

Gender Gap and Decline in Female Labour Force Participation in India: A Joint Search Perspective

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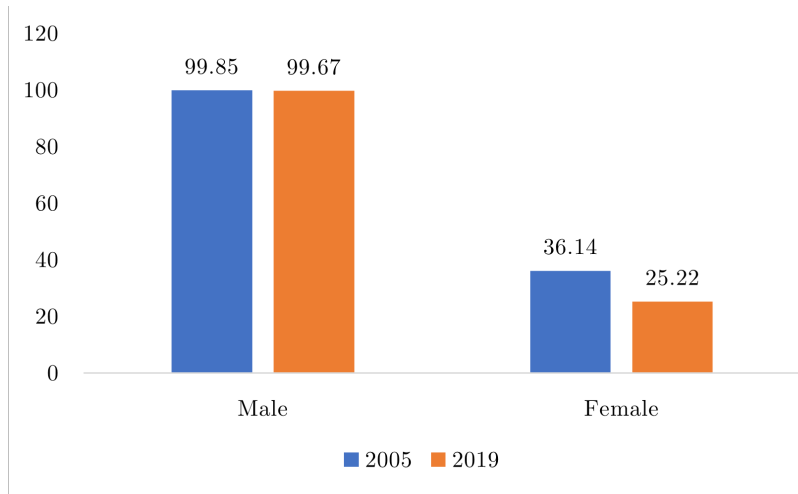
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Female Labor Force Participation: Drivers and Policy Options

Labour Force Participation

Married Couples



Introduction

- ▶ Low and declining female labour force participation in India
 - ▶ Deshpande and Singh (2021), Klasen (2019), Afridi et al. (2018), Lahoti and Swaminathan (2016)

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- ▶ Contribution of demand-side and supply-side factors?

Introduction

- ▶ Low and declining female labour force participation in India
 - ▶ Deshpande and Singh (2021), Klasen (2019), Afridi et al. (2018), Lahoti and Swaminathan (2016)
- ▶ Contribution of demand-side and supply-side factors?
- ▶ We write down a joint search model of couples calibrated to India to answer this question.
 - ▶ Guler et al (2012), Flabbi and Mabli (2018)
 - ▶ A framework that integrates both demand (wage offers) and supply (home production) side factors

What we Find

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What we Find

- ▶ Joint search model broadly captures the gender differences in labour force participation, wages, and time disposition
- ▶ Gender gap
 - ▶ Primarily driven by supply side factors
 - ▶ Gender difference in wage offers can explain only around 6% of the gap
- ▶ Decline over time
 - ▶ Male wages have grown a lot more compared to female wages over time
 - ▶ Differential trends in labour demand can explain 35% of the decline in female LFPR
 - ▶ This mechanism can reconcile the diverging trends in rural and urban India

Employment Distribution

PLFS (2019) & EUS (2005)

	2019			2005		
	E	U	N	E	U	N
Employed (E)	24.34	0.57	73.56	35.09	0.74	63.45
Unemployed (U)	0.20	0.04	0.96	0.14	0.06	0.37
Out of labour force (N)	0.07	0	0.26	0.11	0	0.04
LFPR – Male		99.67			99.85	
LFPR – Female		25.22			36.14	

» Definition

Wages

Residual real wage per hour

	2019		2005		Growth (%)	
	Male	Female	Male	Female	Male	Female
Part-time	94.29	41.19	58.01	36.16	62.52	13.89
Full-time	52.96	22.04	29.54	16.26	79.27	35.57

» Definition

Time Allocation

Time Use Survey (2019)

Activity	Share of Time Spent	
	Male	Female
Market work		
– part-time	20.9	19.67
– full-time	42.28	38.98
Job search	18.24	13.12
Home Production	6.39	54.09
Leisure	34.43	32.96

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Model

Setup

- ▶ A joint search model of couples where an individual's choices depend on the partner's labour market state
 - ▶ Introduce supply-side constraints through home production

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 - ▶ Introduce supply-side constraints through home production
- ▶ A unit measure of households each consisting of a male and a female.
- ▶ Each of the individuals can be in one of the three labour market states

