REWARDING TRUTHFUL-TELLING IN STATED PREFERENCE STUDIES

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**Stated preference methods**

- Used to determine public’s preferences, especially towards non-market goods
- Survey-based – in specially designed surveys respondents state what they would do
- Important for cost-benefit analysis – allow to estimate the benefits
- Flexible – enable valuation of hypothetical states
Stated preference methods

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BUT much scepticism whether survey responses reflect actual preferences
- Surveys are often hypothetical
- Empirical evidence on hypothetical bias
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How to incentivise respondents to answer truthfully in surveys?
Conditions for truthful preference disclosure
Carson and Groves 2007, Carson et al. 2014

1. Respondents understand and answer the question being asked.
2. The survey is seen as a take-it-or-leave-it offer.
3. The survey involves a yes-no answer on a single project. (the Gibbard-Satterthwaite theorem)
4. The authority can enforce the payment (coercive payment).
5. The survey is perceived as consequential:
   - Respondents care about the good being valued.
   - Respondents believe that their responses affect the finally introduced policy.
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• Very restrictive
• Limit efficiency – a single binary question
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Recently developed for other formats
• A sequence of questions – Vossler et al. 2012
• Open-ended format – Holladay and Vossler 2016

But additional conditions are imposed – even more restrictions
As it is difficult to meet the conditions...

### Alternative approaches

- **Cheap talk** – scripts informing about hypothetical bias (Cummings and Taylor 1999)
- **Oath** – respondents swear to tell the truth (Jacquemet et al. 2013)

![Signature](image)

- **Honesty priming** – respondents complete a task involving honesty and truthfulness concepts (De-Magistris et al. 2013)
- **Repetitive reminder about an opt-out / status quo option** (Ladenburg and Olsen 2014)

- All of them are not grounded in economic theory.
- Theoretically, no difference is expected in the behaviors of respondents who answer surveys with and without any of the approaches.
Alternative approaches – limitations

- Lack of economic-based incentives
- Emphasise the hypothetical nature of the survey
- Mixed evidence on the effectiveness of the approaches

We propose a new tool to increase reliability of stated preference surveys.

Our approach

- Lie detection
- Monetary reward for respondents who answer truthfully
  
*Information for the researcher*

*Economic-based incentives*
Our study

- Laboratory, computer-based experiment
- In February 2015, in Nantes, France
- Reforestation programme in Senegal and Peru
- Planted trees would help restore eroded lands (Restoration) or mitigate ongoing erosion (Protection)

<table>
<thead>
<tr>
<th>Programme 1</th>
<th>Programme 2</th>
<th>None of the programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online information</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Ecosystem service</td>
<td>Protection</td>
<td>Restoration</td>
</tr>
<tr>
<td>Country</td>
<td>Senegal</td>
<td>Peru</td>
</tr>
<tr>
<td>Price to plant a tree</td>
<td>2 €</td>
<td>15 €</td>
</tr>
<tr>
<td>Your choice</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

- 16 choice tasks per respondent
- 424 undergraduate students

Regular update with photos and e-mails about the project

2, 5, 10, 15 €
Our study – three treatments

<table>
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<th>Study design</th>
<th>Modelling</th>
<th>Results</th>
<th>Conclusions</th>
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</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>146 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oath</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>137 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asked to sign a form to swear to tell the truth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lie detection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>141 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse measurement with an oximeter; Those suspected of lying excluded from the monetary reward</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reward for participation: a lottery at the end of the experiment in which one participant wins a gift voucher of 50 €
The treatments – additional remarks

• No significant differences in socio-demographics (gender, age, income) across treatments.
• Nobody refused to use the oximeter or to sign the oath form.
• Four participants suspected of lying were excluded.
• Lie detection based on:
  - always choosing Programme 1 or Programme 2,
  - taking very little time to complete the survey,
  - extremely high cardiac pulse rates.
• We excluded participants only when we had strong doubts.
Modelling approach

- Based on the random utility framework (McFadden 1974)
- Utility of consumer $n$ from choosing alternative $j$ in choice task $t$ ($U_{njt}$):

$U_{njt} = \alpha c_{njt} + bX_{njt} + e_{njt}$

- A consumer derives utility from:
  - observable characteristics of the good
  - unobservable factors (random component)

- Our goal to examine the effects of oath and lie detection on:
  - Preferences – the coefficient of the cost attribute
  - Randomness of respondents’ choices – the variance of the error term (scale)
Modelling approach

- Respondents were asked to report their level of stress when completing the survey. (from 1 to 10)
- In lie detection, respondents were asked to state how credible they think the device is. (from 1 to 10)
- These two aspects are indicators of respondent’s (unobservable) engagement.
- They may affect stated preferences.
- They may also be affected by the treatment itself.
- Thus, we estimate a hybrid choice model.
Modelling approach
Hybrid Choice Model

