Aggregate Implications of Barriers to Female Entrepreneurship
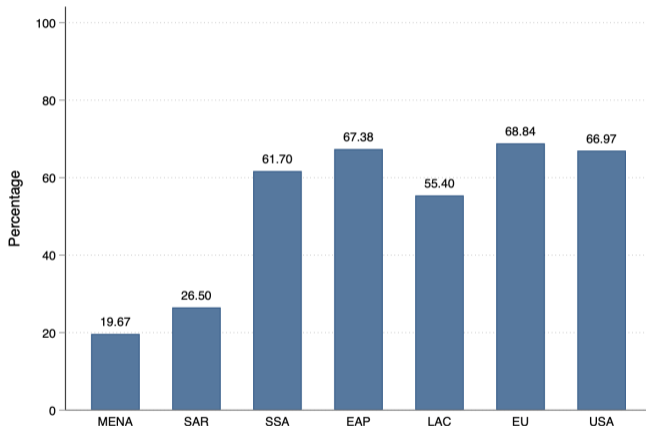
Gaurav Chiplunkar
University of Virginia

Pinelopi K. Goldberg
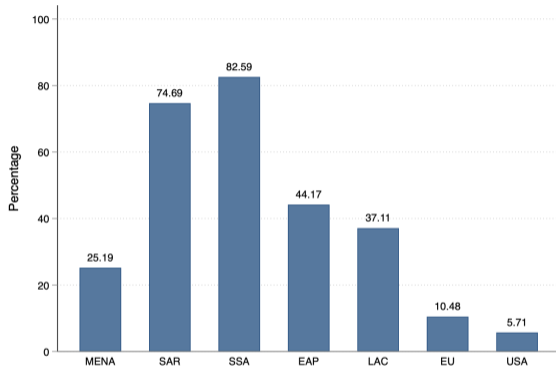Yale University

World Bank
January 2024

Low FLFP is a Concern in Many Developing Countries
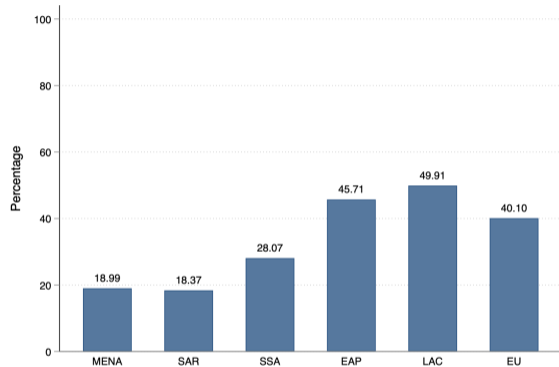
Especially in MENA and South Asia

Data Source: World Bank Gender Data Portal (2021)

High Female Self-employment, Low Entrepreneurship in LMICs

(a) Own account enterprise (OAE)
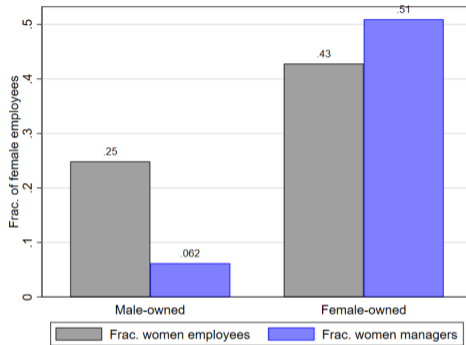
(b) Ownership in firms

...But Women Entrepreneurs Hire More Women

Data Source: World Bank Enterprise Surveys

- Male entrp: 25% women workers, 6.2% have women managers.

- Female entrp: 43% women workers, 51% have women managers.

Motivation

- Recent literature: Eliminating gender distortions in allocation of talent could substantially improve aggregate productivity and welfare (Hsieh et al., 2019; Bento, 2020)

- Effects are likely much larger in developing countries
  (Ranasinghe, 2021; Chiplunkar and Kleineberg, 2024)

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  ▸ Quantify the extent of barriers faced by women in entrepreneurship

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    - Barriers to starting firms vs expanding them

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    - Type of entrepreneurship: self-employment, informality, formality
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  - Quantify the extent to which eliminating these barriers can impact FLFP, aggregate productivity, real income

This paper

- Develop a stylized model of LFP and entrepreneurship
  Allow for LFP decision + wage, OAE, entrp. Capture key features of LMICs, especially informality

- Apply the model to the Indian context
  Low female labor force participation ($\approx$25%)

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- Use Census data + calibration/estimation to quantify key barriers faced by women

- Counterfactual analysis: implications of removing these extra barriers faced by women

- Allows us to identify which barriers are most binding + aggregate implications of removing them (on LFP, productivity, wages and income, etc.)

Key Insights

1. Women face substantial barriers to LFP. But conditional on LFP, barriers to firm expansion are much more important than barriers to entry for female-owned businesses.

