An estimation of the willingness to pay for community healthcare insurance scheme in rural Nigeria

By

Ataguba, John E
Department of Economics
University of Nigeria

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Presentation Outline

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• Health statistics in Nigeria
• The State of Health care financing
• Objectives
• Issued raised
• Literature review
• Methodology
• Results
• Recommendations
Introduction

- About 70% of Nigerians reside in the rural areas with over 65% of the overall population living below poverty line of about US$1/day and the bulk of the poor spend a great chunk of their earnings on food (WHO, 2002).
- High Gini coefficient of income distribution (0.51) => high inequality.
- Access to health care has been greatly reduced for the poor households due to their low purchasing power evidenced by their earnings and expenditure patterns.
- The catastrophic nature of financing health care for the poor and often rural population has been a source of worry for the country and other low and middle-income countries (LMICs) of Africa
- Need to develop alternative financing schemes to cater for the poor
- Such as health prepayment schemes and community based insurance schemes.
Health Statistics in Nigeria

• Brief health statistics for Nigeria
  – Life expectancy dropped from 53.8 years (females) and 52.6 years (males) in 1991 to 46 and 45 years respectively in 2003
  – Infant mortality rate (IMR) rose from 87.2 per 1,000 live births in 1990 to 100 in 2003
  – Under-5 mortality rate (U5MR) rose from 187 per 1,000 in 1998 to 198 in 2003 and about 57% of these under-5 deaths are associated with malnutrition (a consequence of poverty)
  – Maternal mortality rate also stands high at 800 per 100,000 live births and these death rates have been attributed to diseases such as malaria and diarrhoea and also to shortages in skilled medical personnel
  – The leading causes of child mortality include malaria (30%), diarrhoea (20%), and malnutrition accounts for 52% of under-5 deaths in Nigeria
  – HIV/AIDS prevalence as at 2003 is estimated as 6.1% of the population
The State of Health care financing

• Private sector financing made up largely of out-of-pocket payments (OOP) still remains large and dominant. Government funding on health has been on a decline (see Table 2)

• Decline in external resources on health as a percentage of total health expenditure [though current evidence suggests a minimal increase]

• Only recently did the Nigerian government re-launched the National Health Insurance Scheme (NHIS) in June 2005 that was first launched in October 1997 (Nwezeh, 2005) and it is yet to be fully implemented. In its phased implementation, the formally employed are first given priority which is counter to the nature of demand for health care in Nigeria.
Objectives of the study

• To apply the contingent valuation methodology (CVM) to investigate on empirical grounds, the basis for community premiums of the proposed risk-sharing scheme

Specifically,

– To estimate the willingness of rural households to pay for a community prepayment scheme using the Dichotomous Choice Method (DCM) and the Stochastic Payment Card (SPC) design;
– To determine the major factors that determine rural households’ willingness to pay for the proposed scheme;
– To determine the possibility of use of payment vehicles other than cash as it relates to rural communities;
– To compare the results from the two CVM formats for health policy and methodological reasons.
Issues raised

• We argue that if poverty is to be reduced at least by a substantial amount, the rural poor should be given the desired attention in terms of financial protection from their meagre financial resources.

• Given the nature and inverse link that exist between poverty and health, it is important therefore to design policies aimed at shielding the poor from further impoverishment if not totally eliminating their poverty as medical bills are categorized as forced payments (see Whitehead et al., 2001).

• We also argued that traditional CVM studies in this area ignore the actual decision making process in real life and we sought to mimic this through the incorporation of uncertainty in the decision making process.
Brief literature review

- Dong et al. (2003a) – Burkina Faso (WTP for community-based insurance)
- Dong et al. (2003b) – Burkina Faso (comparing gender effects of WTP in community-based health insurance scheme)
- Dong et al. (2004b) – Burkina Faso (differences in WTP of household heads for community-based health insurance premiums for themselves and other members of the household)
- Binam et al. (2004) – rural Cameroon (WTP for community prepayment scheme)
- Asenso-Okyere et al. (1997) - Ghana (WTP for health insurance)
- Mathiyazhagan (1998) – India (willingness of rural households to pay for community health insurance arrangements through community involvement and participation)
- Jiang et al. (2004) – China (willingness to pay for Rural Cooperative Medical Scheme (RCMS))
- Asgary et al. (2004) – Iran (rural household’s WTP for health insurance)
  - All these use various methods of elicitation of preferences.
What was missing?

