Aggregate Implications of Barriers to Female Entrepreneurship

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Motivation

- LFP rates are lower in LMICs compared to HICs. 65.1% in LMICs vs 74% in HICs (Source: World Bank, 2019)
- Driven by differences in Female LFP. Male LFP: 80.0% in LMICs vs 80.4% in HICs Female LFP: 49.9% in LMICs vs 67.3% in HICs

(Source: World Development Indicators, 2019)

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- Recent literature: Eliminating gender distortions in advanced countries improves aggregate productivity and welfare (Hsieh, Hurst, Jones and Klenow, 2019; Bento, 2020)
- Effects are likely much larger in developing countries

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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.

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Women hire more women...but very few women entrepreneurs





- Male entrp: 25% women workers, 6.2% have women managers.
- Female entrp: 43% women workers, 51% have women managers.
- Only 22.5% of firms are female-owned Variation across sectors 3-6% in petroleum, leather and wood, 35% in Garments and Textiles

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

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

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- Apply the model to the Indian context Low female labor force participation (~25%)
- 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.)

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- 5. Eliminating distortions \Rightarrow prod. of marginal entrp. male \uparrow & female \downarrow \Rightarrow positive and large effects on 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

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Data and Descriptive Results

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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: 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).

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#1 Most firms are informal and male-owned

| Firm type | Total firms | | Firm size | | Frac. Female Emp. | |
|------------------|-------------|----------|-----------|----------|-------------------|--------|
| | 1998 | 2005 | 1998 | 2005 | 1998 | 2005 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Male, Informal | 11.58 | 15.83 | 3.29 | 3.01 | 0.19 | 0.21 |
| | (92.75%) | (91.93%) | (3.68) | (2.79) | (0.25) | (0.25) |
| Male, Formal | 0.08 | 0.14 | 77.47 | 67.69 | 0.21 | 0.25 |
| | (0.65%) | (0.82%) | (438.82) | (166.19) | (0.25) | (0.30) |
| Female, Informal | 0.82 | 1.24 | 2.96 | 2.81 | 0.57 | 0.58 |
| | (6.57%) | (7.21%) | (2.98) | (2.82) | (0.33) | (0.31) |
| Female, Formal | 0.00 | 0.01 | 97.87 | 76.63 | 0.45 | 0.48 |
| | (0.02%) | (0.04%) | (1118.20) | (130.07) | (0.37) | (0.40) |
| Total | 12.48 | 17.22 | | | | |

• 99% of firms (male- and female-owned) are informal.

• Frac. of female-owned firms < 10% (slight $\uparrow b/w$ 1998 and 2005)

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#2 Firm size of male-owned and female-owned firms

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 Female-owned firms smaller than male-owned firms in the informal sector, but larger in the formal sector

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#3 Women hire women, more so in the informal sector

| Firm type | Total firms | | Firm size | | Frac. Female Emp. | |
|------------------|-------------|----------|-----------|----------|-------------------|--------|
| | 1998 | 2005 | 1998 | 2005 | 1998 | 2005 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Male, Informal | 11.58 | 15.83 | 3.29 | 3.01 | 0.19 | 0.21 |
| | (92.75%) | (91.93%) | (3.68) | (2.79) | (0.25) | (0.25) |
| Male, Formal | 0.08 | 0.14 | 77.47 | 67.69 | 0.21 | 0.25 |
| | (0.65%) | (0.82%) | (438.82) | (166.19) | (0.25) | (0.30) |
| Female, Informal | 0.82 | 1.24 | 2.96 | 2.81 | 0.57 | 0.58 |
| | (6.57%) | (7.21%) | (2.98) | (2.82) | (0.33) | (0.31) |
| Female, Formal | 0.00 | 0.01 | 97.87 | 76.63 | 0.45 | 0.48 |
| | (0.02%) | (0.04%) | (1118.20) | (130.07) | (0.37) | (0.40) |
| Total | 12.48 | 17.22 | | | | |

 Female-owned firms (as compared to male-owned firms) more than twice as likely to hire women workers, and more so in the informal sector. ・ロト ・ 回 ト ・ 回 ト ・ 回 ・ つへぐ

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Do these patterns reflect sectoral sorting?