- Incorporate perceptions, psychological factors into the random utility model
- Enable to model explicitly the effect of an experimental condition on respondents’ perceptions, and the effect of the perceptions on their (observed) choices
- A psychological factor – involvement in the survey
- All equations are estimated simultaneously

**Structural equation**
(linear regression)
The latent variable is explained by respondents’ socio-demographics.

**Latent variable**
(unobserved involvement in the survey)

**Measurement equations**
(linear regression)
The latent variable influences self-reports about stress and credibility.

**Discrete choice model**
(interactions in the mixed logit model)
The latent variable influences the preferences.
Measurement equations

- Dependent variables (continuous):
  - Indicator of experienced stress
  - Indicator of perceived credibility of lie detection

  $L_{stress} = \phi \left( \frac{\alpha - \beta_{stress} * LV}{\sigma_{stress}} \right)$

  and $\sigma_{stress}$ and $\zeta_{stress}$ are estimated.

- Latent involvement in the survey is positively correlated with self-reported measures of the credibility of lie detection.

- No significant relationship between involvement in the survey and stress – difficult to measure stress.

<table>
<thead>
<tr>
<th></th>
<th>Coeff.</th>
<th>St. Err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_{stress}$</td>
<td>0.1041</td>
<td>0.0871</td>
</tr>
<tr>
<td>$\sigma_{stress}$</td>
<td>1.7886</td>
<td>0.0710</td>
</tr>
<tr>
<td>$\beta_{credibility}$</td>
<td>1.5307</td>
<td>0.2430</td>
</tr>
<tr>
<td>$\sigma_{credibility}$</td>
<td>3.0132</td>
<td>0.2873</td>
</tr>
</tbody>
</table>

*** - Significance at the 1% level.
Structural equation

- Dependent variable: Involvement in the survey (latent variable, LV)

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.1471</td>
<td>0.0734</td>
</tr>
<tr>
<td>Age²</td>
<td>0.0121</td>
<td>0.0041</td>
</tr>
<tr>
<td>Female</td>
<td>1.0650</td>
<td>0.3544</td>
</tr>
<tr>
<td>Income</td>
<td>-1.6361</td>
<td>1.0105</td>
</tr>
<tr>
<td>Income²</td>
<td>5.9715</td>
<td>1.8707</td>
</tr>
</tbody>
</table>

- Individual’s socio-demographics influence unobservable involvement in the survey.

***, ** - Significance at the 1% and 5% levels, respectively.
## Discrete choice model

Random parameters model with scale covariates

### Preference parameters

|                  | Coeff.  | St. Err. | Status quo | -5.2782  | 0.8464 | ***
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</tr>
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<tbody>
<tr>
<td>Online</td>
<td>0.7684</td>
<td>0.0775</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restoration</td>
<td>-0.0549</td>
<td>0.0875</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>0.0215</td>
<td>0.0546</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>-0.1774</td>
<td>0.0215</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price x Oath</td>
<td>-0.1341</td>
<td>0.0913</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price x Oath x LV</td>
<td>0.0961</td>
<td>0.0476</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price x Lie det.</td>
<td>-0.1190</td>
<td>0.0377</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price x Lie det. x LV</td>
<td>0.0452</td>
<td>0.0188</td>
<td>**</td>
<td></td>
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### Covariates of scale

<table>
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<tr>
<th></th>
<th>Coeff.</th>
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<th>Oath</th>
<th>0.4681</th>
<th>0.5676</th>
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<tr>
<td>Lie detection</td>
<td>-0.7413</td>
<td>0.1911</td>
<td>***</td>
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<tr>
<td>Oath x LV</td>
<td>-0.3184</td>
<td>0.3528</td>
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<td></td>
<td></td>
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<tr>
<td>Lie detection x LV</td>
<td>0.8908</td>
<td>0.3039</td>
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On average, less uncertainty / randomness in respondents’ choices in lie detection when combined with involvement in the survey

***, ** - Significance at the 1% and 5% levels, respectively.
# [Discrete choice model](#)

## Random parameters model with scale covariates

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### Covariates of scale

- Lower willingness to pay in lie detection – smaller hypothetical bias?
- Involvement in a survey increases willingness to pay

***, ** - Significance at the 1% and 5% levels, respectively.
Conclusions

- Rewarding truthfulness:
  1) Based on economic theory
  2) Easy to implement
  3) Not indifferent to respondents

- How does it affect respondents’ choices?
  - Lower randomness
  - Lower willingness to pay values

- Possible limitations
  - People react differently when they know that they are observed
  - Some respondents doubted the effectiveness of lie detection
  - Respondents may want to comply with researchers’ expectations
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