• Protest votes as responses are omitted from analysis *a priori*, which may result in biases of various forms (hence need for sample selection models)

• Method of payment that has been used in traditional analyses in health insurance CVM studies has been in direct monetary terms (need to use non-monetary terms where possible)

• Uncertainty as an inherent part of decision making is largely neglected.
Literature on uncertainty

- Weighted Likelihood Function Model (WLFM) by Li and Mattson (1995)
- Asymmetric Uncertainty Model (ASUM) by Champ et al. (1997)
- Symmetric Uncertainty Model (SUM) by Loomis and Ekstrand (1998)
- Multiple-bound Discrete Choice Model (MBDCM) by Welsh & Poe (1998)
- Random Valuation Model (RVM) by Wang (1997)
  - Wang et al. (2004) and Wang & Whittington (2005) – the stochastic payment card design for elicitation
- Fuzzy Model (FM) by van Kooten et al. (2001)
Methodology

• Population: Rural Nigeria (Nsukka Local Government Area)
• Study Design: Cross-sectional
• Data sources: Household Survey
• Data collection tool: Structured Questionnaire
  - Proposed bid vector (₦0, ₦200, ₦400, ₦600, ₦800 and ₦1000 for the SPC design) and (₦200, ₦400, ₦600, ₦800 and ₦1000 for the DCM)
WTP Models

• The Heckman (1979) **Selection Model**
  – Used by differentiating protesters from non-protesters

• Maximum Likelihood Model
  – Similar also to the selection model by differentiating protesters from non-protesters

• **Random Valuation Model** (RVM)
  – this model assumes that the value placed by individuals on a good or service in a valuation process is a random variable with an underlying distribution rather than a single point valuation (Wang, 1997; Wang & Whittington, 2005)
Results

Descriptive statistics

- Over 77% of the respondents do not have more than 7 years of formal education.
- About 78% of the respondents had confidence in the proposed scheme.
- About 40% of the respondents have had a household member falling sick within the last two weeks prior to the interview.
- The cost of treatment of these sick household members is as high as an average of ₦763 ($5.87) across the whole sample of respondents.
- The amount borrowed and from the sale of valuable assets averaged across the entire respondents is about ₦666 ($5.12), which makes up over 87% of the amount spent on treatment averaged across the total respondents.
- Over half (60.2%) of the household heads reported health status above ‘Good’ as at the time of interview.
- Over half (55%) of the respondents seek health care from orthodox health care providers while 45% patronize herbalists, traditional healers and most especially patent medicine stores.
Results

Descriptive statistics cont’d

• The average distance to the nearest health centre is about 3.3Km with the maximum of about 10Km.
• More than half (59%) of the respondents adjudged the quality of the health care centres nearest to them as above ‘Good’.
• The knowledge of health insurance or any other form of insurance is quite low among the sample of respondents and this will not be any different from the general population of the rural dwellers as only about 11% of the respondents claimed knowledge of what insurance is all about.
• Only 3% of the respondents claimed to have participated in any form of insurance (not necessarily health related) in the past or at present
• The number of respondents WTP an amount decline with increasing bid amounts, which is typical of any ‘normal’ good with an inverse demand function. See the Bid Distribution
The distribution points to the need to correct for the selected sample by testing for sample selection bias.
# Results