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Do these patterns reflect sectoral sorting?

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

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Theory

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Economy Setup

- R regions and J industries (aggregate to Agriculture, Manufacturing and Services in the empirics)
- Two sectors in each industry: Formal and Informal
- N_g individuals indexed by their gender g
- Only 1 input in production labor.
- Perfectly competitive labor and product markets
- No product differentiation (Formal and informal sectors produce identical products)

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 N_g individuals









Production

 Entrepreneur of gender g and ability z ~ H(z) in sector s and industry j (dropping g, s, j for notation):

$$y = z I^{\rho}$$
$$I = \left[\sum_{g'} (A^{g'})^{\frac{1}{\gamma}} (I^{g'})^{\frac{\gamma-1}{\gamma}} \right]$$

- Hire male (I^m) and female (I^f) workers to produce output (y).
- A^g productivity of worker of gender g.
- γ elasticity of substitution between male-female workers in production.

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Formal and Informal Sectors

• Formal sector: comply with laws, pay taxes, register with the government.

$$\pi_F = \max_{\{l_F^m, l_F^f\}} (1-t) p z l_F^
ho - rac{1}{T} igg[\sum_{g'} w^{g'}_F l_F^{g'} igg]$$

• T – aggregate industry-specific technology/cost shifters.

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- T aggregate industry-specific technology/cost shifters.
- Informal sector: don't pay taxes, but face a size-dependant penalty of being informal (access to formal finance; audits, etc.), captured by $\tilde{\rho} = \lambda \rho < \rho$.

$$\pi_{I} = \max_{\{I_{I}^{m}, I_{I}^{f}\}} pz I_{I}^{\widetilde{\rho}} - \frac{1}{T} \left[\sum_{g'} w^{g'}_{I} I_{I}^{g'} \right]$$

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Gender specific barriers in hiring

- Modeled as "wedges" b/w nominal and *effective* marginal costs:
 - Male entrepreneurs: $\{w_{msj}^m, w_{msj}^f\} = \{\widetilde{w}^m, \widetilde{w}^f\}$
 - Female entrepreneurs: $\{w_{fsj}^m, w_{fsj}^f\} = (1 + \tau_{sj})\{\widetilde{w}^m, (1 + \tau_{sj}^f)\widetilde{w}^f\}$
- τ_{sj} : additional cost for a female (relative to male) entrepreneur in hiring a worker in sector s and industry j.
- τ_{sj}^{f} : additional cost for a female (relative to male) entrepreneur in hiring a female (relative to male) worker in sector s and industry j.

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- τ_{sj}^{f} : additional cost for a female (relative to male) entrepreneur in hiring a female (relative to male) worker in sector s and industry j.
- "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.

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Overview of the Model: Labor Supply Decision



Labor Supply Decisions

• Each individual indexed by $\{g, x, \eta\}$ chooses b/w:

(a) labor force participation vs not

(b) wage work vs entrepreneurship (conditional on LFP)

(c) Industry choice \rightarrow post-entry productivity $z = x \varepsilon_j$ (conditional on entrepreneurship)

where: $\varepsilon_j \sim F(\theta_g)$

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Labor Supply Decisions

- Each individual indexed by $\{g, x, \eta\}$ chooses b/w:
 - (a) labor force participation vs not
 - (b) wage work vs entrepreneurship (conditional on LFP)
 - (c) Industry choice \rightarrow post-entry productivity $z = x\varepsilon_j$ (conditional on entrepreneurship)
 - where: $\varepsilon_j \sim F(\theta_g)$
- Wage work vs Entrepreneurship:
 - Wage employment: $I(x) = b + \widetilde{w}^g$
 - Informal sector: $I(x) = b + E \prod_{gl} (x) \widetilde{w}^g \frac{E_{gl}}{E_{gl}}$
 - Formal sector: $I(x) = b + E \prod_{gF}(x) \widetilde{w}^{g}(\frac{E_{gI}}{E_{gI}} + \frac{E_{gR}}{E_{gR}})$