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   $\Rightarrow$ Eliminating distortions $\rightarrow$ higher prod. women replace (relative) lower prod. men
   $\Rightarrow$ Higher aggregate productivity and welfare.

Roadmap For the Rest of the Talk

- Data and Descriptive Results

- Theory

- Model Estimation

- Results (parameter estimates, frictions, etc.)

- Impact of counterfactual policies

- Concluding thoughts

Data and Descriptive Results

Data

- Main data source: Economic Census of India (1998 and 2005 Rounds)
  Census of firms → entire distribution across formal and informal sectors.

- Rich information on: gender of owner, gender of workers, firm-size, 4-digit NIC classification, registration status, location, etc.
  ⇒ Classify firms as: OAEs, formal/informal + male vs female-owned.

- Is a cross-section + no information on output, sales, capital, etc.

- Auxiliary data: Annual Survey of Industries (ASI), National Sample Surveys (NSS).

#1 Most Self-Employed Individuals Operate OAEs

≈55% of male-owned and female-owned firms are OAEs

Firm type	Total firms		Firm size		Frac. Female Emp.	
	1998	2005	1998	2005	1998	2005
	(1)	(2)	(3)	(4)	(5)	(6)
Male, Self-Employed	12.68	21.14				
	(48.35%)	(51.26%)				
Male, Informal	11.58	15.83	3.29	3.02	0.10	0.10
	(44.13%)	(38.37%)	(2.83)	(2.12)	(0.21)	(0.22)
Male, Formal	0.08	0.14	77.31	67.54	0.21	0.25
	(0.31%)	(0.34%)	(440.9)	(166.58)	(0.25)	(0.3)
Female, Self-Employed	1.07	2.50				
	(4.07%)	(6.06%)				
Female, Informal	0.82	1.24	3.01	2.81	0.70	0.76
	(3.13%)	(3.04%)	(2.61)	(1.83)	(1.86)	(0.37)
Female, Formal	0.00	0.01	97.59	76.53	0.37	0.48
	(0.01%)	(0.02%)	(1197.03)	(130.34)	(0.33)	(0.40)
Total	26.23	40.86				

#2 Most Firms are Male-Owned, and Informal

99% of firms are informal (employ 80% of workforce); < 10% are female-owned

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#3 Informal Female-Owned Firms Smaller than Male-Owned Ones

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#3 ...But Larger in Size in the Formal Sector

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#4 Female-Owned Firms Employ More Female Workers

Consistent with the cross-country evidence from earlier

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- No.

- We estimate regressions of the form:

$$Y_{fjd} = \alpha_d + \alpha_j + \beta_1 Female_f + \beta_2 Female_f \times Formal_f + \delta X_{fjd} + \varepsilon_{fjd}$$

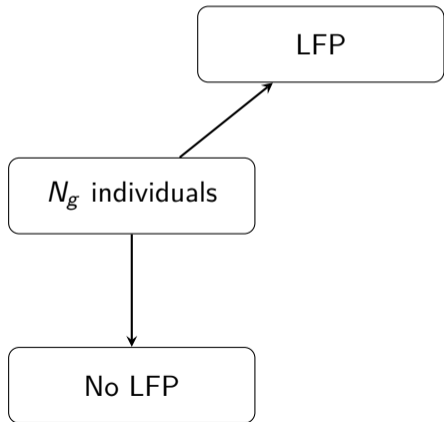- Results are consistent with patterns described previously. (Results)

Theory

Overview of the Model

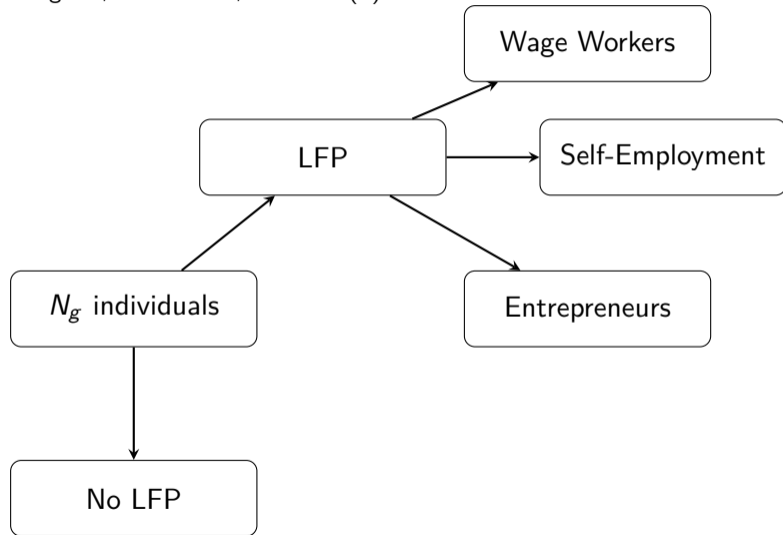*R* regions, *J* industries, 2 sectors (S): Formal & Informal

