Male Income Inequality & Female Marital Outcomes
Evidence from India

A.V. Chari       Annemie Maertens      Sinduja V. Srinivasan

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Motivation

Increasing income inequality in India
Motivation

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And women’s age at marriage rising
Motivation

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Increasing income inequality in India

And women’s age at marriage rising

How are two trends related?
Does male income income affect female marital outcomes?

- Increased (upper tail) earnings inequality: Women delay marriage
  - Marriage propensity decreases by 2 percentage points
  - Age at marriage increases by 0.4 years
- While searching, women remain in school
  - Women get additional 0.6 years of education
  - Complete high school; Matriculate into college
Does male income income affect female marital outcomes?

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Overview

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Model: Marital Search

Data: Indian Human Development Survey (2005)
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Empirical Strategy
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Results: Impact of male income inequality on female marital outcomes
· Educational attainment
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Summary & Conclusion
Model & Data

Woman faces male earnings distribution: accepts or rejects offer of

\[ R \cdot q \cdot \text{Search time (age at marriage)} \]

Rising inequality often asymmetric

- Upper-tail inequality increases \( R \) and search time for most women
- Inequality in lower-tail will not affect most women

Indian Human Development Survey (2005): nationally representative

- Full sample: Impact on marital status (probability)
- Ever-married sample: Impact on age at marriage

Measures

- Male earnings: Outside earnings + farm/business income
- Earnings distribution: Eligible men in each marriage market
- \( \rightarrow \) Unmarried; ages 18-35; not enrolled in school

Marriage markets: Community (caste) and state
- Exploits regional and occupational earnings differences
Model

Woman faces male earnings distribution
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- Reservation earnings level $R$
- Probability of marriage $q$
- Search time (age at marriage) $\frac{1}{q}$
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Descriptives
Empirical Strategy

Full sample: Regress marital status on male earnings inequality (LPM)
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\[ y_{ics} = \beta_1 (e^{90} - e^{50})_{cs} + \beta_2 (e^{50} - e^{10})_{cs} + \beta_3 e^{50}_{cs} + \gamma Age_{ics} + \eta_c + \eta_s + u_{ics} \]
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\[ y_{ics} = 1 \text{ if woman } i \text{ in community } c \text{ and state } s \text{ is married} \]
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\( (e^{90} - e^{50})_{cs}, (e^{50} - e^{10})_{cs} \): male earnings inequality measures
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\[ y_{ics} = \beta_1(e^{90} - e^{50})_{cs} + \beta_2(e^{50} - e^{10})_{cs} + \beta_3 e_{cs}^{50} + \gamma \text{Age}_{ics} + \eta_c + \eta_s + u_{ics} \]

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\[ Age_{ics} : \text{ individual’s age} \]
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\(Age_{ics} : \text{ individual’s age}\]

\(\eta_c : \text{ community fixed effects}; \eta_s : \text{ state fixed effects}\]

\(u_{ics} : \text{ error}\]
Empirical Strategy

Ever-married sample: Regress age at marriage on male earnings inequality

\[ \text{AgeMarriage}_{ics} = \beta_1 (e^{90} - e^{50})_{cs} + \beta_2 (e^{50} - e^{10})_{cs} + \beta_3 e^{50}_{cs} + \eta_c + \eta_s + u_{ics} \]

\( \text{AgeMarriage}_{ics} \): age at marriage for woman \( i \) in caste \( c \) and state \( s \)
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\( e^{50}_{cs} \): male earnings distribution location
\( \text{Age}_{ics} \): individual’s age
\( \eta_c \): community fixed effects; \( \eta_s \): state fixed effects
\( u_{ics} \): error
↑ Male income inequality: ↓ Female marriage rates

Driven by upper-half inequality

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<thead>
<tr>
<th>Male earnings: $90^{th}$-$50^{th}$ percentile</th>
<th>Probability of marriage</th>
</tr>
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<td>Age of woman (years)</td>
<td>0.068 *** (0.001)</td>
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<td>N (women)</td>
<td>25,550</td>
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<td>R-squared</td>
<td>0.451</td>
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↑ Male income inequality: ↓ Female marriage rates; ↑ Age at marriage

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Testing alternative hypotheses

AH1: Are men searching longer for women?  No
AH2: Are women different across high- and low-inequality markets?  No
AH3: Are men absent from marriage market?  No
AH4: Are male earnings proxying for (expected) female earnings?  No
AH5: Are marriages delayed due to wedding expenditures (do they)?  No
AH1: Are men searching longer for women?

