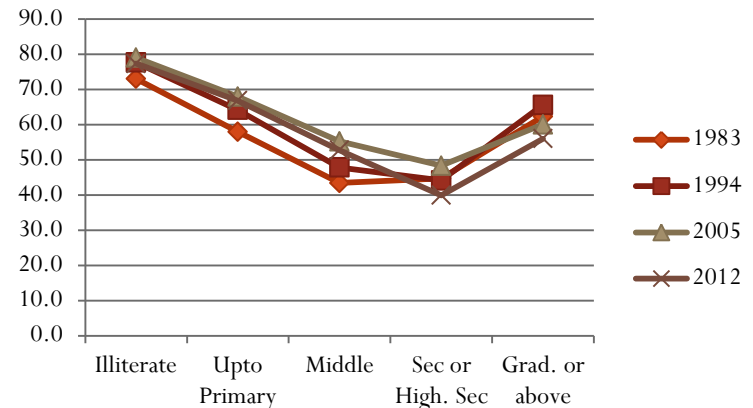
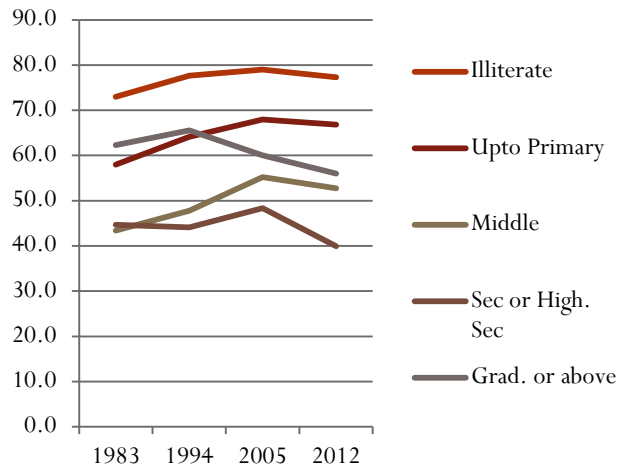
Definitions used are LFP1 (narrow, casual and salaried employment), LFP3 (includes self-employing proprietors), and LFP6 at top (includes all remunerated work)

Pre-Marriage Dropoff is Noticeable

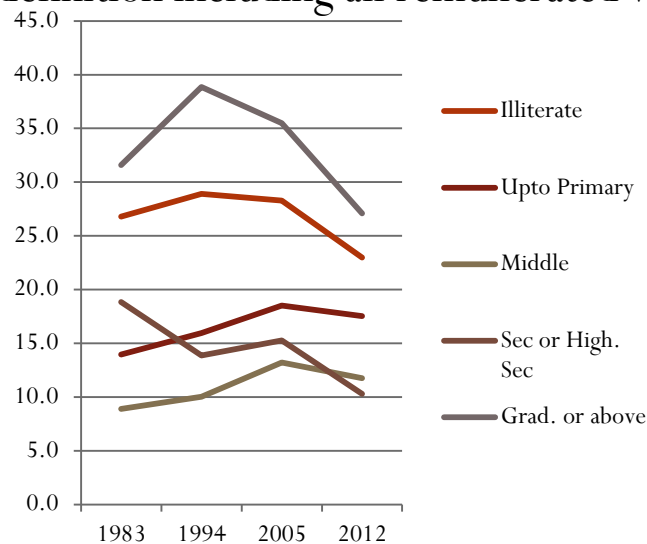


Definition of LFP 3: All women working as employees (LFP1), casual labour or MNREGA (LFP2), or unemployed as their principle or subsidiary occupation (LFP3) – inclusively.