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 - Formal sector: $I(x) = b + E \prod_{gF}(x) \widetilde{w}^{g}(\frac{E_{gI}}{E_{gI}} + \frac{E_{gR}}{E_{gR}})$
- Decision to work:

Indirect Utility:
$$V\left(\frac{I(x)}{P},\eta\right) = \frac{I(x)}{P} - \mathbf{1}_{LFP} \times \eta \overline{u}_{g}$$

 $\begin{array}{l} \eta \overline{u}_g \text{ is (gender-specific) disutility of work, } \eta \sim G(\eta) \text{ (Bick et al., 2021)} \\ \Rightarrow \text{ participate if } \eta < \frac{l(x)/P}{\overline{u}_{\sigma}} \equiv \eta_g^* \\ \text{ Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)} \end{array}$

Labor Force Participation Choices

Each individual indexed by: $\{g, x, \eta\}$



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Role of Gender

- 1. $\{\gamma, A\} \rightarrow M$ and F workers are imperfect substitutes in production & worker productivity is allowed to vary by gender
- 2. $\overline{u} \rightarrow \text{Disutility of work (cost of LFP)}$
- 3. $\theta \rightarrow \text{Realized entpr. prod. in each industry}$
- 4. $\{E_I, E_R\} \rightarrow$ Fixed costs for starting and formalizing business
- 5. $\{\tau, \tau^f\} \rightarrow$ Frictions in expanding business (i.e., hiring workers) depends on gender of entrepreneur <u>and</u> worker

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Equilibrium in the Model

For each region r, equilibrium defined as a set of prices $\{p_j\}_{\forall j}$ and wages for men and women i.e., $\{\tilde{w}^m, \tilde{w}^f\}$ s.t.

Product markets clear

- Labor markets clear for each gender
- Total taxes equal total benefits
- Zero-profit conditions for *I* and *F* sectors + LFP indifference condition hold with equality for both genders

Empirical Implementation

Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)

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" faced by entrepreneurs, such as fixed costs $\Upsilon = \{\overline{u}, E_I, E_R\}_{\forall g, r} \text{ and hiring wedges } \Theta = \{\tau_{fI}, \tau_{fF}, \tau_{fI}^f, \tau_{fF}^f\}_{\forall j, r}.$
- 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)

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- 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 $\rightarrow \Theta$

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Results

Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)

Comparative advantage of female workers in services

| 1998 | | | | 2005 | | |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Agri. | Manf. | Services | Agri. | Manf. | Services |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Pane | | | | | | |
| A _I A _F | 0.65 0.16 | 0.66 0.33 | 1.00 1.00 | 0.64 0.42 | 0.67 0.29 | 1.00 1.00 |

- Consistent with brawn vs. brain hypothesis Pitt, Rosenzweig and Hassan (2012)
- Literature examining the impact of rise of services on FLFP Rendall (2013); Olivetti and Petrongolo (2014, 2016); Ngai and Petrongolo (2017)

Realized entrp. ability hardly differs across M and F

| | 1998 | 2005 |
|-------------------------|--------|---------|
| $\widetilde{\theta}_m$ | 2.66 | 2.74 |
| | (0.21) | (0.03) |
| $\widetilde{	heta}_{f}$ | 2.64 | 2.61 |
| | (0.09) | (0.03) |
| σ_x | 0.13 | 0.11 |
| | (.002) | (0.004) |

- The realized entrepreneurial ability distributions not very different for men and women.
- Values are close to Hsieh, Hurst, Jones and Klenow (2019), who find a value of 2.57.

