The best way to measure women’s agency using just five questions

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Why measure women’s agency?

- It is often valuable to measure women’s agency
  - Does an intervention increase women’s agency?
  - Does women's agency moderate how successful an intervention’s is?
- Agency = Ability to affect one’s life by having power to make choices and to control acquired resources
How do you choose which survey questions to use?

- Option 1: Use validated, thorough module such as WEAI
- Option 2: Choose a few questions in ad hoc way
- Our alternative: New validated, short module
  - Useful when agency is of secondary interest
  - Common questions that researchers can supplement with others
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- Goal #1: New module for women’s agency
- Goal #2: New method for designing survey modules by combining machine learning and semi-structured interviews (MASI)
Methodological innovation for designing the survey module

- Choose questions that are most strongly correlated with “gold standard” measure of the construct, i.e., women’s agency
- Gold standard: Semi-structured interviews
- Also tried using lab game but did not work well
Data collection
Study carried out among women in Haryana, India

- Collected data in 21 villages in Kurukshetra district in Haryana from February to May 2019
- Conducted both quantitative surveys and qual interviews with 210 married women
- Sample averages: 30 years old, married 10 years, 10 years of education, youngest child age 5
Quantitative survey had closed-ended questions about agency

- Ask a long list (64) close-ended or quantitative survey questions

- Goal was to include the common questions used by researchers (but not be so redundant as to frustrate survey respondents)

- Questions drawn from several existing measurement tools
  - Relative Autonomy Index questions (Ryan and Deci 2000)
  - Demographic and Health Survey
  - Questions from J-PAL Toolkit on measuring women’s agency
  - Sexual Relationship Power Scale (Pulerwitz et al. 2000)
Semi-structured interviews serve as “gold standard”

- Conducted by 3 interviewers trained in qualitative methods
- On average 45 minutes long
- Followed a guide covering 6 domains: Education, Fertility, Mobility, Health, Household expenditures, and Work
- Then transcribed and coded up using qualitative coding methods
Histogram of women’s agency based on semi-structured interviews
Statistical analysis
Selecting questions that best match the “gold standard” measure

- The goal is prediction, as with standard machine learning
- Main difference: We specify the number of variables to include

Method 1: LASSO stability selection
- Run LASSO on 50% subsamples 1000 times
- Best variables are the ones most often chosen by LASSO

Method 2: Backward selection
- Starting with all 64 variables, delete one and calculate the $R^2$ when $Y$ is regressed on standardized index of remaining 63
- Permanently delete the variable that led to smallest loss of $R^2$
- Repeat to trim set from 63 to 62 vars; keep going until 5 questions are left
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New 5-question survey module
# Proposed survey questions to use

<table>
<thead>
<tr>
<th>Question</th>
<th>LASSO stability selection</th>
<th>Backward selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opinion heard when expensive item like a bicycle or cow is purchased?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Need permission from other household members to buy clothing for self?</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Allowed to buy things in the market without asking partner?</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Are you permitted to visit women in other neighborhoods to talk with them?</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Who do you consult with for decisions regarding your children's health care?</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Allowed to go alone to meet your friends for any reason?</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Who in hhld decides to pay school fees for a relative from your side of family?</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

| 5-Question Index $R^2$           | 0.2888     | 0.2867     |
| 5-Question Multivariate Regression $R^2$ | 0.2896     | 0.2893     |
Index performs well compared to benchmarks

Another benchmark: If use principal component of all 64 questions as index, $R^2$ will be $0.0$. If use principal component of 5 randomly chosen variables, $R^2$ will be lower.

[Graph showing distribution of R2 using index that averages 5 randomly chosen variables]
Index performs well compared to benchmarks

Another benchmark: If use principal component of all 64 questions as index, $R^2 = 0.23$
Conclusions

- Takeaway #1: Can use this new module for women’s agency in surveys
- Takeaway #2: This new method for developing validated measures can be applied elsewhere
  - We would like to piggyback on other field projects to replicate what we did
  - Method can also be applied when trying to select quantitative indicators of complex concepts
Thanks to our field team (Ambika Chopra, Anubha Agarwal, Sahiba Lal, Azfar Karim, Bijoyetri Samaddar, Vrinda Kapoor) + data analysts (Jake Gosselin, Akhila Kovvuri, Ashley Wong) + funder (Bill & Melinda Gates Foundation)

Comments welcome!
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Extra slides
### Coding tree example for mobility

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1        | Has restrictions imposed by husband or family members in stepping out  
           | Needs explicit permission to step out  
           | Always goes accompanied by someone  
           | Does not go independently to ANY of: school, hospital, natal village, bank, shopping |
| 2        | Has same restrictions as for category 1  
           | But the woman resists, e.g., goes outside to talk to a friend without permission even though she is “supposed to” get permission  
           | Or questions the restrictions put on her |
| 3        | Some mobility: Is allowed to go some places but not others (e.g., kirana shop, or anywhere in village, to the main road to pick up her children from school) |
| 4        | Does not have restrictions imposed by husband or family members in stepping out  
           | Does not need explicit permission to step out  
           | Can go independently to all of: school, hospital, natal village, bank, shopping, both inside and outside village |
## Frequency that top questions are selected using LASSO stability