More Dropoff if More Education



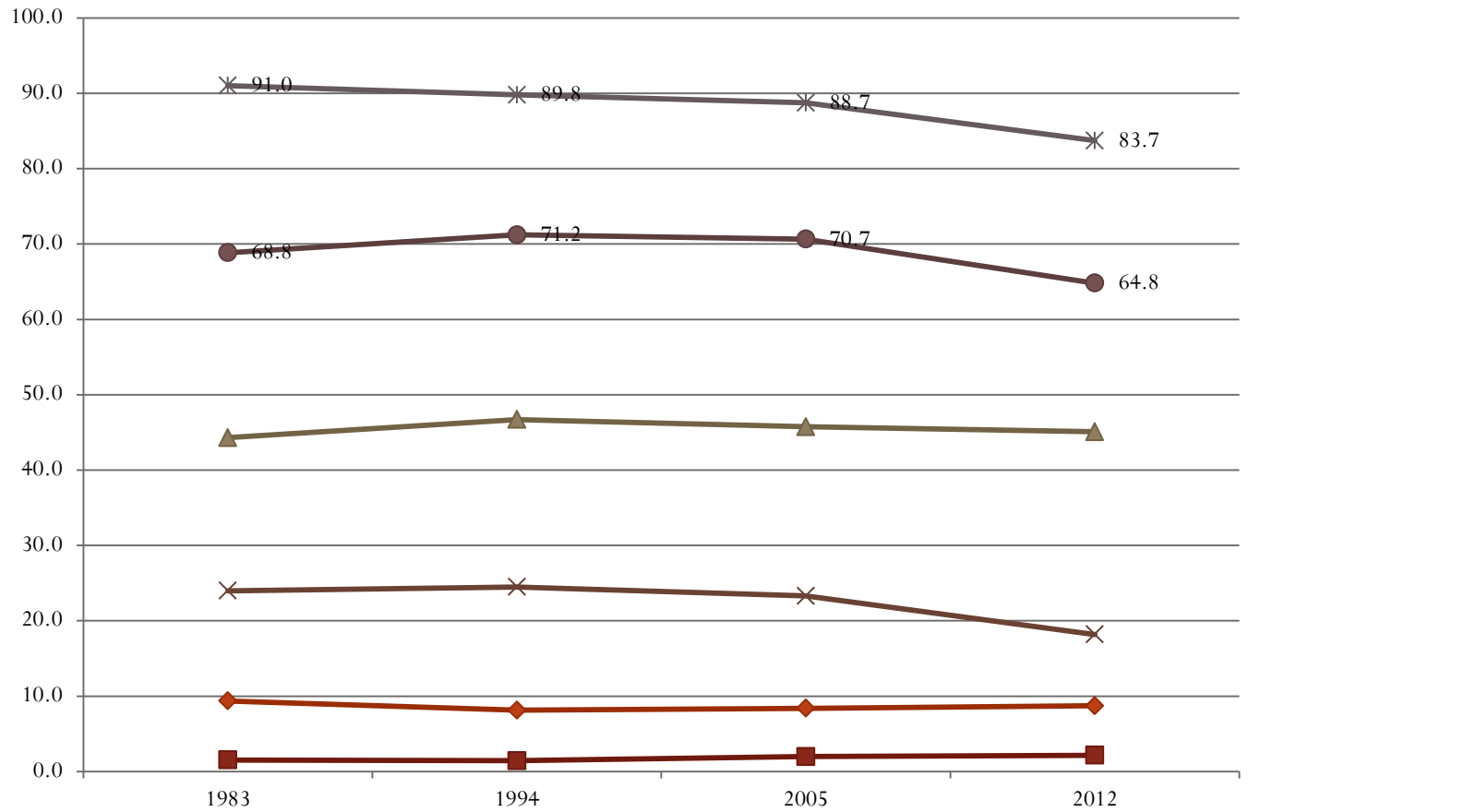
An unchanged U-curve by education, but strong dropoff for secondary and degree holders, using LFP6 (wide definition including all remunerated work)



For LFP3, the dropoff for degree holders is large.

Illiterate women of high age also withdrew.

The male trend is mixed.