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Setup

- ▶ A joint search model of couples where an individual's choices depend on the partner's labour market state
 - ▶ Introduce supply-side constraints through home production
- ▶ A unit measure of households each consisting of a male and a female.
- ▶ Each of the individuals can be in one of the three labour market states
- ▶ Both the individuals choose their labour market state and time allocation in order to maximize a common household utility

Model

Setup

- ▶ Employed individuals can either be working in a part-time or a full-time job and earn wages.
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- ▶ Employed individuals can either be working in a part-time or a full-time job and earn wages.
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- ▶ Unemployed individuals actively search for a job
 - ▶ Spend time on job search, home production, and leisure

Model

Setup

- ▶ Employed individuals can either be working in a part-time or a full-time job and earn wages.
 - ▶ Spend time on market work, home production, and leisure
- ▶ Unemployed individuals actively search for a job
 - ▶ Spend time on job search, home production, and leisure
- ▶ Out of labour force individuals do not have a job and spend no time on job search
 - ▶ Split their time between home production and leisure

Value Functions

- ▶ Model features 9 value functions for 9 different households.

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- ▶ Model features 9 value functions for 9 different households.
- ▶ w_m - male wage, w_f - female wage, h_m - male hours, h_f - female hours, where h is either part-time or full-time.
 - ▶ $EE(w_m, h_m, w_f, h_f)$, $EU(w_m, h_m)$, $EN(w_m, h_m)$
 - ▶ $UE(w_f, h_f)$, UU , UN
 - ▶ $NE(w_f, h_f)$, NU , NN

Value functions

Both employed

$$rEE(w_m, h_m, w_f, h_f) = \max_{l_m, l_f} \left\{ u(\mathcal{I}, \mathcal{H}(hp_m, hp_f, \mathcal{I}), l_m, l_f) + \delta_f \left(\max \{ EU(w_m, h_m), EN(w_m, h_m), UU, UN, NU, NN \} - EE \right) + \delta_m \left(\max \{ UE(w_f, h_f), NE(w_f, h_f), UU, UN, NU, NN \} - EE \right) \right\}.$$

where

$$\mathcal{I} = w_m h_m + w_f h_f,$$

$$hp_m = 1 - h_m - l_m,$$

$$hp_f = 1 - h_f - l_f.$$

Value functions

Male employed, female unemployed

$$\begin{aligned} rEU(w_m, h_m) = & \max_{l_m, l_f} \left\{ u(\mathcal{I}, \mathcal{H}(hp_m, hp_f, \mathcal{I}), l_m, l_f) + \right. \\ & \delta_m \left(\max \{ UU, UN, NU, NN \} - EU(w_m, h_m) \right) + \\ & \left. \alpha_f s_f \left(\int_w \max \{ EU(w_m, h_m), EE(w_m, h_m, w, h), UE(w, h), NE(w, h) \} - \right. \right. \\ & \left. \left. EU \right) dF_f(w, h) \right\}. \end{aligned}$$

where

$$\mathcal{I} = w_m h_m,$$

$$hp_m = 1 - h_m - l_m,$$

$$hp_f = 1 - s_f - l_f.$$

Value functions

Male employed, female out of labour force

$$rEN(w_m, h_m) = \max_{l_m, l_f} \left\{ u(\mathcal{I}, \mathcal{H}(hp_m, hp_f, \mathcal{I}), l_m, l_f) + \delta_m \left(\max \{ UN, NN \} - EN \right) \right\}$$

where

$$\mathcal{I} = w_m h_m.$$

$$hp_m = 1 - h_m - l_m,$$

$$hp_f = 1 - l_f.$$

Model Fit

Employment Distribution

	Data			Model		
	E	U	N	E	U	N
Employed (E)	24.34	0.57	73.56	23.77	0.42	74.25
Unemployed (U)	0.20	0.04	0.96	1.07	0.01	0.50
Out of labour force (N)	0.07	0	0.26	0	0	0
LFPR – Male		99.67			100	
LFPR – Female		25.22			25.26	