N_g individuals

Overview of the Model

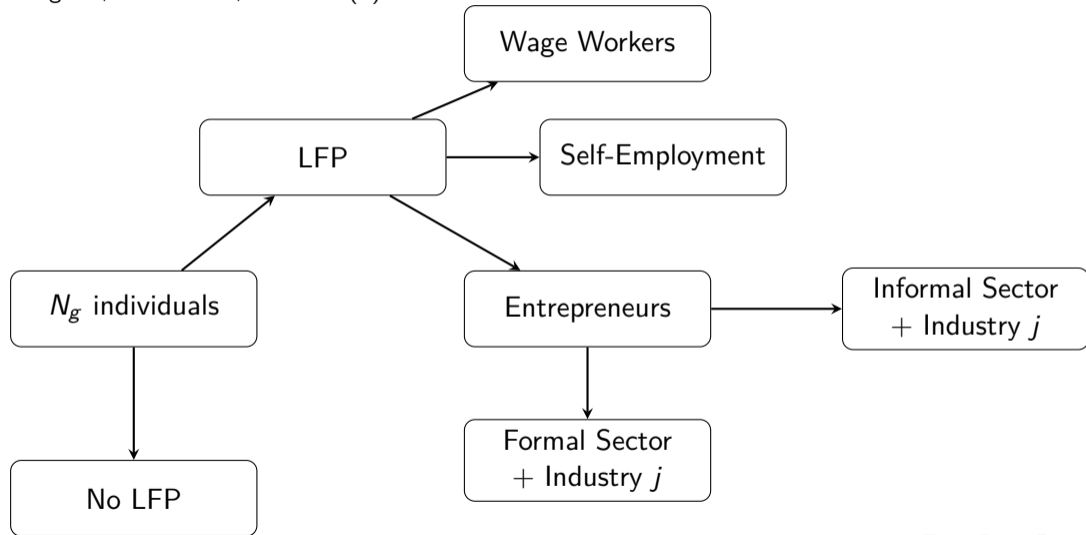*R* regions, *J* industries, 2 sectors (S): Formal & Informal

```
                    ┌─────────────────┐
                    │       LFP       │
                    └─────────────────┘
                            ↗
┌─────────────────┐
│ $N_g$ individuals│
└─────────────────┘
        │
        ↓
┌─────────────────┐
│     No LFP      │
└─────────────────┘
```

Overview of the Model

R regions, *J* industries, 2 sectors (S): Formal & Informal

```
                              ┌──────────────────┐
                              │   Wage Workers   │
                              └──────────────────┘
                                      ↗
              ┌──────────┐                ┌──────────────────┐
              │   LFP    │ ────────────→  │  Self-Employment │
              └──────────┘                └──────────────────┘
                  ↗     ↘
   ┌──────────────┐        ┌──────────────────┐
   │ N_g individuals│      │   Entrepreneurs  │
   └──────────────┘        └──────────────────┘
          │
          ↓
   ┌──────────┐
   │  No LFP  │
   └──────────┘
```