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AH3: Are men absent from marriage market?  No
AH4: Are male earnings proxying for (expected) female earnings?  No
AH5: Are marriages delayed due to wedding expenditures (dowry)?  No
Human capital implications of delayed marriage (ever-married sample)

Impact on completed years of education

\[ \text{EduYears} = \beta_1 (e_{90} - e_{50}) + \beta_2 (e_{50} - e_{10}) + \beta_3 e_{50} + \eta_c + \eta_s + u \]

Identify level where additional education accrues

\[ \text{level} = \beta_1 (e_{90} - e_{50}) + \beta_2 (e_{50} - e_{10}) + \beta_3 e_{50} + \eta_c + \eta_s + u \]

Women attain more education, at high school/college

- Women accrue 0.6 additional years of education
- Complete high school; Matriculate into college

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<tr>
<td>Any education</td>
<td>5+ years</td>
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<td>10+ years</td>
<td>0.607∗0.013</td>
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<td>12+ years</td>
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Caste fixed effects? Yes
State fixed effects? Yes
N (women) 627
R-squared 0.201

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<td>0.270</td>
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<tr>
<td>State fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N (women)</td>
<td>627</td>
<td>627</td>
<td>627</td>
<td>627</td>
<td>627</td>
<td>627</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.201</td>
<td>0.139</td>
<td>0.130</td>
<td>0.164</td>
<td>0.176</td>
<td>0.167</td>
</tr>
</tbody>
</table>
Conclusion

Earnings inequality impacts female marital outcomes in India
- Increases in upper-half inequality delay marriage; no effect from lower-half
- Results robust to alternative hypotheses, measures, regression samples
Earnings inequality impacts female marital outcomes in India
· Increases in upper-half inequality delay marriage; no effect from lower-half
· Results robust to alternative hypotheses, measures, regression samples

Corresponding effect on educational attainment, at higher levels
Thank you!
Women marry within their community and settle nearby.
**AH1: Male marriage uncorrelated with female earnings dispersion**

<table>
<thead>
<tr>
<th>Probability of marriage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female earnings: 90&lt;sup&gt;th&lt;/sup&gt;-50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>-0.001 (0.004)</td>
</tr>
<tr>
<td>Female earnings: 50&lt;sup&gt;th&lt;/sup&gt;-10&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>-0.004 (0.008)</td>
</tr>
<tr>
<td>Female earnings: 50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.020 (0.012)</td>
</tr>
<tr>
<td>Age of man (years)</td>
<td>0.047*** (0.000)</td>
</tr>
</tbody>
</table>

Community fixed effects? Yes
State fixed effects? Yes
N (men) 37,841
R-squared 0.546
AH2: Women in high-inequality markets are not observably different
AH2: Women in high-inequality markets are not observably different

<table>
<thead>
<tr>
<th></th>
<th>Age at menarche</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male earnings: 90&lt;sup&gt;th&lt;/sup&gt;-50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.035</td>
<td>1.106</td>
</tr>
<tr>
<td></td>
<td>(0.080)</td>
<td>(1.310)</td>
</tr>
<tr>
<td>Male earnings: 50&lt;sup&gt;th&lt;/sup&gt;-10&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.153</td>
<td>-0.831</td>
</tr>
<tr>
<td></td>
<td>(0.179)</td>
<td>(3.878)</td>
</tr>
<tr>
<td>Male earnings: 50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.091</td>
<td>1.590</td>
</tr>
<tr>
<td></td>
<td>(0.237)</td>
<td>(3.706)</td>
</tr>
</tbody>
</table>