2. Plan – Modelling to Solve Problem

- **Regression results Using B'Desh DHS 2007** and for India using NSS 2005, 2011
- Model 1:
 - Dep var = Logit of work status.
 - Indep vars = age, age2, educ, rural/urban
- Model 2: Decomposition Over Time
- Two years, 0 and 1.
- Labour supply probit in each year.
- Oaxaca decomposition finds drivers.
- Relative contribution of each factor

Table 2

Key: egalatt = egalitarian attitude to decision making about spending in the household

And the interaction effect inter1 represents `egalatt*edyears`

`. logistic workerhigh egalatt inter1 age age2 wi hindu rural widow edyears`

```

Logistic regression                Number of obs   =      30527
                                   LR chi2(9)        =      1206.18
                                   Prob > chi2        =      0.0000
Log likelihood = -6037.2591        Pseudo R2       =      0.0908
    
```

workerhigh	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
egalatt	1.401404	.0851929	5.55	0.000	1.243993 1.578734
inter1	1.034331	.0094293	3.70	0.000	1.016014 1.052978
age	1.068418	.0267958	2.64	0.008	1.017169 1.122249
age2	.998892	.0003659	-3.03	0.002	.998175 .9996095
wi	.9999995	3.12e-07	-1.53	0.125	.9999989 1
hindu	1.092677	.10026	0.97	0.334	.912828 1.307962
rural	.4855427	.0291189	-12.05	0.000	.4316973 .5461042
widow	.6096366	.0901155	-3.35	0.001	.4562972 .8145059
edyears	1.133964	.008117	17.56	0.000	1.118166 1.149985

Table 2

Key: egalatt = egalitarian attitude to decision making about spending in the household

```
. logistic workerinformal egalatt inter1 age age2 wi hindu rural widow edyears
```

```
Logistic regression                Number of obs   =       30527
                                   LR chi2(9)       =       3013.37
                                   Prob > chi2       =         0.0000
Log likelihood = -16252.24         Pseudo R2      =         0.0848
```

workerinfo~1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
egalatt	1.557391	.0378612	18.22	0.000	1.484925	1.633394
inter1	.9562915	.0061382	-6.96	0.000	.9443361	.9683982
age	1.12165	.0151164	8.52	0.000	1.09241	1.151672
age2	.9983868	.0001914	-8.42	0.000	.9980117	.9987621
wi	.9999929	2.53e-07	-27.99	0.000	.9999924	.9999934
hindu	1.224311	.0595232	4.16	0.000	1.113034	1.346714
rural	.8545736	.0281364	-4.77	0.000	.801169	.9115381
widow	1.608873	.0905997	8.44	0.000	1.44075	1.796616
edyears	.9260595	.004441	-16.02	0.000	.9173959	.9348048

Findings (1b): *Discernment Through Clarity of Dependent Variable Construction*

LFP=labour force participation	Effect of Education	What is the education effect on LFP?
FORMAL LFP (narrow LFP1)	Positive	Positive
WIDE LFP (LFP3)	Negative	Small
INFORMAL LFP (wide LFP6)	Negative <i>It is a poverty effect: women joining in the labour market more in desperation. (Distress)</i> <i>This would explain why the most backward states UP, MP have not had a reduction in wide labour force participation</i>	Negative



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Review of Indian Literature

- Mincerian equations (e.g. found in Kingdon & Unni, 2001) usually are adjusted for self-selection bias or by using part-time work as a factor influencing wages in a regression context (Blau and Kahn, 2003: 116). This modern-industrial economy view is ethnocentric, if applied where the informal sector is large.
- One detailed analysis which grasps both the new home economics and the complexity of India's informality is Srivastava and Srivastava, 2010. Informality in labouring is not a clearcut sector, but more a style of hiring.
- Srinivasan (2010) showed a gradual pattern of relative defeminisation of the rural labour force employed in agriculture over Round 32 to Round 61 (1977 to 2005) (2010: 97).

Review, cont'd.