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LFP costs 2x for women compared to men

Much higher in the North compared to the South



- Median LFP costs twice for women vs men (Avg: \approx 3)
- Clear geographic divide- costs much higher in the North vs. South (Consistent with Evans (2020) and Rao, Verschoor, Deshpande and Dubey (2008))

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Fixed costs (cond. on LFP) similar for M and F



- Conditional on LFP, fixed costs comparable b/w M and F (Median \approx 1)
- More women-owned informal businesses in the North (rel. to South)

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Hiring costs higher for women entrepreneurs

Costs are higher in both the Informal and Formal sectors



- Marginal costs for hiring workers are for women entrepreneurs.
- Informal sector \rightarrow 9% (median) and 3.9-12.4% (25th-75th pctile)
- Formal sector ightarrow 15% (median) and 5-36% (25th-75th pctile)

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...but lower if women entrepr. hire women workers



Easier for women to hire women, both in the informal and formal sectors

- Informal sector \rightarrow -5.2% (median) and -3.5% to -7.5% (25th-75th pctile)
- Formal sector \rightarrow -13.6% (median) and -32% to +17.3% (25th-75th pctile)

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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)

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- 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)

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 - 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 ${f U}$ ${f W}$
 - Identification through computing derivatives of moments to small parameter changes (Kaboski and Townsend, 2011; Bick et al., 2021) Table

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Impact of Counterfactual Policies

Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)

• We consider five scenarios that remove *excess costs* faced by women:

1. Fixed costs $\rightarrow E_{fl} = \min\{E_{fl}, E_{ml}\} \& E_{fF} = \min\{E_{fF}, E_{mF}\}$

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• We consider five scenarios that remove *excess costs* faced by women:

1. Fixed costs
$$\rightarrow E_{fl} = \min\{E_{fl}, E_{ml}\} \& E_{fF} = \min\{E_{fF}, E_{mF}\}$$

2. Hiring costs $\rightarrow \tau_s = \min\{\tau_s, 0\} \& \tau_s^f = \min\{\tau_s^f, 0\}$

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- We consider five scenarios that remove *excess costs* faced by women:
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 - 2. Hiring costs $\rightarrow \tau_s = \min\{\tau_s, 0\} \& \tau_s^f = \min\{\tau_s^f, 0\}$
 - 3. Fixed costs and Hiring costs \rightarrow both (1) and (2)

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- We consider five scenarios that remove *excess costs* faced by women:
 - 1. Fixed costs $\rightarrow E_{fI} = \min\{E_{fI}, E_{mI}\} \& E_{fF} = \min\{E_{fF}, E_{mF}\}$
 - 2. Hiring costs $\rightarrow \tau_s = \min\{\tau_s, 0\} \& \tau_s^f = \min\{\tau_s^f, 0\}$
 - 3. Fixed costs and Hiring costs \rightarrow both (1) and (2)
 - 4. LFP costs $\rightarrow \overline{u}_f = \min\{\overline{u}_f, \overline{u}_m\}$

- We consider five scenarios that remove *excess costs* faced by women:
 - 1. Fixed costs $\rightarrow E_{fl} = \min\{E_{fl}, E_{ml}\} \& E_{fF} = \min\{E_{fF}, E_{mF}\}$
 - 2. Hiring costs $\rightarrow \tau_s = \min\{\tau_s, 0\} \& \tau_s^f = \min\{\tau_s^f, 0\}$
 - 3. Fixed costs and Hiring costs \rightarrow both (1) and (2)
 - 4. LFP costs $\rightarrow \overline{u}_f = \min\{\overline{u}_f, \overline{u}_m\}$
 - 5. All barriers \rightarrow both (3) and (4)
- <u>Aim</u>: Help us understand the mechanisms at work + which frictions are important, as opposed to "policies" per se.