Selection or First Stage results

**Table 8: Selection equations using the Heckman’s 2-step and the Maximum Likelihood Estimation procedures**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cash (2-Step Probit)</th>
<th>Cash (FIML)</th>
<th>Commodities (2-Step Probit)</th>
<th>SPC [Mean Eqn] (2-Step Probit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est.</td>
<td>S. Error</td>
<td>Est.</td>
<td>S. Error</td>
</tr>
<tr>
<td>Constant</td>
<td>2.005</td>
<td>1.367</td>
<td>2.123</td>
<td>1.341</td>
</tr>
<tr>
<td>Male</td>
<td>0.865</td>
<td>0.182***</td>
<td>0.802</td>
<td>0.183***</td>
</tr>
<tr>
<td>Sick</td>
<td>1.127</td>
<td>0.696*</td>
<td>1.099</td>
<td>0.683*</td>
</tr>
<tr>
<td>Floor</td>
<td>0.605</td>
<td>0.225***</td>
<td>0.610</td>
<td>0.234***</td>
</tr>
<tr>
<td>LTratamount</td>
<td>-0.139</td>
<td>0.103</td>
<td>-0.143</td>
<td>1.001</td>
</tr>
<tr>
<td>LDistance</td>
<td>0.440</td>
<td>0.135***</td>
<td>0.437</td>
<td>0.134***</td>
</tr>
<tr>
<td>LWealthmeasure</td>
<td>0.327</td>
<td>0.099***</td>
<td>0.312</td>
<td>0.100***</td>
</tr>
<tr>
<td>LBid</td>
<td>-1.018</td>
<td>0.186***</td>
<td>-1.042</td>
<td>0.183***</td>
</tr>
<tr>
<td>HHnumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KnowInsurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LBorrowedamount</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNumrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% correctly predicted</td>
<td>81%</td>
<td>79%</td>
<td>81%</td>
<td>88%</td>
</tr>
</tbody>
</table>

*, **, *** Significant at 10%, 5% and 1% levels respectively.
Results

• These factors are those that influence the probability of the respondent in reporting a positive WTP i.e. the factors that influence the probability of participating or protesting.

• **[cash]**: gender, recent experience of sickness, nature of the floor material of the household, distance to the nearest health facility, income and the initial bid amount.

• **[commodities]**: recent experience of sickness, distance to the nearest health centre, household size, knowledge of health insurance, and the number of dwelling rooms in the household.

• **[SPC]**: recent experience of sickness, distance to the nearest health facility, wealth or income level of the respondent, ownership of bathroom and a modern toilet facility.
Results

- Valuation or second stage results (1)

**Table 9: Willingness to pay equations for the use of cash and commodities**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>OLS Cash as payment vehicle</th>
<th>2-step Cash as payment vehicle</th>
<th>FIML</th>
<th>OLS Commodities as payment vehicle</th>
<th>2-Step Commodities as payment vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.408</td>
<td>0.645***</td>
<td>2.164</td>
<td>0.63***</td>
<td>2.243</td>
</tr>
<tr>
<td>Age</td>
<td>-0.007</td>
<td>0.003**</td>
<td>-0.006</td>
<td>0.003**</td>
<td>-0.007</td>
</tr>
<tr>
<td>Knowledge</td>
<td>0.377</td>
<td>0.125***</td>
<td>0.381</td>
<td>0.122***</td>
<td>0.380</td>
</tr>
<tr>
<td>Hstatus</td>
<td>-0.113</td>
<td>0.056**</td>
<td>-0.100</td>
<td>0.055**</td>
<td>-0.108</td>
</tr>
<tr>
<td>Floor</td>
<td>-0.237</td>
<td>0.115**</td>
<td>-0.261</td>
<td>0.113**</td>
<td>-0.244</td>
</tr>
<tr>
<td>Toilet</td>
<td>0.362</td>
<td>0.084***</td>
<td>0.374</td>
<td>0.082***</td>
<td>0.363</td>
</tr>
<tr>
<td>LWealth measure</td>
<td>0.147</td>
<td>0.049***</td>
<td>0.139</td>
<td>0.048***</td>
<td>0.142</td>
</tr>
<tr>
<td>LEd</td>
<td>0.411</td>
<td>0.071***</td>
<td>0.441</td>
<td>0.070***</td>
<td>0.431</td>
</tr>
</tbody>
</table>