<table>
<thead>
<tr>
<th>Question</th>
<th>Percent of times selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opinion heard when expensive item like a bicycle or cow is purchased?</td>
<td>86.8</td>
</tr>
<tr>
<td>Need permission from other household members to buy clothing for self?</td>
<td>76.8</td>
</tr>
<tr>
<td>Allowed to buy things in the market without asking partner?</td>
<td>75.7</td>
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<tr>
<td>Are you permitted to visit women in other neighborhoods to talk with them?</td>
<td>62.8</td>
</tr>
<tr>
<td>Who do you consult with for decisions regarding your children’s health care?</td>
<td>59.4</td>
</tr>
<tr>
<td>Allowed to go alone to meet your friends for any reason?</td>
<td>58</td>
</tr>
<tr>
<td>Are you permitted to visit any place riding on public transport?</td>
<td>57.4</td>
</tr>
<tr>
<td>Can decide by self to purchase emergency medicine for child</td>
<td>55.4</td>
</tr>
<tr>
<td>When husband has different opinion, voice opinion and argue more often than voice opinion but do as he says</td>
<td>53.2</td>
</tr>
<tr>
<td>In last 12 months, how often you and husband discussed children’s expenses</td>
<td>50.8</td>
</tr>
</tbody>
</table>

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Correlation between indices and domain-level qualitative scores

<table>
<thead>
<tr>
<th></th>
<th>Qual interview agency score</th>
<th>LASSO stability selection 5-Q Index</th>
<th>Backward selection 5-Q Index</th>
<th>Fertility score</th>
<th>Education score</th>
<th>Health score</th>
<th>HH Expenses score</th>
<th>Mobility score</th>
<th>Work score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qual-interview agency score</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>LASSO stability selection 5-Q Index</td>
<td>0.535</td>
<td>1.000</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Backward selection 5-Q Index</td>
<td>0.537</td>
<td>0.817</td>
<td>1.000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertility score</td>
<td>0.341</td>
<td>0.199</td>
<td>0.237</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education score</td>
<td>0.662</td>
<td>0.296</td>
<td>0.262</td>
<td>0.088</td>
<td>1.000</td>
<td></td>
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<tr>
<td>Health score</td>
<td>0.631</td>
<td>0.281</td>
<td>0.312</td>
<td>0.132</td>
<td>0.416</td>
<td>1.000</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HH Expenses score</td>
<td><strong>0.710</strong></td>
<td><strong>0.441</strong></td>
<td><strong>0.437</strong></td>
<td><strong>0.097</strong></td>
<td><strong>0.364</strong></td>
<td><strong>0.363</strong></td>
<td><strong>1.000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility score</td>
<td><strong>0.696</strong></td>
<td><strong>0.338</strong></td>
<td><strong>0.358</strong></td>
<td><strong>0.005</strong></td>
<td><strong>0.306</strong></td>
<td><strong>0.357</strong></td>
<td><strong>0.526</strong></td>
<td><strong>1.000</strong></td>
<td></td>
</tr>
<tr>
<td>Work score</td>
<td><strong>0.467</strong></td>
<td><strong>0.313</strong></td>
<td><strong>0.283</strong></td>
<td><strong>0.140</strong></td>
<td><strong>0.156</strong></td>
<td><strong>0.027</strong></td>
<td><strong>0.079</strong></td>
<td><strong>0.142</strong></td>
<td><strong>1.000</strong></td>
</tr>
</tbody>
</table>

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**Correlation between agency measures and individual traits**

<table>
<thead>
<tr>
<th>Qual-interview agency score</th>
<th>LASSO stability selection 5-Q Index</th>
<th>Backward selection 5-Q Index</th>
<th>Less than 8 years of education</th>
<th>Age at marriage</th>
<th>Age gap (Husband-wife)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qual-interview agency score</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
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<td>0.537</td>
<td>0.817</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 8 years of education</td>
<td>-0.039</td>
<td>-0.094</td>
<td>-0.162</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Age at marriage</td>
<td>-0.064</td>
<td>-0.012</td>
<td>-0.020</td>
<td>-0.349</td>
<td>1.000</td>
</tr>
<tr>
<td>Husband-wife age gap</td>
<td>0.053</td>
<td>0.019</td>
<td>0.039</td>
<td>0.132</td>
<td>-0.249</td>
</tr>
</tbody>
</table>

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Distribution of agency scores from interviews, by domain
How much gain from using more questions? (LASSO stability)

Max R2 = 0.351 (12 questions)

5-question R2 = 0.289
How much gain from using more questions? (Backward selection)
Distribution of WTP to receive money personally

![Histogram showing the distribution of WTP to receive Rs. 300 personally.](image)

- The x-axis represents the extra money sacrificed to receive Rs. 300 personally, ranging from 'Never' to 400.
- The y-axis represents the percentage of respondents.

The histogram indicates a significant number of respondents are willing to sacrifice a large amount of money to receive Rs. 300 personally.