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Policies targeting fixed costs



(a) Distribution of women

(b) \triangle Real wages & profits for women

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- Increase in fraction of women entrepreneurs from 1.2% to 2%.
- Little changes in real wages, profits for women. •

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Policies targeting hiring barriers



(a) Distribution of women

(b) riangle Real wages & profits for women

- Frac. women entrepreneurs↑ + real wages & profits for women↑
- Female LFP $\uparrow \rightarrow$ women entrepreneurs hire women workers

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Productivity of marginal entrepr. across scenarios



(a) Ability of Marginal Entrepreneur

(b) riangle Avg. Productivity

- At baseline: $x_f^* > x_m^*$ (13% higher ability)
- Reducing frictions: higher ability women enter → pushing out lower ability male entrepreneurs.
- As a result, $x_m^* \uparrow$ and $x_f^* \downarrow \Rightarrow \overline{x}_m \uparrow$ and $\overline{x}_f \downarrow$

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Aggregate Productivity and Welfare



(b) \triangle Real Income (Welfare)

 Removing all barriers increases aggregate productivity by 1.5% and real income by 40%

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(a) \triangle Aggregate Productivity

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Concluding Thoughts

- Barriers modeled as "wedges" (black box). Nevertheless, non-trivial insights on what policies might help.
 (For eg: hiring frictions and LFP costs more binding than fixed costs)
- Evaluating policies at scale requires assessing different margins (LFP, wage emp., informal/formal entrp., etc.) + general equilibrium effects
 → our framework can prove useful.
- 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) Why do women entprepreneurs hire more women? Reflect underlying preferences? discrimination? norms?

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Thank you!

Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)

Percentage of female-owned firms



Data Source: World Bank Enterprise Surveys Chiplunkar & Goldberg (Barriers to Female Entrepreneurship) Э

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Results: Sectoral Sorting

Back

| | Log(L) 1998 2005 | | Frac. fen 1998 | nale emp. 2005 | | |
|---|---------------------|-----------|-------------------|-------------------|--|--|
| | (1) | (2) | (3) | (4) | | |
| Panel A: Without industry fixed effects | | | | | | |
| Female | -0.0162 | -0.0297 | 0.298 | 0.288 | | |
| | (0.0176) | (0.00466) | (0.0138) | (0.0130) | | |
| Formal | 2.448 | 2.575 | 0.0647 | 0.0792 | | |
| | (0.0328) | (0.0309) | (0.00941) | (0.0103) | | |
| Female × Formal | 0.234 | 0.171 | -0.122 | -0.0910 | | |
| | (0.141) | (0.0441) | (0.0401) | (0.0198) | | |
| R^2 | 0.210 | 0.283 | 0.341 | 0.316 | | |
| Panel B: With indu | stry fixed effe | cts | | | | |
| Female | -0.0123 | -0.0451 | 0.233 | 0.236 | | |
| | (0.0135) | (0.00612) | (0.00956) | (0.00781) | | |
| Formal | 2.132 | 2.417 | 0.0428 | 0.0562 | | |
| | (0.0340) | (0.0353) | (0.00818) | (0.00915) | | |
| $Female \times Formal$ | 0.329 | 0.173 | -0.0920 | -0.0632 | | |
| | (0.166) | (0.0473) | (0.0282) | (0.0166) | | |
| N | 12.48m | 17.22m | 12.48m | 17.22m | | |
| R^2 | 0.338 | 0.345 | 0.472 | 0.402 | | |
| Male, Informal | 1.007 | 0.970 | 0.189 | 0.205 | | |
| Firm controls | Yes | Yes | Yes 💷 | ⊧ ∢¥es⊧ | | |

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Statutory Parameter Values (Γ)

| Parameter Description | | Source | Value | |
|-----------------------|--|---------------------------------------|------------------|--|
| α_j | Share of industry <i>j</i> in con- sumption | Share of sales from ASI and NSS | {0.22,0.36,0.42} | |
| ρ | Curvature of Prod. Func- tion | 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

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Targeted Moments and Identification

| Parameter Des | scription | 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_i Penalty of operating in | | Ratio of firm-size b/w Formal and In- | | |
| , | Informal Sector | formal 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 | | |
| $	au_{\sf sjr}$ | Hiring any worker | Ratio of F to M firm-size | | |
| τ_{sir}^{f} Hiring F to M worker | | Ratio of F:M worker in a F:M firm | | |

Table: Parameters and Data Moments

Chiplunkar & Goldberg (Barriers to Female Entrepreneurship)