Model Fit

Wage Distribution

	Data (Accepted)		Model (Accepted)		Model (Offers)	
	Male	Female	Male	Female	Male	Female
<i>Part-time</i>						
Mean	4.46	3.61	4.57	3.53	3.30	2.04
Std dev	0.42	0.47	0.59	0.67	1.03	1.01
<i>Full-time</i>						
Mean	3.86	2.96	3.83	3.22	2.05	1.59
Std dev	0.47	0.51	0.55	0.70	0.99	1.04

Model Fit

Time Allocation

Activity	Data		Model	
	Male	Female	Male	Female
Market work				
– part-time	20.9	19.67	20.49	
– full-time	42.28	38.98	41.83	
Leisure	34.43	32.96	53.36	30.43
Home Production	6.39	54.09	8.61	60.53

Counterfactual Experiments

- ▶ Decomposing gender gap in LFPR
 - ▶ Provide females with male wage offers

Counterfactual Experiments

- ▶ Decomposing gender gap in LFPR
 - ▶ Provide females with male wage offers
- ▶ Decline in LFPR from 2005 to 2019
 - ▶ Recalibrate offers to match 2005 wages

Equal Wage Offers

Employment Distribution

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	23.77	0.42	74.25	28.16	0.67	69.44
Unemployed (U)	1.07	0.01	0.50	1.19	0.01	0.53
Out of labour force (N)	0	0	0	0.02	0	0
LFPR – Male		100			99.98	
LFPR – Female		25.26			30.04	

Equal Wage Offers

Employment Distribution

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	23.77	0.42	74.25	28.16	0.67	69.44
Unemployed (U)	1.07	0.01	0.50	1.19	0.01	0.53
Out of labour force (N)	0	0	0	0.02	0	0
LFPR – Male		100			99.98	
LFPR – Female		25.26			30.04	

Labour demand channel explains only 6.5% of the gender gap

Decline in LFPR

Employment Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	23.77	0.42	74.25	27.31	0.74	70.31
Unemployed (U)	1.07	0.01	0.50	1.21	0.01	0.43
Out of labour force (N)	0	0	0	0.005	0	0
LFPR – Male		100			99.995	
LFPR – Female		25.26			29.27	

Decline in LFPR

Employment Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	23.77	0.42	74.25	27.31	0.74	70.31
Unemployed (U)	1.07	0.01	0.50	1.21	0.01	0.43
Out of labour force (N)	0	0	0	0.005	0	0
LFPR – Male		100			99.995	
LFPR – Female		25.26			29.27	

- ▶ Data: LFPR ↓ 10.92 pp (36.14% in 2005 to 25.22% in 2019)

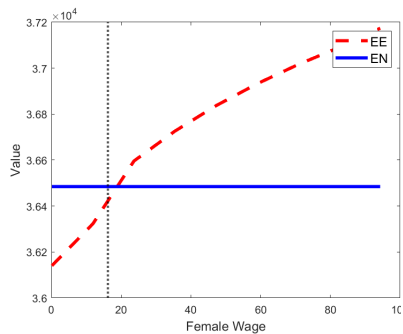
Decline in LFPR

Employment Distribution under 2005 wages

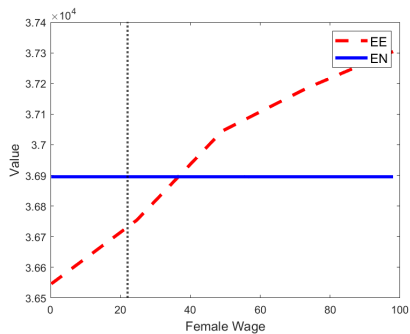
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Unemployed (U)	1.07	0.01	0.50	1.21	0.01	0.43
Out of labour force (N)	0	0	0	0.005	0	0
LFPR – Male		100			99.995	
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- ▶ Data: LFPR ↓ 10.92 pp (36.14% in 2005 to 25.22% in 2019)
- ▶ Model can generate 35% of the observed decline in LFPR