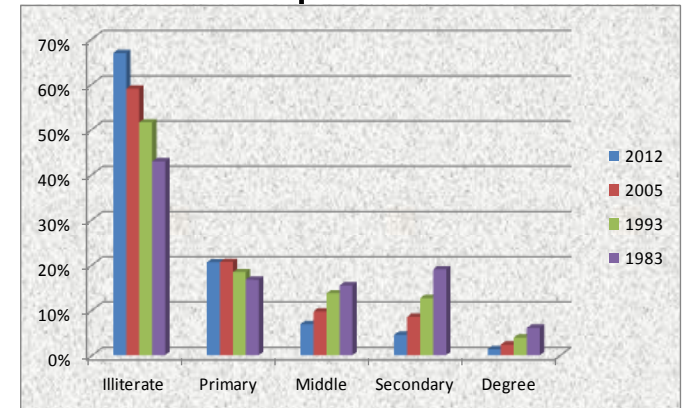
- Masood and Ahmad (2009: 7) suggest that “Education has a positive effect on the decision to participate in the labour market for two reasons. First, education is an investment in human capital...” and secondly the opportunity cost of not working is higher if her education is higher. This claim is then refuted for rural India.
- The overall downward shift is not falsifying the human-capital hypothesis, but suggest something else is going on.

Review, 3.

- Bhalla and Kaur, looking at urban Indian women since 1983, show that there is a small pay gap of 10-20% for women, holding education and experience constant, but they argue this is not causing women to withdraw from the labour market (2009: 1). They also argue this gap is declining. They go on to assume that women work every year except when they are in school – an unlikely situation for most women. This enables the authors to put “experience” (age – education years; *ibid.*, pg 13) into a wage-explaining regression. The traditional assumptions of a modern economy keep creeping into these studies.

Facts of changing education levels

- Figure 1: Women's Education and Work Participation in Rural India
- EDUCATION RATES



The standard definition ‘medium’

Women Working, by Definition of “paid work”

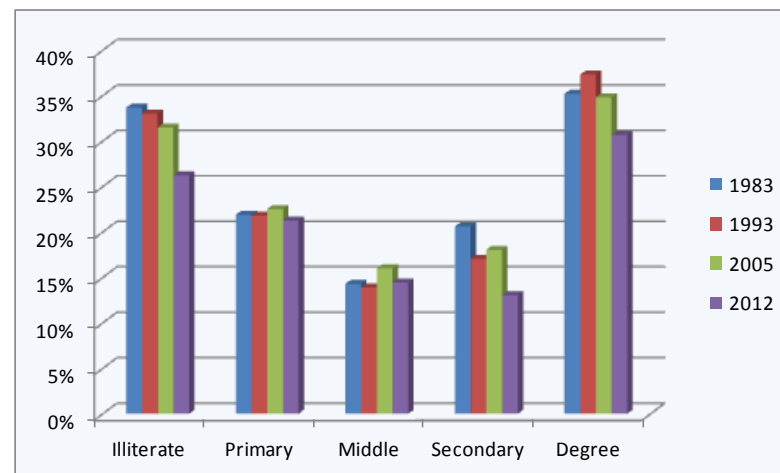
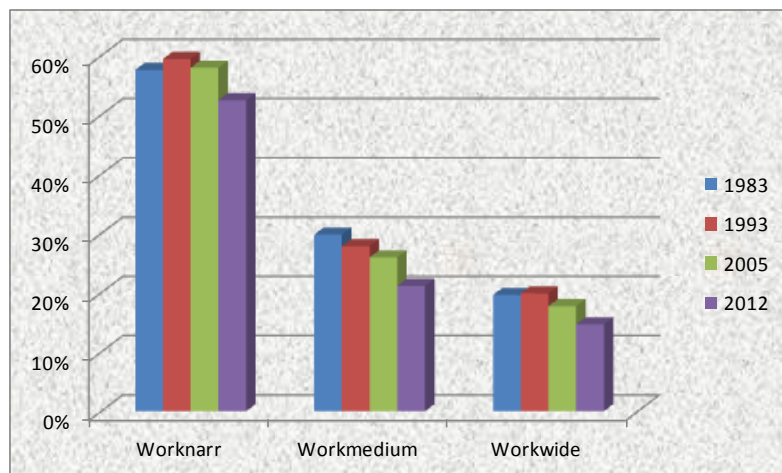
Women Working by Education, Over Time