Community fixed effects? Yes Yes
State fixed effects? Yes Yes
N (women) 646 646
R-squared 0.235 0.086
AH2: Women in high-inequality markets are not observably different

<table>
<thead>
<tr>
<th></th>
<th>Age at menarche</th>
<th>Height (cm)</th>
<th>Age at marriage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male earnings: 90^{th}-50^{th} percentile</strong></td>
<td>0.035</td>
<td>1.106</td>
<td>0.335***</td>
</tr>
<tr>
<td></td>
<td>(0.080)</td>
<td>(1.310)</td>
<td>(0.106)</td>
</tr>
<tr>
<td><strong>Male earnings: 50^{th}-10^{th} percentile</strong></td>
<td>0.153</td>
<td>-0.831</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>(0.179)</td>
<td>(3.878)</td>
<td>(0.289)</td>
</tr>
<tr>
<td><strong>Male earnings: 50^{th} percentile</strong></td>
<td>0.091</td>
<td>1.590</td>
<td>-0.489**</td>
</tr>
<tr>
<td></td>
<td>(0.237)</td>
<td>(3.706)</td>
<td>(0.240)</td>
</tr>
<tr>
<td>Age at menarche</td>
<td></td>
<td></td>
<td>0.041</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.060)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td></td>
<td></td>
<td>0.006**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>Community fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N (women)</td>
<td>646</td>
<td>646</td>
<td>646</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.235</td>
<td>0.086</td>
<td>0.180</td>
</tr>
</tbody>
</table>
### AH3: Men are not absent from marriage market

<table>
<thead>
<tr>
<th>Male earnings: $90^{th}$-$50^{th}$ percentile</th>
<th>Probability of marriage</th>
<th>Age at marriage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male earnings: $50^{th}$-$10^{th}$ percentile</td>
<td>-0.014**</td>
<td>0.339***</td>
</tr>
<tr>
<td>Male earnings: 50$^{th}$ percentile</td>
<td>0.002</td>
<td>0.048</td>
</tr>
<tr>
<td>Age of woman (years)</td>
<td>0.068***</td>
<td></td>
</tr>
<tr>
<td>Male:Female ratio</td>
<td>0.044***</td>
<td>-0.239</td>
</tr>
</tbody>
</table>

Community fixed effects? Yes  Yes  
State fixed effects? Yes  Yes  
N (women)  25,530  644  
R-squared  0.451  0.174
AH4: Male earnings not proxying for female earnings

<table>
<thead>
<tr>
<th></th>
<th>Probability of marriage</th>
<th>Age at marriage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male earnings: 90\textsuperscript{th}-50\textsuperscript{th} percentile</strong></td>
<td>-0.021***</td>
<td>0.467***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.139)</td>
</tr>
<tr>
<td>Male earnings: 50\textsuperscript{th}-10\textsuperscript{th} percentile</td>
<td>-0.012</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.312)</td>
</tr>
<tr>
<td>Male earnings: 50\textsuperscript{th} percentile</td>
<td>0.010</td>
<td>-0.328</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.274)</td>
</tr>
<tr>
<td>Age of woman (years)</td>
<td>0.068***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td><strong>Female earnings: 90\textsuperscript{th}-50\textsuperscript{th} percentile</strong></td>
<td>0.012**</td>
<td>-0.283</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.182)</td>
</tr>
<tr>
<td>Female earnings: 50\textsuperscript{th}-10\textsuperscript{th} percentile</td>
<td>-0.006</td>
<td>0.199</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.321)</td>
</tr>
<tr>
<td>Female earnings: 50\textsuperscript{th} percentile</td>
<td>0.017</td>
<td>-0.581</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.527)</td>
</tr>
<tr>
<td>Community fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N (women)</td>
<td>25,550</td>
<td>646</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.451</td>
<td>0.179</td>
</tr>
</tbody>
</table>
AH5: Wedding expenditures are not prohibitive