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                                    ┌─────────────────────┐
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                                    └─────────────────────┘
                                              ↑
                    ┌──────────┐              │    ┌─────────────────────┐
                    │          │──────────────┴───→│   Self-Employment   │
                    │   LFP    │                   └─────────────────────┘
                    │          │────┐
                    └──────────┘    │
                         ↑          │
                         │          ↓
  ┌──────────────┐       │    ┌──────────────────┐      ┌─────────────────────┐
  │              │───────┘    │                  │─────→│  Informal Sector    │
  │ $N_g$ individuals │       │  Entrepreneurs   │      │  + Industry $j$     │
  │              │            │                  │      └─────────────────────┘
  └──────────────┘            └──────────────────┘
         │                             │
         ↓                             ↓
  ┌──────────────┐            ┌──────────────────┐
  │   No LFP     │            │  Formal Sector   │
  │              │            │  + Industry $j$  │
  └──────────────┘            └──────────────────┘
```

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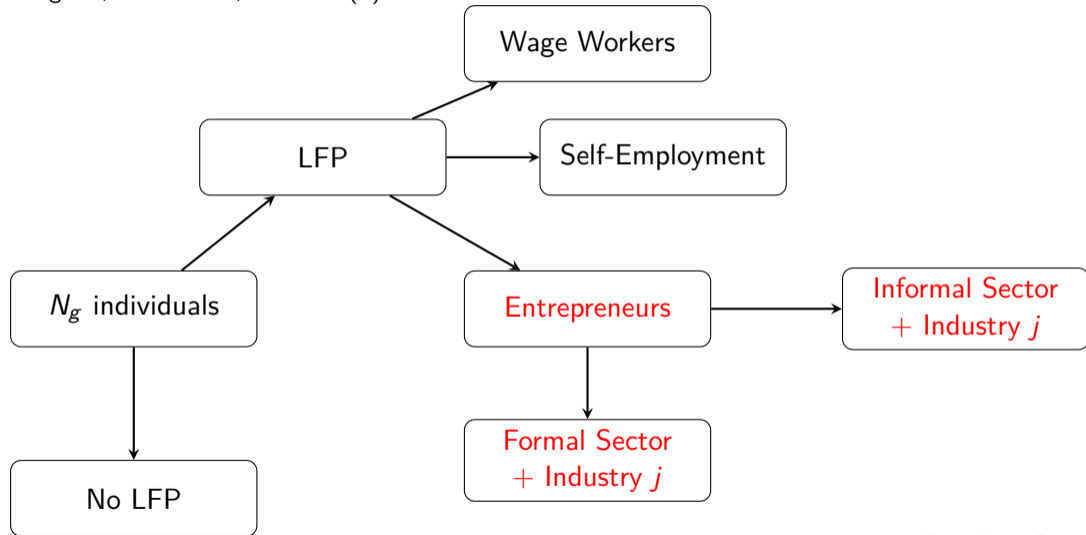
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- Firms maximize:

$$\pi_{s(jr)} = \max_{\{l_s^m, l_s^f\}} p_s z l_s^{\rho_s} - \left[\sum_{g'} w_s^{g'} l_s^{g'} \right]$$

Gender Specific Barriers in Firm "Expansion"

- Modeled as "wedges" b/w nominal and *effective* marginal costs:
  - Male entrepreneurs: $\{w^m_{msjr}, w^f_{msjr}\} = \{\widetilde{w}^m, \widetilde{w}^f\}$
  - Female entrepreneurs: $\{w^m_{fsjr}, w^f_{fsjr}\} = (1 + \tau_{sjr})\{\widetilde{w}^m, (1 + \tau^f_{sjr})\widetilde{w}^f\}$

- τ_{sjr}: add. cost for a f (rel. to m) entpr. in hiring a worker in sjr

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- τ_{sjr}^f: add. cost for a f (rel. to m) entpr. in hiring a f (rel. to m) worker in sjr

- Barriers to firm expansion (hiring frictions):
  - vary by gender of entrepreneur as well as worker
  - vary by sector (formal/informal) + industry (A/M/S) + region
  - has no restrictions on values i.e., could be zero or negative as well.

Overview of the Model: Labor Supply and Occ. Choice Decisions

Labor Supply Decisions

- Barriers to entry (fixed costs):
  - Self employment: $I(x) = b + \zeta \widetilde{w}^g - PE_{gO}$
  - Wage employment: $I(x) = b + \widetilde{w}^g - PE_{gW}$
  - Informal sector: $I(x) = b + E\Pi_{gI}(x) - EP_{gI}$
  - Formal sector: $I(x) = b + E\Pi_{gF}(x) - P(E_{gI} + E_{gR})$

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- Decision to work: $V\left(\frac{I(x)}{P}, \eta\right) = \underbrace{\frac{I(x)}{P}}_{\text{Real Income}} - \mathbf{1}_{LFP} \times \underbrace{\eta \overline{u}_g}_{\text{Disutility from work}}$