WORK PARTICIPATION RATES

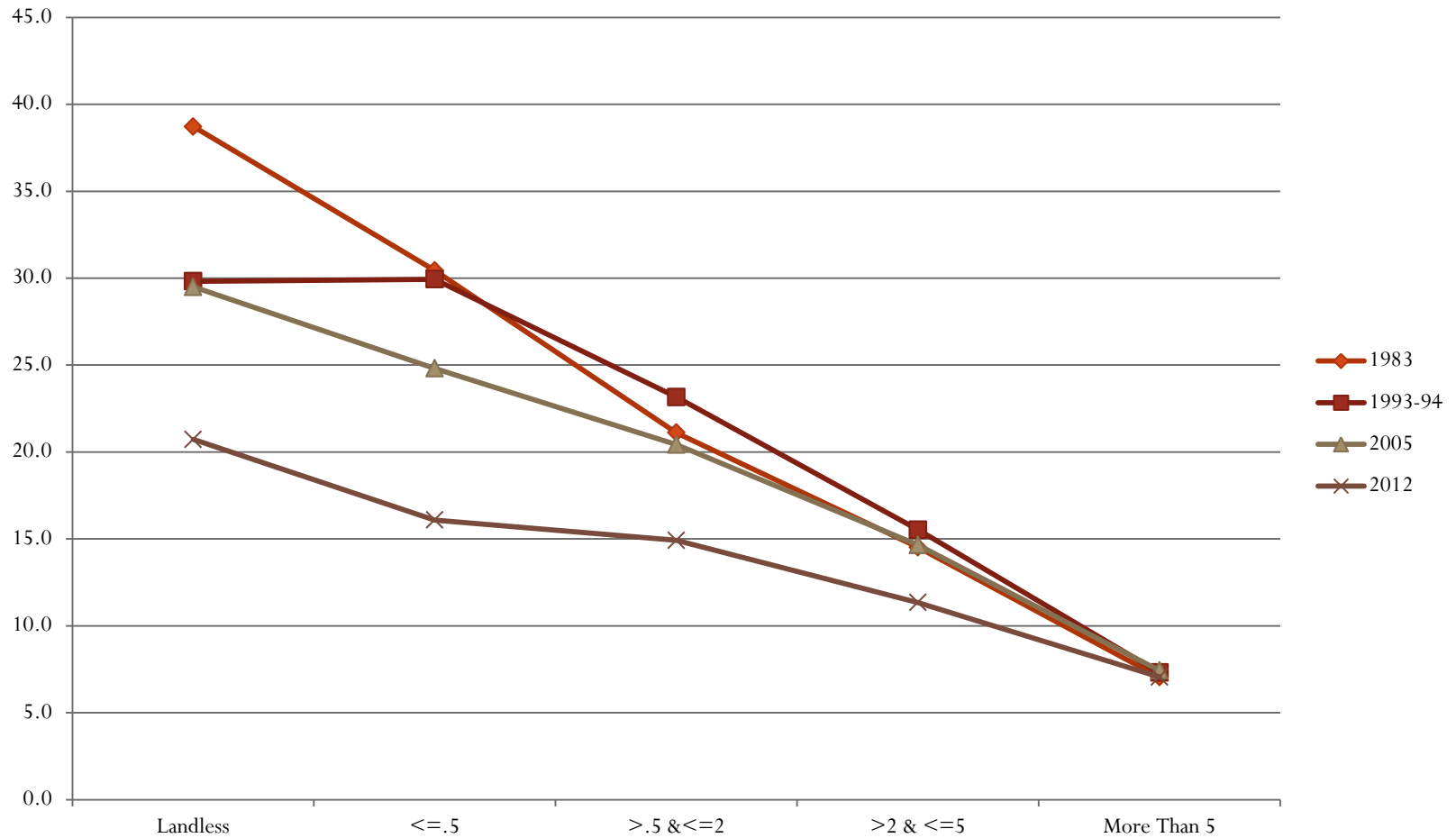
Figure 2: Rural Women in the Labour Force by Education, India, 1983-2012

Source: NSSO, Rounds 38, 50, 61, and 68.

www.mospi.in



3. Dramatic Change in the Driver of Low Rural FLFP



3. Method to Elicit the Drivers of Decline in Women's LFP

- A decomposition by synthetic panel methods is proposed by Jann, 2008.
- The data comes from Indian National Sample Survey Employment and Unemployment Survey for 1983, 1993, 2004, and 2011 (www.mospi.in).
- We examine probit regressions of labour supply. The outcome is yes/no for a series of alternative definitions of labour-force participation. The NSS has intrinsically had careful harmonisation over time, by choices made in the NSSO offices. We are therefore able to carry out a decomposition of change over time for each of the three intervening time-periods as if Year 1 and Year 2 respondents were two groups experience a kind of artificial “discrimination” in their labour supply. This is a sophisticated methods requiring careful interpretation.