\[ \chi \]
\[ \rho \]
\[ \sigma \]

| Adj. R-Squared | 0.275 |                      | -338.225 | 0.207 |

* *, **, *** Significant at 10%, 5% and 1% levels respectively.
Results

- The proxy for income positively influenced the amount households are WTP implying that richer households accept to pay higher amounts than poorer households. This imply also that WTP is an increasing function of ability to pay (ATP) (see Smith et al., 1999c:12)
- Households that know what health insurance is are willing to pay higher amounts because of the prepayment function
- Household heads with poorer health status are willing to pay higher amounts than household heads with better reported health status. The reverse is, however the case for the use of commodities which shows the importance of health irrespective of current health status.
- The elderly are less willing to pay higher amounts (cash) compared to the younger respondents (explainable by the pay-off period for any human capital investment in health with increasing age – Kenkel (1994) termed the effect due to life cycle)
- Male headed households are more willing to pay higher amounts than the female heads which is a big problem for health care financing in rural Nigeria
## Results

- Valuation or second stage results (2)

### Table 10: Willingness to pay equations for the SPC design

<table>
<thead>
<tr>
<th>Parameter</th>
<th>OLS</th>
<th>M. Error</th>
<th>2-step</th>
<th>M. Error</th>
<th>OLS</th>
<th>M. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est.</td>
<td>S. Error</td>
<td>Est.</td>
<td>S. Error</td>
<td>Est.</td>
<td>S. Error</td>
</tr>
<tr>
<td>Constant</td>
<td>4.644</td>
<td>0.426***</td>
<td>4.693</td>
<td>0.423***</td>
<td>5.449</td>
<td>0.160***</td>
</tr>
<tr>
<td>Male</td>
<td>0.182</td>
<td>0.068***</td>
<td>0.179</td>
<td>0.067***</td>
<td>-0.230</td>
<td>0.069***</td>
</tr>
<tr>
<td>HHNumber</td>
<td>0.020</td>
<td>0.011*</td>
<td>0.021</td>
<td>0.011*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.130</td>
<td>0.036***</td>
<td>0.127</td>
<td>0.036***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td>0.211</td>
<td>0.088**</td>
<td>0.212</td>
<td>0.087**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LWWealthmeasure</td>
<td>0.086</td>
<td>0.039**</td>
<td>0.086</td>
<td>0.038**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.238</td>
<td>0.068***</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.081</td>
<td>0.040**</td>
</tr>
<tr>
<td>Numrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.186</td>
<td>0.072***</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\lambda &= -0.218 \\
\rho &= -0.404 \\
\sigma &= 0.539 \\
\text{Adj. R-Squared} &= 0.143
\end{align*}
\]

\[*, **, *** \text{ Significant at 10\%, 5\% and 1\% levels respectively.}\]
Results

SPC

- **[mean eqn]**: households headed by males are more willing to pay higher amounts than those headed by females; household size is an increasing function of amounts household are WTP; more educated heads are WTP higher amounts than the less educated heads; Amounts household heads are WTP is an increasing function of the income level

- **[Variance eqn]**: the factors that determine variations in the WTP of households include gender (there is less variability in the amounts male headed households are WTP as there is in the female headed households); ownership of a functional toilet facility decreases variability, trust or confidence in the scheme reduces variability, and the number of dwelling rooms in the household increases variability.
Results

Summary of estimated WTP amounts

Table 11: Summary of estimated mean and median quarterly WTP amount (in Naira)