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- Equilibrium choices:
  - work if: $\eta < \eta^*$
  - self-employment: $x < x_{gI}^*$ and $\zeta > \zeta^*$
  - wage employment: $x < x_{gI}^*$ and $\zeta < \zeta^*$
  - informal entrepreneurship: $x > x_{gI}^*$ and $x < x_{gF}^*$
  - formal entrepreneurship: $x > x_{gF}^*$

Role of Gender: A Summary

1. Preferences: same across gender → "disutility" for work ($\bar{u}$) captures distortions in LFP as opposed to innate dislike for work

2. Prod. Tech: same across gender but differs by *sjr* Data constraints; some evidence using NSS

3. Entrp. Ability: same ex-ante distr. → ex-post distr. are gender-specific
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4. **Workers & Production:** worker productivity diff. by gender (in each *sjr*)
   Accounts for gender-specific comparative advantage; brawn vs brain, etc.

5. **Fixed Costs of Entry:** vary by gender (in each *sjr*)

6. **Frictions in Business Expansion:** varies by gender of entrepreneur <u>and</u> worker

Empirical Implementation

Parameterization and Estimation

- Two sets of parameters:

  (a) Fundamental parameters: $\{\Gamma, \Psi\} = \left\{ \{\rho, \gamma, \alpha_j, t_{jr}\}, \{\lambda_j, A_{sjr}, T_{jr}, \sigma_x^2, \theta_g\} \right\}_{\forall g,j,r}$

  (b) "Barriers" to entry $\Upsilon = \{\overline{u}, E_W, E_I, E_R\}_{\forall g,r}$ and firm expansion $\Theta = \{\tau_{fl}, \tau_{fF}, \tau_{fl}^f, \tau_{fF}^f\}_{\forall j,r}$.

- Γ taken from the literature using statutory values (Details)

- $\{\Psi, \Upsilon, \Theta\}$ estimated from the data using SMD.
  (S.E. computed using bootstrapping method that allows for both sampling and simulation error)

- Identification: (Details)
  Moments across all firms $\rightarrow \{\Psi, \Upsilon\}$
  Diff. b/w M and F firms $\rightarrow \Theta$

Results

Fixed Costs of LFP, Wage Employment and Entrepreneurship
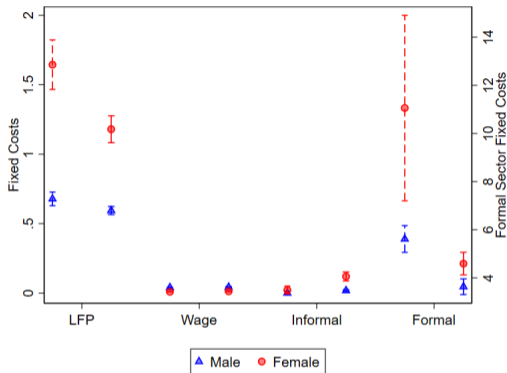
- Women face 2-2.5x higher cost of LFP
- *Cond. on LFP*, low excess fixed costs (rel. to self-emp.) in wage work or starting informal firms
  (driven by non-hired wage work in family-owned businesses)
- Costs to formalizing firms around 25% higher for women

Excess Costs in Expanding Businesses for Women
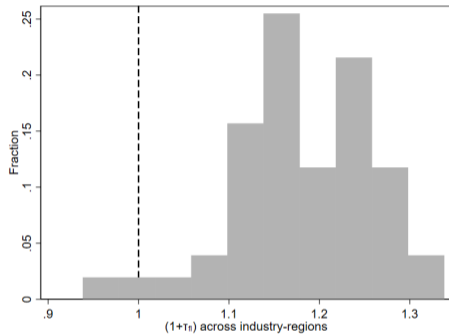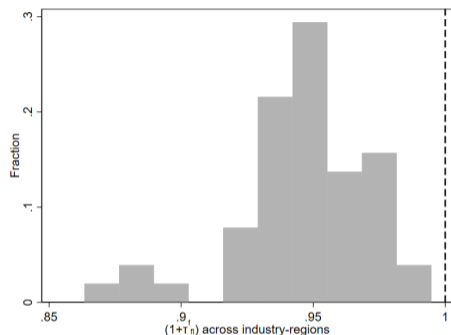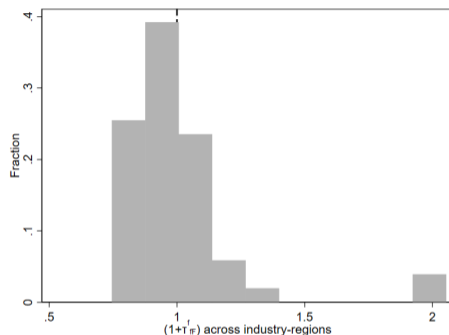

(a) Informal Sector
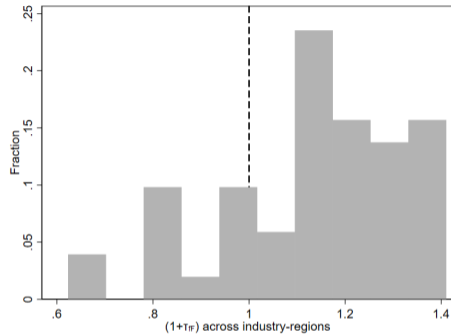
(b) Formal Sector

- 20-25% higher (per worker) in the informal and formal sector

- Lower in states with more progressive gender norms
  Women empowerment index; Gender vulnerability index; Index of patriarchy; Reservation quotas in politics

Gender Composition of Workers: Hiring Female Workers

(a) Informal Sector

(b) Formal Sector

- 5-10% lower costs for female entrepreneurs in the informal sector