Decomposition Is Controversial

- Yun solved the problem of how to reach the coefficients optimally with a nonlinear iteration method (2008). Although advocating a slightly different method, he agrees with the use of Jann's Oaxaca routine in stata (Jann, 2008). Both work on similar premises to the work of Fairlie (2005).
- Yun himself applied these methods to the labour-force participation binary outcome in 2005. He showed how to test the significance of each component of the decomposition (2005). Each effect, which he labelled there as the "characteristics and coefficients effects in a decomposition analysis", 2005: 295, had a standard error. Thus a confidence interval can be calculated (Yun, 2004). These methods can be used with cluster-sampled data, post-hoc weighted data, design weighted data and for unbalanced data.
- For dummy explanatory variables, with the base case arbitrary, see Yun, 2005, *Economics Letters*.
- Fortunately, "aggregate characteristics and coefficients effects are invariant to the choice of the left-out group" (*Ibid.*, 797), thus solving the problem noticed by Oaxaca and Ransom (1999). An application to groups in India differentially experiencing poverty is set out by Gang, Sen and Yun (2008).

Sources:

Barr, T., and N. Lin, 2013. *A Detailed Decomposition of Synthetic Cohort Analysis*. IZA Discussion Paper No. 7743, URL <http://ftp.iza.org/dp7743.pdf>.

R.W. Fairlie (2005) An extension of the Blinder-Oaxaca decomposition technique to logit and probit models, *Journal of Economic and Social Measurement* 30, 305–316.

Gang, Ira N., Kunal Sen, and Myeong-Su Yun (2008). Poverty In Rural India: Caste And Tribe, *Review of Income and Wealth*, 54:1, 50-70.

Jann, B. 2008. The Blinder–Oaxaca decomposition for linear regression models. *Stata Journal* 8: 453–479.

Oaxaca, R. (1973) Male and female differentials in urban labour markets, *International Economic Review*, 3, pp. 603-709.

Oaxaca, R. L., and M. R. Ransom. “Identification in Detailed Wage Decompositions.” *Review of Economics and Statistics*, 81(1), 1999, 154–57.

- Based on Yun:
- Yun, M.-S. 2004. Decomposing Differences in the First Moment. *Economics Letters* 82: 275–280.
- Yun, Myeong-Su. 2008. Identification Problem and Detailed Oaxaca Decomposition: A General Solution and Inference. *Journal of Economic and Social Measurement* 33 (2008) 27–38.
- We have two key sets of terms in a decomposition.

How does decomposition work?

- Decomposition difference

Let p be the proportion of women in the labour market at time 0 or 1

We have observations X which are dummy 0=no, 1=yes.

It can be shown (Oaxaca and Ransom, various) that:

$$\text{The gap in LFP} = \bar{p}_1 - \bar{p}_0 = (\bar{X}_1 - \bar{X}_0) \beta_1 + (\beta_1 - \beta_0) \bar{X}_0 \quad (\text{Eq. 1})$$

- This sum of terms can also be described as:

= **sum of the endowment effects** + **sum of the slope effects.**

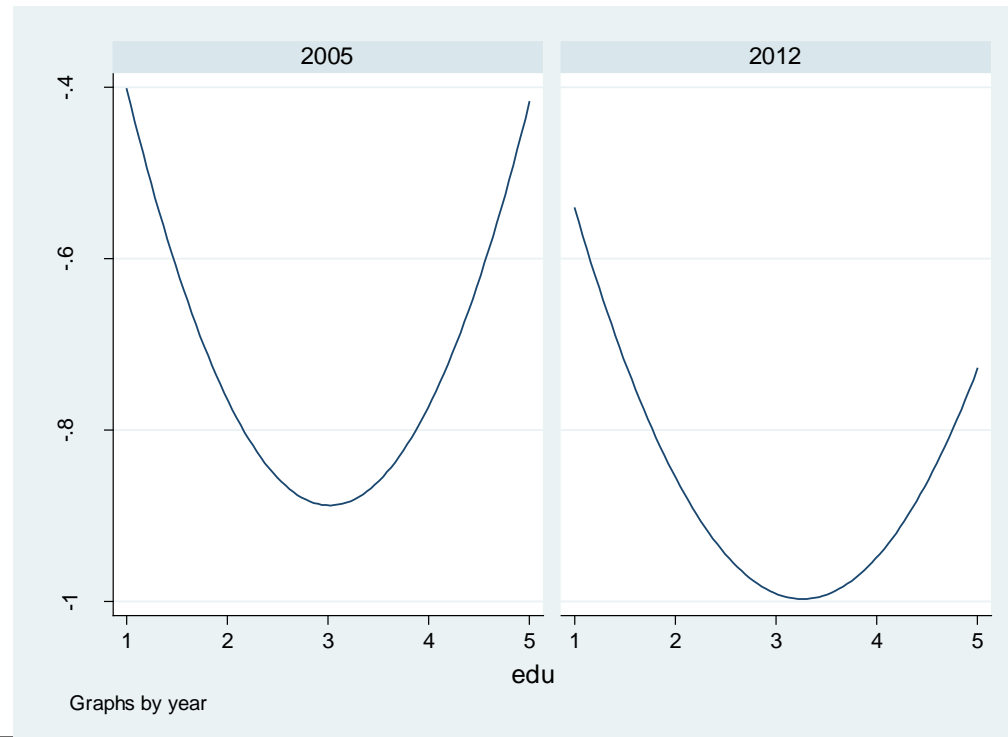
OR

= **sum of the explained changes in the LFP gap** + **sum of the unexplained changes in how the LFP responds to the Independent variables.**

- E.G.: More education changes one of the X means, and with rising education, p_1 should exceed p_0 .
- E.G.: More nuclear households causes a rise in Hhtype 1, and with this rise, p_1 should be less than p_0 . Here, Hhtype 1 would be nuclear wage earning, hence Male Breadwinner with Housewife.

Results I

- Probit with education and education (in years), squared (rather than the spline)
- PREDICTIONS FROM PROBITS using predict for WORK MEDIUM by all variables) indicative:



4. Results II

- The probit model of FLFP assumes additive effects on the probability of female labour force participation.
- This model has education as a key human capital indicator, and {children in household + ill health of the woman or her husband} as a key indicator of a constraining factor.
- The dependent variable's coding can be Wide or Medium.
- In either case we add both those working in an occupation as their Principle and their Subsidiary Occupation.

Findings

- If you take 2005-2012, not much explanatory power.