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th></th>
<th></th>
<th>Commodities</th>
<th></th>
<th></th>
<th>SPC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OBS</td>
<td>Median</td>
<td>mean</td>
<td>OBS</td>
<td>median</td>
<td>Mean</td>
<td>OBS</td>
<td>mean</td>
</tr>
<tr>
<td>(1) All</td>
<td>309</td>
<td>200.00</td>
<td>392.20</td>
<td>309</td>
<td>550.00</td>
<td>788.09</td>
<td>306</td>
<td>479.40</td>
</tr>
<tr>
<td>(2) OLS Valid (i.e. no selection)</td>
<td>235</td>
<td>420.73</td>
<td>504.75</td>
<td>246</td>
<td>826.96</td>
<td>1003.81</td>
<td>267</td>
<td>547.37</td>
</tr>
<tr>
<td>(3) 2-Step</td>
<td>235</td>
<td>378.24</td>
<td>458.67</td>
<td>246</td>
<td>792.74</td>
<td>961.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) FIML</td>
<td>235</td>
<td>387.22</td>
<td>466.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Number of observations.

Table 12: Confidence intervals for the estimated mean and median WTP (in Naira)

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th></th>
<th></th>
<th>Commodities</th>
<th></th>
<th></th>
<th>SPC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CI median</td>
<td>CI mean</td>
<td>CI median</td>
<td>CI mean</td>
<td>CI median</td>
<td>CI mean</td>
<td>CI mean</td>
<td></td>
</tr>
<tr>
<td>(1) All</td>
<td>200.0-400.0</td>
<td>337.0-447.5</td>
<td>488.4-700.0</td>
<td>703.3-872.9</td>
<td>405.8-553.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) OLS Valid (i.e. no selection)</td>
<td>398.9-442.5</td>
<td>478.6-530.9</td>
<td>795.9-863.1</td>
<td>959.9-1047.7</td>
<td>532.4-562.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) 2-Step</td>
<td>358.2-398.3</td>
<td>434.3-483.0</td>
<td>755.3-830.2</td>
<td>915.7-1006.5</td>
<td>537.6-588.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) FIML</td>
<td>366.9-407.6</td>
<td>442.2-491.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Results

Simple aggregation analysis
As noted by Smith et al. (1999c), the WTP values can only be used and applied to the specific circumstance for which it was elicited hence its use will be limited to the rural Nsukka community [problem of aggregation!!!]

Assumptions:
1. 65% of the entire population is rural
2. Average rural household size of 6 members
3. WTP amounts can be aggregated vertically across individuals
4. Preferences remain relatively constant over a certain range of time
## Results

**Table 13: Comparison of WTP with the actual cost of treatment**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cash</th>
<th>Commodities</th>
<th>SPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Per capita annual rural WTP</td>
<td>₦305.80</td>
<td>₦669.20</td>
<td>₦364.92</td>
</tr>
<tr>
<td>(2) Per capita annual rural health expenditure</td>
<td>₦1,027.67</td>
<td>₦1,027.67</td>
<td>₦1,027.67</td>
</tr>
<tr>
<td>(3) Per capita rural community annual WTP</td>
<td>₦65,991,640.00</td>
<td>₦144,413,360.00</td>
<td>₦78,749,736.00</td>
</tr>
<tr>
<td>(4) Per capita rural community annual health expenditure</td>
<td>₦221,770,754.40</td>
<td>₦221,770,754.40</td>
<td>₦221,770,754.40</td>
</tr>
<tr>
<td>% of WTP in annual health expenditure</td>
<td>29.76%</td>
<td>65.12%</td>
<td>35.51%</td>
</tr>
</tbody>
</table>
Results

- The vulnerable groups in terms of health care financing are women, children and the old as these members were WTP lesser amounts.
- For the use of cash as the medium of payment, the amount available to the scheme will only cover 30% of the annual cost of health care.
- The use of commodities will cover over 65% of household annual health care expenditure.
- The Stochastic payment Card design (not a payment medium) produced better results of about 36% of the annual cost of health care.
- => the scheme will require external source of funding.
- => the scheme though able to cater for some segment of the population, may exclude the poor except where payments are made in the form of agricultural commodities as is for the agrarian community considered or probably other forms that these households can afford.
Recommendation