Mechanism

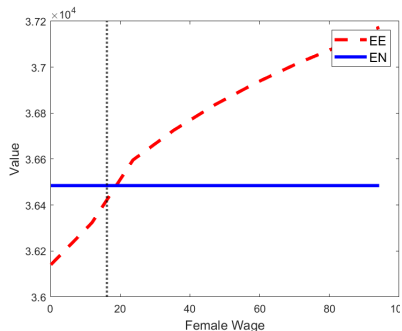


(a) 2005

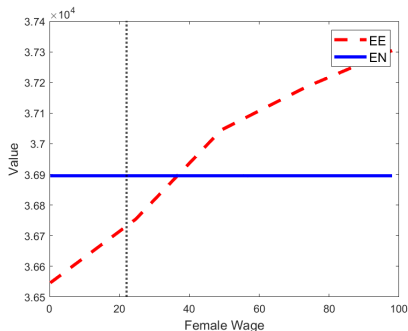


(b) 2019

Mechanism



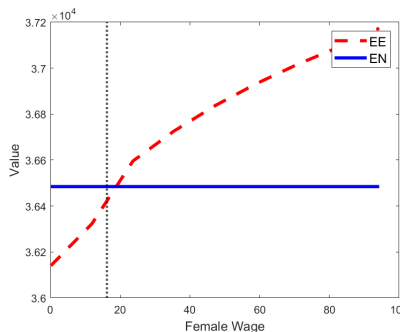
(a) 2005



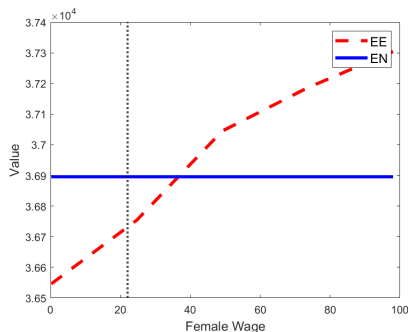
(b) 2019

- ▶ Male wages grew lot more (79.3%) compared to female wages (35.6%)

Mechanism



(a) 2005



(b) 2019

- ▶ Male wages grew lot more (79.3%) compared to female wages (35.6%)
- ▶ Female reservation wage \uparrow
 - ▶ 2005: 18.43 INR (13.4% above the avg wage)
 - ▶ 2019: 35.74 INR (62.2% above the avg wage)

Supporting Evidence

Rural vs. Urban

	All		Rural		Urban	
	2005	2019	2005	2019	2005	2019
Male LFPR (%)	99.85	99.67	99.86	99.74	99.83	99.48
Female LFPR (%)	36.14	25.22	41.7	27.29	19.52	20.19
Gender Wage Gap						
Part-time	1.6	2.29	1.27	1.87	2.05	2.25
Full-time	1.82	2.4	2.04	2.64	2.01	1.88

Rural Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	26.0	0.37	72.26	30.08	1.08	67.45
Unemployed (U)	0.91	0.015	0.45	1.05	0.02	0.33
Out of labour force (N)	0	0	0	0	0	0
LFPR – Male		100			100	
LFPR – Female		27.29			32.22	

Rural Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	26.0	0.37	72.26	30.08	1.08	67.45
Unemployed (U)	0.91	0.015	0.45	1.05	0.02	0.33
Out of labour force (N)	0	0	0	0	0	0
LFPR – Male		100			100	
LFPR – Female		27.29			32.22	

► Data: LFPR ↓ 14.4 pp (41.7% in 2005 to 27.29% in 2019)

Rural Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	26.0	0.37	72.26	30.08	1.08	67.45
Unemployed (U)	0.91	0.015	0.45	1.05	0.02	0.33
Out of labour force (N)	0	0	0	0	0	0
LFPR – Male		100			100	
LFPR – Female		27.29			32.22	

- ▶ Data: LFPR ↓ 14.4 pp (41.7% in 2005 to 27.29% in 2019)
- ▶ Model can generate 34% of the observed decline in LFPR

Urban Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	19.02	0.3	79.27	18.50	0.29	79.05
Unemployed (U)	0.85	0.025	0.54	1.31	0.03	0.84
Out of labour force (N)	0.005	0	0	0	0	0
LFPR – Male		99.995			100	
LFPR – Female		20.20			20.12	

Urban Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	19.02	0.3	79.27	18.50	0.29	79.05
Unemployed (U)	0.85	0.025	0.54	1.31	0.03	0.84
Out of labour force (N)	0.005	0	0	0	0	0
LFPR – Male		99.995			100	
LFPR – Female		20.20			20.12	