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-----
      |                               Linearized
      |                               Coef.   Std. Err.   t   P>|t|   [95% Conf. Interval]
-----+-----
overall |
  group_1 |   .2984469   .001673   178.39   0.000   .2951678   .301726
  group_2 |   .2394148   .0023799   100.60   0.000   .2347502   .2440794
  difference |   .0590321   .0029091   20.29   0.000   .0533302   .0647339
  explained |   .0100067   .0009311   10.75   0.000   .0081818   .0118317
  unexplained |   .0490253   .0031012   15.81   0.000   .042947   .0551037
-----+-----

```

The longer term has more structural change, 1983-2011.

- Blinder-Oaxaca decomposition

• Number of strata	=	1	Number of obs	=	445613
• Number of PSUs	=	445613	Population size	=	508817.28
•			Design df	=	445612
•			Model	=	probit
• Group 1: yearall = 1983			N of obs 1	=	118286
• Group 2: yearall = 2012			N of obs 2	=	93898

		Linearized					
workmed		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----							
overall							
group_1		.3502618	.0014075	248.85	0.000	.347503	.3530205
group_2		.2397872	.0023081	103.89	0.000	.2352634	.244311
difference		.1104745	.0027034	40.86	0.000	.1051759	.1157732
explained		.1204052	.006743	17.86	0.000	.1071892	.1336213
unexplained		-.0099307	.0070876	-1.40	0.161	-.0238222	.0039608

Conclusions

- A wealth mechanism could enable women to stay at home doing domestic work as a luxury good.
 - Wealth rose and it can cause an unexplained rise in stayathome women, with male breadwinners or as Added-Females.
 - Nuclearisation has however reduced the number of Added-Females.
- The puzzle is also resolved through recognising the wealth mechanism is not the only mechanism... human capital and opportunity costs operate to increase Labour Supply only when we consider the higher-educated groups, and is reversed in the lowest-education groups.
 - These work in the informal and farming sectors anyway
 - They have withdrawn more of their labour in recent years
 - It is not clear why, but as income rose, the distress work would recede, and the importance of domestic work rose for them.

Substantive references

- Abraham, V.J. (2009): “Employment Growth in Rural India: Distress-Driven?”, *Economic & Political Weekly*, 18th April.
- Kingdon, G, and J, Unni (2001),”Education and Women’s Labour Market Outcomes in India”, *Education Economics*, Vol. 9(2), pp. 173-194.
- Mazumdar, I. & Neetha, N. (2011): “Gender Dimensions: Employment Trends in India, 1993-94 to 2009-10”, *Economic & Political Weekly*, 22nd October.
- National Sample Survey (1984) 38th Round questionnaire, Section 10, Unemployment & Employment Survey, National Sample Survey of India. Obtained via the NSSO website (www.mospi.in or http://mospi.nic.in/Mospi_New/site/inner.aspx?status=3&menu_id=36), accessed Dec. 2014.
- NSS (2012), at URL http://mospi.nic.in/Mospi_New/upload/nss_report_559_10oct14.pdf, Accessed 2014.
- National Sample Survey (various years), 38th, 50th, 61st, and 68th Rounds, Employment and Unemployment Survey, National Sample Survey of India. Data obtained via the NSSO website (www.mospi.in)
- Olsen, W.K. and Smita Mehta (2007) "A Pluralist Account of Labour Participation in India", chapter in *Workers’ Participation in Management: An Introduction*, eds. Debdatta Gupta and Sanjeev Kumar Singh, Delhi: Icfai University Press, December, 2007. (The full version is accessible at URL <http://www.gprg.org/pubs/workingpapers/pdfs/gprg-wps-042.pdf>, “A Pluralist Account of Labour Participation in India”, W.K. Olsen and S. Mehta, Global Poverty Research Group Working Paper 42, 2006.)
- Olsen, Wendy, and S. Mehta (2006) “The Right to Work and Differentiation in Indian Employment”, *Indian Journal of Labour Economics*, 49:3, July-Sept., 2006, pages 389-406.
- Rangarajan, C., Padma Iyer Kaul & Seema (2011): “Where Is the Missing Labour Force?” *Economic & Political Weekly*, 24th September.
- Rodgers, J.(2012). *Labour Force Participation in Rural Bihar: A Thirty-Year Perspective Based on Village Surveys* , IHD working paper 04/2012. Delhi: Institute for Human Development, URL http://www.ihdindia.org/PDFs/Labour_Force_Participation_in_Rural_Bihar_A_Thirty-Year_Perspective_based_on_Village_Surveys.pdf, accessed Dec. 2014.
- Srinivasan, T.N. (2010): “Employment and India’s Development and Reforms”, *Journal of Comparative Economics*, Vol.38 p.82–106.
- Srivastava, N. & Srivastava, R. (2010): “Women, Work, and Employment Outcomes in Rural India”, *Economic & Political Weekly*, 10th July.
- World Bank (2010): *India’s Employment Challenge. Creating Jobs, Helping Workers*, The World Bank, New Delhi: Oxford University Press.

References

- Gang, Ira N., Kunal Sen, and Myeong-Su Yun, 2008. Poverty In Rural India: Caste And Tribe, *Review of Income and Wealth*, 54:1, 50-70.
- Jann, B. 2008. The Blinder–Oaxaca decomposition for linear regression models. *Stata Journal* 8: 453–479.