- Advantage is present, but muted in the formal sector (avg: 1; median: 0.93)

How Plausible are the Results?

- "Wedges" correlated with indices of women empowerment

  `Fixed costs` `Hiring barriers`

  Women empowerment index (Bansal, 2017); Gender vulnerability index (Plan International, 2017); Index of patriarchy (Singh et al., 2021); Reservation quotas in politics (Ghani et al., 2014)

- Findings consistent with various strands of the literature:
  1. Informal women businesses (Bardasi et al., 2007; World Bank, 2020)
  2. Gendered labor laws (Hyland, Djankov and Goldberg, 2020)
  3. Quantitative evidence from India (Ghani et al., 2013; Deshpande and Sharma, 2013)
  4. Qualitative evidence from India (Basu and Thomas, 2009)

- Model Fit:
  - Good fit with targeted and non-targeted moments in the data `I` `II`
  - Identification through computing derivatives of moments to small parameter changes (Kaboski and Townsend, 2011; Bick et al., 2022) `Table`

Impact of Counterfactual Policies

Impact of Affirmative Action Policies

- We consider five scenarios that remove _excess costs_ faced by women:

  1. Fixed costs $\rightarrow$ $E_{fW} = \min\{E_{fW}, E_{mW}\}$; $E_{fI} = \min\{E_{fI}, E_{mI}\}$; $E_{fF} = \min\{E_{fF}, E_{mF}\}$

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    4. LFP costs $\rightarrow \overline{u}_f = \min\{\overline{u}_f, \overline{u}_m\}$

    5. All barriers $\rightarrow$ both (3) and (4)

- _Aim:_ Help us understand the mechanisms at work + which frictions are important, as opposed to "policies" per se.

Policies Targeting Entry & Expansion Barriers

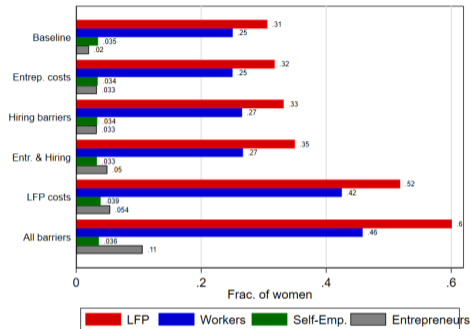Labor demand-led policies
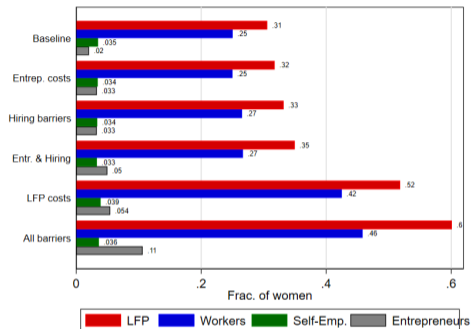
(a) Distribution of women
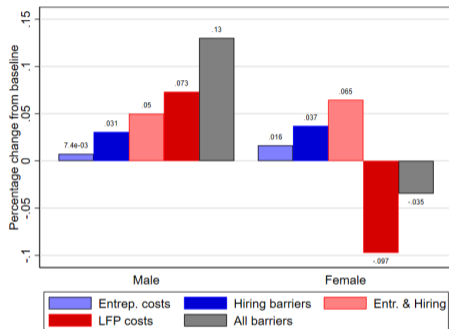
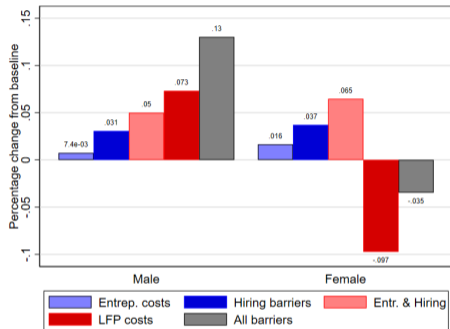(b) △ Real wages for men and women

- Increases FLFP, reduces self-employment, increases entrp.
- Increases real wages for both men and women

Policies Targeting Excess LFP Costs
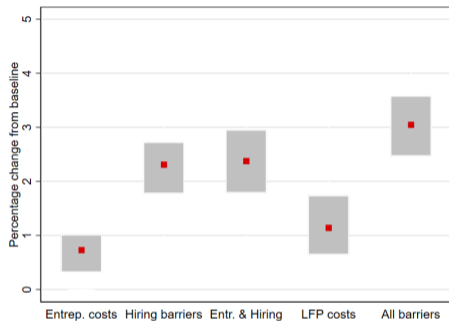
Labor supply-led policies
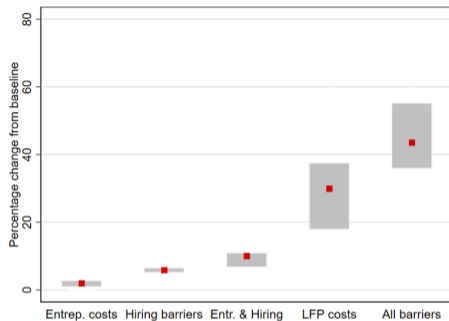

(a) Distribution of women

(b) △ Real wages for men and women

- Increases FLFP, reduces self-employment, increases entrp.
- *Reduces* real wages of women; marginally increases real profits of women-owned firms

Aggregate Productivity and Real Income

(a) Change in Aggregate Productivity

(b) Change in Real Income

Mechanisms:

- At baseline: marginal F entrp. has 30% higher ability than a man
- Reducing frictions: higher ability women enter → pushing out lower ability male entrepreneurs → gains in agg. prod. & real income

Concluding Thoughts

- Three non-trivial insights:
    - Women hire more women → incr. female entrp. has multiplier effects on FLFP
    - *Conditional on LFP*, barriers to firm expansion are much larger than entry barriers