- Need to consider uncertainty in eliciting WTP amounts
  - Specifically in health studies we argue that health and health care is besieged with uncertainty in terms of recovery from an illness or the outcome of a particular treatment option or therapy, etc. hence a greater justification for use of models that capture uncertainty
- Need for making context specific contributions to any form of community financing schemes aimed at poverty reduction
- Use of commodities have been questioned because of the problem of storage, sale and re-sale, and so on. However, the trick we adopt here is beyond the issue of payment directly in commodities. This is for the bases of price setting. If households can afford to pay in commodities, they may be able to afford the monetary equivalence of the commodity and this will not be ‘catastrophic’ and will increase the resource base of the scheme.
Recommendation

- Selective targeting of the vulnerable within the communities and cross-subsidization through also use of sliding premium scale where possible could be adopted.
- Varied forms of payments may be allowed
- Need for external source of funding to augment.
Thank You All for Listening!!!
Table 2: Relative shares of various health care financing mechanisms in Nigeria

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Health expenditure as a fraction of GDP</th>
<th>Government expenditure as a percentage of total health expenditure</th>
<th>Private sector expenditure on health as a % of total health expenditure</th>
<th>Private households’ OOP* as a % of private sector health expenditure</th>
<th>Prepaid and risk-pooling plans as % of Private sector expenditure on health</th>
<th>General government expenditure on health per capita at exchange rate</th>
<th>General government health expenditure as a % of general government expenditure</th>
<th>External resources on health as a % of Total expenditure on health</th>
</tr>
</thead>
<tbody>
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What is CVM?

The Contingent Valuation Methodology is simply a survey-based device, which operates on the general assumption that monetary valuation can be placed on certain classes of goods and services for which there is no market and, therefore, no price or compensation payment. In Health care, Klose (1999) defines the CVM as a survey-based, hypothetical and direct method used for eliciting monetary value of a health care technology or intervention (=> utility, QALY)
WTP models

We model (Heckman, 1979)

Stage I

\[ Y_{1i} = \begin{cases} 1 & \text{if } w_i \phi + e_i > 0 \\ 0 & \text{if } w_i \phi + e_i < 0 \end{cases} \]

Stage II

\[ \ln Y_{2i} = \begin{cases} z_i \phi + s m_i, & \text{if } Y_1 = 1 \\ \text{unobserved}, & \text{if } Y_1 = 0 \end{cases} \]

\[ E(\ln Y_{2i} | z_i, Y_{1i} = 1) = z_i \phi + rs l (w_i \phi) \]

Where \( y_1 \) is a dichotomous variable and \( y_2 \) is the revealed amount.
The Random Valuation Model

- Each respondent is presented on a ‘card’ with numerical likelihood corresponding to some qualitative likelihood references such as ‘definitely yes (100%)’, ‘probably yes (75%)’, ‘not sure (50%)’, ‘probably no (25%)’, and ‘definitely no (0%)’ that the respondent will agree to pay a specified amount from an array of prices.

- This information is used to construct the likelihood function of the individual

The probability that a utility maximizer with a cumulative valuation distribution function $F(.)$ would accept the offer presented on the card design at price of $T$, is given as:

- $\Pr(\text{yes}) = \Pr[v(Y-T,p,H^1,e)>v(Y,p,H^0,e)]$
  
  $\quad = \Pr[\text{WTP}>T]$
  
  $\quad = 1-F(T)$

By transformation,

$$T_{ij} = \mu_i + \sigma_i \Phi^{-1}(1 - P_{ij})$$
Distribution of Bids

![Graph showing the distribution of bids with frequency on the y-axis and bids on the x-axis. The graph depicts a decreasing trend in frequency as bids increase.](image)