► Data: LFPR \longleftrightarrow (19.52% in 2005 to 20.19% in 2019)

Urban Distribution under 2005 wages

	Benchmark			Counterfactual		
	E	U	N	E	U	N
Employed (E)	19.02	0.3	79.27	18.50	0.29	79.05
Unemployed (U)	0.85	0.025	0.54	1.31	0.03	0.84
Out of labour force (N)	0.005	0	0	0	0	0
LFPR – Male		99.995			100	
LFPR – Female		20.20			20.12	

- ▶ Data: LFPR \longleftrightarrow (19.52% in 2005 to 20.19% in 2019)
- ▶ Model generates constant LFPR

Conclusion

- ▶ Gender gap
 - ▶ Gender wage gap can explain only 6% of the gender gap in LFPR
 - ▶ Gender gap in LFPR primarily driven by supply side factors
- ▶ Decline over time
 - ▶ Widening gender wage gap can explain 35% of the decline in female LFPR
 - ▶ This mechanism can reconcile diverging trends in both rural and urban India

Employment Distribution

PLFS (2019) & EUS (2005)

- ▶ Married couples between the age of 15 and 65
- ▶ Labour market status: Employed(E), Unemployed(U), Out of labour force (N)
- ▶ Employed
 - ▶ Regular and casual labour
 - ▶ Part-time: Working for less than 40 hours a week
 - ▶ Full-time: Working for more than 40 hours a week
- ▶ Unemployed: Those who aren't employed, but actively searching for a job
- ▶ Out of labour force: Those who aren't employed, but not searching

Wages

Residual real wage per hour

- ▶ Control for the heterogeneity in demographic factors by calculating the residual wage distribution.
 - ▶ Autor et al. (2008), Heathcote et al. (2010)

$$\ln(w_i) = \beta' X_i + \epsilon_i$$

X_i is the vector of demographic variables, which include dummies for education, age, state, region (rural or urban), etc.

▶ Back

Time Allocation

Time Use Survey (2019)

Market work	Employment and related activities (A1)
Job search	Time spent in job search (A116)
Home Production	Unpaid domestic services for household members (A3) + Unpaid caregiving services for household members (A4) + Unpaid volunteer, trainee and other unpaid work (A5)
Leisure	Learning (A6) + Socializing and communication, community participation and religious practice (A7) + Culture, leisure, mass-media and sports practices (A8)

Parameter Values

Internally Chosen

Parameter	Definition	Value	
		Male	Female
δ_i	Job separation rates	$3e - 4$	$6e - 7$
α_i	Job finding rates	0.316	0.049
η_i	Utility weights on leisure	0.196	0.257
$[\mu_i^{pt}, \sigma_i^{pt}]$	Offer dist. (part-time)	[3.30, 1.03]	[2.04, 1.01]
$[\mu_i^{ft}, \sigma_i^{ft}]$	Offer dist. (full-time)	[2.05, 0.99]	[1.59, 1.04]
p_i	Prob. of part-time offer	0.044	0.273
$[A_i^1, A_i^2]$	Home prod.	[2.38, 43.07]	[2.25, 42.72]
p_i^{hp}	Prob. of low home prod.	0.998	0.219

▶ Back

Parameter Values

Externally Chosen

Parameter	Definition	Value	
		Male	Female
r	Interest rate	0.001	
σ_c	Utility curvature on consumption	0.9744	
σ_i	Utility curvature on leisure	0.9448	0.9657
s_i	Search intensity	0.1824	0.1312
ϕ	ES between male and female hours	0.5963	
ω	ES between market and home goods	0.44	
ψ	Share of income in home production	0.39	

» Back

Evolution of Rural Gender Wage Gap

Across Sectors

Sector	Part-time		Full-time	
	2005	2019	2005	2019
Agriculture & Mining	1.43	1.15	1.75	3.52
Manufacturing	2.20	1.35	1.47	1.74
Construction	1.25	2.27	1.21	1.34
Services	0.72	1.09	2.34	3.14

» Back