    - Targeting supply-side policies at scale (e.g. norms) → imp. distributional effects
      increase FLFP but depress wages; increase productivity and real income in the aggregate

Concluding Thoughts

- Three non-trivial insights:

  - Women hire more women $\rightarrow$ incr. female entrp. has multiplier effects on FLFP

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  - Targeting supply-side policies at scale (e.g. norms) $\rightarrow$ imp. distributional effects
    increase FLFP but depress wages; increase productivity and real income in the aggregate

- Questions for future research:

  a) Why is it easier for women to start businesses in low LFP settings?
     (For eg: "push" and "pull" factors)

  b) How should support be targeted in promoting female entrepreneurship?

  c) Why do women entprepreneurs hire more women?
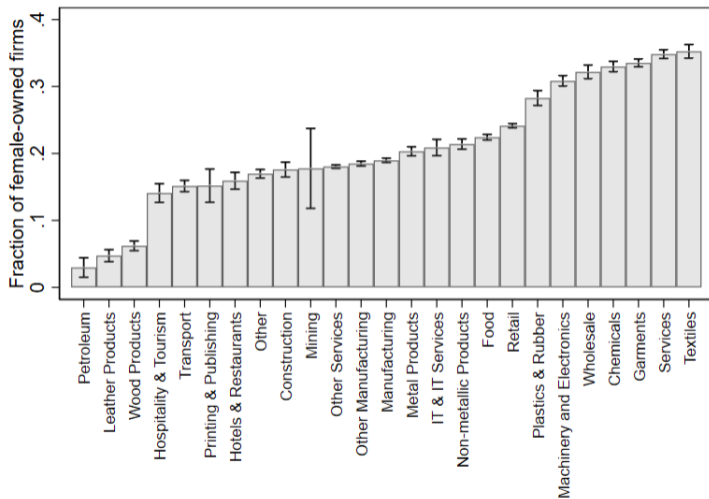   Reflect underlying preferences? discrimination? norms?

Thank you!

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Percentage of female-owned firms

Results: Sectoral Sorting

| | Log(L) | | Frac. female emp. | |
	1998	2005	1998	2005
	(1)	(2)	(3)	(4)
Panel A: Without Industry Fixed Effects				
Female	-0.0167	-0.0346***	0.304***	0.298***
	(0.0175)	(0.00485)	(0.0126)	(0.0111)
Formal	2.348***	2.536***	0.0904***	0.0970***
	(0.0364)	(0.0332)	(0.00951)	(0.00990)
Female × Formal	0.135*	0.196***	-0.180***	-0.111***
	(0.0689)	(0.0452)	(0.0231)	(0.0176)
R^2	0.212	0.280	0.328	0.301
Panel B: With Industry Fixed Effects				
Female	-0.00962	-0.0435***	0.232***	0.235***
	(0.0135)	(0.00642)	(0.00953)	(0.00786)
Formal	2.079***	2.385***	0.0520***	0.0692***
	(0.0347)	(0.0361)	(0.00831)	(0.00885)
Female × Formal	0.170**	0.184***	-0.120***	-0.0676***
	(0.0672)	(0.0480)	(0.0191)	(0.0164)
R^2	0.338	0.344	0.472	0.404
N	12.48m	17.22m	12.48m	17.22m
Male, Informal	1.007	0.970	0.190	0.205

Statutory Parameter Values (Γ)

	Parameter Description	Source	Value
α_j	Share of industry j in consumption	Share of sales from ASI and NSS	{0.22,0.36,0.42}
ρ	Curvature of Prod. Function	Avg. labor share from ASI and NSS	0.738
γ	EoS b/w M and F workers	Literature	2.1
t	Tax rates	Average sales tax across ASI firms	5-8%

Table: Parameter values

Targeted Moments and Identification

Parameter Description		Data Moments
A_{sjr}	Rel. F to M workers prod.	Ratio of F to M workers in $\{s, j, r\}$; Norm. $A_{s,Services,r} = 1$
T_{jr}	Aggregate Technology	Firm-size in the formal sector; Norm. $T_{Services,r} = 1$
λ_j	Penalty of operating in Informal Sector	Ratio of firm-size b/w Formal and Informal firms
$\{\sigma_x, \theta_m, \theta_f\}$	Productivity Distribution	Var. of F and M firm-size
$\{\overline{u}, E_I, E_R\}_{\forall g}$	Fixed Costs	LFP rates, Frac. of M and F firms in Informal & Formal sectors
τ_{sjr}	Hiring any worker	Ratio of F to M firm-size
τ_{sjr}^f	Hiring F to M worker	Ratio of F:M worker in a F:M firm

Table: Parameters and Data Moments