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Corr. of fixed costs and women empowerment (Back)

| - | | | | |
|--------------------|-------------------|-------------------|-------------------|-------------------|
| | WEI | GVI | PI | Pol. Res. |
| | (1) | (2) | (3) | (4) |
| Panel | A: Relative | e LFP Cos | ts | |
| Index | -0.188 (0.104) | -0.285 (0.148) | 0.245 (0.0702) | 0.0235 (0.336) |
| R^2 | 0.304 | 0.351 | 0.445 | 0.247 |
| Panel | B: Relative | e Entreprei | neurial Entr | y Costs |
| Index | 0.324 (0.295) | 0.487 (0.323) | -0.574 (0.193) | 0.329 (0.524) |
| R^2 | 0.542 | 0.563 | 0.689 | 0.521 |
| Panel | C: Relative | e Formaliza | ation Costs | |
| Index | 0.0162 (0.248) | 0.245 (0.221) | -0.119 (0.131) | -0.827 (0.526) |
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| | Informal | | | Formal | | |
|--|---------------------|-------------------------------|-----------------------|--------------------|---------------------|---------------------|
| | WEI | GVI | PI | WEI | GVI | PI |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel , | A: Hiring bar | riers ($1+	au_{	extsf{fsj}}$ |) | | | |
| Index | -0.0189 (0.0106) | -0.0202 (0.0185) | -0.00472 (0.00765) | 0.0612 (0.0753) | -0.0555 (0.0949) | -0.0332 (0.0338) |
| R^2 | 0.317 | 0.314 | 0.307 | 0.109 | 0.105 | 0.107 |
| Panel B: Hiring barriers for female relative to male workers $(1+	au_{	extsf{fsj}}^{	extsf{f}})$ | | | | | | |
| Index | 0.0145 (0.00536) | 0.00895 (0.00674) | -0.00461 (0.00242) | 0.0483 (0.458) | 0.124 (0.266) | -0.194 (0.178) |
| R ² N | 0.237 102 | 0.215 102 | 0.216 102 | 0.272 102 | 0.273 102 | 0.277 102 |

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Model Fit I Back

| | Male | | Fen | nale | | | |
|---|----------|----------|----------|----------|--|--|--|
| | Data | Model | Data | Model | | | |
| | (1) | (2) | (3) | (4) | | | |
| Panel A: Occupational choice of individuals | | | | | | | |
| 1-LFP | 0.58 | 0.59 | 0.73 | 0.73 | | | |
| | (0.04) | (0.04) | (0.07) | (0.07) | | | |
| Frac. Wage Emp. | 0.31 | 0.31 | 0.25 | 0.25 | | | |
| | (0.04) | (0.04) | (0.07) | (0.07) | | | |
| Frac. Inf. Entrp. | 0.11 | 0.10 | 0.02 | 0.01 | | | |
| | (0.01) | (0.03) | (0.01) | (0.01) | | | |
| Frac. Formal Entrp. | 0.001 | 0.001 | 0.0001 | 0.0002 | | | |
| | (0.0005) | (0.0001) | (0.0001) | (0.0001) | | | |
| Panel B: Ratio of female-male workers in a firm | | | | | | | |
| Informal | 0.98 | 0.99 | 1.11 | 1.11 | | | |
| | (0.09) | (0.11) | (0.15) | (0.16) | | | |
| Formal | 1.65 | 1.64 | 2.17 | 2.17 | | | |
| | (2.69) | (2.65) | (6.54) | (6.47) | | | |