<table>
<thead>
<tr>
<th>Male earnings: $90^{th}-50^{th}$ percentile</th>
<th>Probability of marriage</th>
<th>Age at marriage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.013**</td>
<td>0.386***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Male earnings: $50^{th}-10^{th}$ percentile</td>
<td>-0.005</td>
<td>0.066</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.281)</td>
</tr>
<tr>
<td>Male earnings: $50^{th}$ percentile</td>
<td>0.011</td>
<td>-0.506**</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.230)</td>
</tr>
<tr>
<td>Age of woman (years)</td>
<td>0.068***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>Wedding expenditure</td>
<td>-0.003</td>
<td>-0.041</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.076)</td>
</tr>
</tbody>
</table>

Community fixed effects?  Yes  Yes
State fixed effects?  Yes  Yes
N (women)  25,550  646
R-squared  0.451  0.175
Women with no education still delay marriage

Channel: Income inequality → education

<table>
<thead>
<tr>
<th></th>
<th>Age at marriage (1)</th>
<th>Age at marriage (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male earnings: 90th-50th percentile</strong></td>
<td>0.311***</td>
<td>0.311**</td>
</tr>
<tr>
<td></td>
<td>(0.117)</td>
<td>(0.119)</td>
</tr>
<tr>
<td>Male earnings: 50th-10th percentile</td>
<td>-0.017</td>
<td>-0.076</td>
</tr>
<tr>
<td></td>
<td>(0.283)</td>
<td>(0.291)</td>
</tr>
<tr>
<td>Male earnings: 50th percentile</td>
<td>-0.377</td>
<td>-0.348</td>
</tr>
<tr>
<td></td>
<td>(0.231)</td>
<td>(0.236)</td>
</tr>
<tr>
<td>Female no education indicator</td>
<td>-0.868***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.224)</td>
<td></td>
</tr>
<tr>
<td>Female less than primary indicator</td>
<td></td>
<td>-0.934***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.205)</td>
</tr>
<tr>
<td><strong>Male 90th-50th * No education</strong></td>
<td>0.282</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.239)</td>
<td></td>
</tr>
<tr>
<td><strong>Male 50th-10th * No education</strong></td>
<td>0.097</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.179)</td>
<td></td>
</tr>
<tr>
<td><strong>Male 90th-50th * Less than primary</strong></td>
<td></td>
<td>0.183</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.217)</td>
</tr>
<tr>
<td><strong>Male 50th-10th * Less than primary</strong></td>
<td></td>
<td>0.287</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.169)</td>
</tr>
<tr>
<td><strong>Net effect</strong></td>
<td>0.593**</td>
<td>0.494**</td>
</tr>
<tr>
<td></td>
<td>(0.236)</td>
<td>(0.209)</td>
</tr>
</tbody>
</table>

Community fixed effects? Yes
State fixed effects? Yes
N (women) 627
R-squared 0.202
## Education outcomes unchanged for young girls

<table>
<thead>
<tr>
<th></th>
<th>Currently enrolled in school</th>
<th>Completed years of education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male earnings: 90&lt;sup&gt;th&lt;/sup&gt;-50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.011 (0.012)</td>
<td>0.023 (0.017)</td>
</tr>
<tr>
<td>Male earnings: 50&lt;sup&gt;th&lt;/sup&gt;-10&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>0.023 (0.018)</td>
<td>0.001 (0.039)</td>
</tr>
<tr>
<td>Male earnings: 50&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>-0.045 (0.024)</td>
<td>-0.022 (0.054)</td>
</tr>
<tr>
<td>Age of woman (years)</td>
<td>0.219*** (0.003)</td>
<td>0.389*** (0.014)</td>
</tr>
<tr>
<td>Community fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N (girls)</td>
<td>19,446</td>
<td>19,446</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.552</td>
<td>0.571</td>
</tr>
</tbody>
</table>