Corr. of fixed costs and women empowerment [Back]

	WEI	GVI	PI
	(1)	(2)	(3)
Panel A: Relative LFP Costs			
Index	-0.500***	-0.461***	0.255*
	(0.001)	(0.001)	(0.061)
R^2	0.348	0.317	0.227
Panel B: Relative Formal Sector Entry Costs			
Index	-0.185	-0.00329	0.0125
	(0.489)	(0.988)	(0.940)
R^2	0.101	0.090	0.090
N	34	34	34

Corr. of hiring barriers and women empowerment Back

	Informal			Formal		
	WEI	GVI	PI	WEI	GVI	PI
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Hiring barriers $(1 + \tau_{fsj})$						
Index	-0.0258**	-0.0353***	0.00618	-0.0345	-0.0861***	-0.0137
	(0.026)	(0.006)	(0.531)	(0.281)	(0.019)	(0.549)
R^2	0.182	0.204	0.153	0.488	0.521	0.482
Panel B: Hiring barriers for female relative to male workers $(1 + \tau_{fsj}^f)$						
Index	0.0000599	-0.00375	-0.000280	0.0367	0.0124	0.00880
	(0.986)	(0.268)	(0.898)	(0.255)	(0.729)	(0.573)
R^2	0.246	0.252	0.246	0.156	0.143	0.143
N	102	102	102	102	102	102

Model Fit I [Back]

	Male		Female	
	Data	Model	Data	Model
	(1)	(2)	(3)	(4)
Panel A: Occupational choice of individuals				
1-LFP	0.43	0.43	0.70	0.69
	(0.04)	(0.04)	(0.08)	(0.08)
Frac. Wage Emp.	0.31	0.31	0.25	0.25
	(0.04)	(0.04)	(0.07)	(0.07)
Frac. Self Emp.	0.15	0.14	0.03	0.03
	(0.02)	(0.02)	(0.03)	(0.03)
Frac. Inf. Entrp.	0.11	0.11	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.01)
Frac. Formal Entrp.	0.001	0.001	0.000	0.000
	(0.0005)	(0.0005)	(0.0001)	(0.0001)

	Male		Female	
	Data	Model	Data	Model
	(1)	(2)	(3)	(4)

Panel A: Ratio of average firm size

$\bar{l}_{gI}/\bar{l}_{mI}$	1.00	1.00	1.06	1.04
	(0)	(0)	(0.18)	(0.17)
$\bar{l}_{gF}/\bar{l}_{mF}$	1.00	1.00	1.18	1.05
	(0)	(0)	(0.62)	(0.29)
$\bar{l}_{gF}/\bar{l}_{gI}$	22.69	28.70	26.15	28.66
	(9.39)	(7.55)	(20.64)	(8.99)

Panel B: Average firm size

Informal	4.21	6.83	4.37	7.11
	(0.70)	(0.88)	(0.40)	(1.39)
Formal	95.95	103.54	113.29	100.99

Derivatives of moments to parameter changes [Back]

Moment	A_I	A_F	τ_I^f	τ_F^f	τ_I	τ_F	λ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Sample from the 1998 Round of the Economic Census							
$R_{mI,j}/R_{mI,Serv.}$	**0.67**	0.00	0.00	0.00	0.00	0.00	0.00
$R_{mFj}/R_{mFServ.}$	0.00	**0.66**	0.00	0.00	0.00	0.00	0.00
$R_{fI,j}/R_{fI,Serv.}$	0.00	0.00	**-2.18**	0.00	0.00	0.00	0.00
$R_{fF,j}/R_{fF,Serv.}$	0.00	0.00	0.00	**-2.25**	0.00	0.00	0.00
$\bar{l}_{fI,j}/\bar{l}_{mI,j}$	0.06	0.04	-0.85	0.07	**-1.34**	0.31	0.00
$\bar{l}_{fF,j}/\bar{l}_{mF,j}$	-0.13	0.14	-0.24	-0.31	-0.40	**-1.27**	-2.46
$\bar{l}_{mF,j}/\bar{l}_{mF,Serv.}$	-0.20	0.08	-0.01	0.00	0.03	0.09	**-3.30**
Panel B: Sample from the 2005 Round of the Economic Census							
$R_{mI,j}/R_{mI,Serv.}$	**0.67**	0.00	0.00	0.00	0.00	0.00	0.00
$R_{mFj}/R_{mFServ.}$	0.00	**0.65**	0.00	0.00	0.00	0.00	0.00
$R_{m\ldots}/R_{\ldots}$	0.00	0.00	**2.10**	0.00	0.00	0.00	0.00

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See the paper for a complete list of references

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