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Model Fit II Back

| | <u>M</u> Data | <u>ale</u> Model | <u>Fen</u> Data | nale Model | | | | | | |
|--|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|--|--|--|--|--|--|
| | (1) | (2) | (3) | (4) | | | | | | |
| Panel A: Ratio of average firm size | | | | | | | | | | |
| Ī _{gl} /Ī _{ml} | 1 (0) | 1 (0) | 1.01 (0.18) | 1.09 (0.24) | | | | | | |
| I _{gF} /I _{mF} | 1 (0) | 1 (0) | 0.97 (0.71) | 1.25 (0.85) | | | | | | |
| Ī _{gF} /Ī _{gI} | 21.57 (5.89) | 18.36 (24.54) | 18.32 (15.20) | 19.05 (42.11) | | | | | | |
| Panel B: Average firm size | | | | | | | | | | |
| Informal Formal | 4.21 (0.70) 95.09 (43.61) | 4.28 (3.05) 93.99 (80.24) | 4.37 (0.40) 113.05 (03.83) | 4.92 (3.73) 127.8 (116.71) | | | | | | |
| (43.01) (00.24) (93.83) (110.71) Panel C: Std. Deviation of firm size | | | | | | | | | | |
| Informal | 3.60 | 1.49 | 3.58 | 1.77 | | | | | | |
| Formal | (1.34) 184.70 (108.7) | (1.16) 42.85 (38.12) | (1.16) 156.75 (175.14) | (1.40) 59.15 (63.99) | | | | | | |

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Derivatives of moments to parameter changes (Back)

| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | | | | | | | | | | | | | |
|--|--|--|--|---|--|--|--|--|---|--|--|--|--|
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Moment | A _I | A _F | τ_I^f | τ_F^f | τ_I | $	au_{F}$ | λ | Т | | | | |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | | | | |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Panel A: Sample fro | Panel A: Sample from the 1998 Round of the Economic Census | | | | | | | | | | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $\begin{array}{c} R_{ml,j}/R_{ml,Serv.} \\ R_{mF,j}/R_{mF,Serv.} \\ R_{fl,j}/R_{ml,j} \\ R_{ff,j}/R_{mF,j} \\ \overline{I}_{fl,j}/\overline{I}_{ml,j} \\ \overline{I}_{fl,j}/\overline{I}_{mf,j} \\ \overline{I}_{ff,j}/\overline{I}_{mf,j} \\ \overline{I}_{mF,j}/\overline{I}_{ml,j} \\ \end{array}$ | 0.67 0.00 0.00 0.00 0.15 0.09 -0.15 | 0.00 0.65 0.00 0.00 0.05 0.07 0.22 0.20 | 0.00 0.00 - 2.20 0.00 -0.48 -0.17 0.02 | 0.00 0.00 - 8.80 0.04 -0.44 0.01 | 0.00 0.00 0.00 - 1.28 -0.41 0.02 | 0.00 0.00 0.00 0.21 -0.81 0.01 | 0.00 0.00 0.00 -0.37 -0.11 -1.99 | 0.00 0.00 0.00 0.00 0.04 0.02 -0.01 | | | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Panel B: Sample fro | om the 20 | 0.20 05 Round | l of the Ed | conomic (| Census | 0.03 | 0.01 | <u>0.47</u> | | | | |
| | $\begin{array}{c} R_{ml,j}/R_{ml,Serv.} \\ R_{mF,j}/R_{mF,Serv.} \\ R_{fl,j}/R_{ml,j} \\ R_{ff,j}/R_{mf,j} \\ \overline{I}_{fl,j}/\overline{I}_{ml,j} \\ \overline{I}_{fl,j}/\overline{I}_{ml,j} \\ \overline{I}_{ff,j}/\overline{I}_{mF,j} \\ \overline{I}_{mF,j}/\overline{I}_{mI,j} \end{array}$ | 0.67 0.00 0.00 0.00 0.11 0.08 -0.15 | 0.00 0.75 0.00 0.00 0.09 0.12 0.33 | 0.00 0.00 - 2.21 0.00 -0.43 -0.17 0.01 | 0.00 0.00 - 3.56 0.19 -0.56 0.04 | 0.00 0.00 0.00 <u>-1.41</u> -0.51 0.02 | 0.00 0.00 0.00 0.22 <u>-0.61</u> 0.03 | 0.00 0.00 0.00 -0.66 -0.18 <u>-2.12</u> | 0.00 0.00 0.00 0.00 0.09 0.10 -0.07 | | | | |

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