Experimental Economics and Development Policy: Some research findings from Bangladesh

by

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Introduction and Overview

- **Part I: Introduction and Summary**
  - ♦ **Experimental Economics: What is it about? Why is it important for development policies?**
  - ♦ **Behavioral Foundation of Development**
  - ♦ **Experimental Method and development Themes**
  - ♦ **Field experiments in Bangladesh:**
    - o **1) Identity and Trust; 2) Demand for Safe Water Product; and 3) Road Safety and Drivers' risk-taking behavior**
- **Part II: Discussions**

What is experimental Economics about?

Experimental Methods

- **"**A revolution to understand behavior" in controlled environment

    - Provides feedback between theory and observed behavior

    - Participants make decisions in a controlled environment(laboratory) and are paid according to the results of their decision. The decisions are then compared with standard theories about individuals behaviors

- Experiments are particularly useful for testing theories as well as exploring the behavioral determinants of "failed theories", for looking at "empirical regularities as the basis for new theories,", for comparing and designing as well as for evaluating policies; these are all fundamental to the study of development.

- There are some specific areas where experiments would generate valuable insights for development studies and policies.

- Randomized experiments facilitates better evaluation of development policy options

Types of Experiments

- Laboratory experiment
  - ◆ Mostly with student sample, not framed, imposed rules
- Field experiment
  - ◆ Artefactual: which are the same as conventional lab experiments but with a non-standard subject pool (i.e., non-students). Example;
  - ◆ Framed: has field context in either the commodity, task, or information set for use by the subjects
- Natural: setting is such that the subjects do not know that they are participants in an experiment. Example
- Randomized Expriments : "Implementation and evaluation by comparing different treatment groups chosen at random of an intervention or a set of intervention specifically designed to test a hypothesis or a set of hypothesis"
- Better evaluation of different policy options" : "Systematic use of randomized evaluations as a way to improve policy effectiveness"

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Experiments and Traditional Empirical Economics

S.D. Levitt, J.A. List / European Economic Review 53 (2009) 1–18

Controlled Data			Naturally-Occurring Data	
Lab	AFE	FFE	NFE	NE, PSM, IV, STR

- Lab: Lab experiment
- AFE: Artefactual field experiment
- FFE: Framed field experiment
- NFE: Natural field experiment
- NE: Natural experiment
- PSM: Propensity score estimation
- IV: Instrumental variables estimation
- STR: Structural modeling

Fig. 1. A field experiment bridge.

Behavioral foundation of development

- The idea of institution has re-emerged as central question of development (Pande and Udry 2005): underdevelopment results from the absence of institution that facilitates cooperation and pro-social behavior

  - "How institutions interact with behavioral predispositions and economic decision-making heuristics is now central to modern development theories "

  - Understanding how to "harness peoples' intrinsic motivation and social preferences" is important as it may help to improve weak institutions in many countries

Development themes and economic experiments

- **Preferences and Norms**
  - ◆ Social preferences (altruism, trust, reciprocity, fairness, cooperation)
    - o (ongoing inequality aversion experiment)
  - ◆ Risk and Time preferences(ongoing :effect of disaster)
  - ◆ Intra-household allocation and bargaining
  - ◆ Gender, ethnic, racial discrimination
- **Social dilemmas**
  - ◆ Public Goods Provision and Voluntary Contributions Mechanisms
  - ◆ Common-Pool Resources
  - ◆ Prisoners' Dilemma, Trust and Third Party Punishment Games
  - ◆ Self-governing institutions

Questions we can answer with Randomized experiments/evaluations

- To understand whether public programs actually work as they are designed to reach certain goals and beneficiaries:

  - ◆ Has the MFI loans succeeded in lowering consumption poverty, seasonal hunger, women empowerment

  - ◆ Does a new road increase welfare of remote people?

  - ◆ Does conditional cash transfer program improve health and education outcome ?

  - ◆ Local governance model(Link model)) facilitates norms of cooperation and trust ?

  - ◆ What kind of insurance contract works better for farmers production behavior?

  - ◆ The question of behavior change: why are not people doing things that are obviously good for them?

  - ◆ (How) does incentive work for teachers and doctors to solve the problem of absenteeism in developing countries ?

Specific experiments with development theme: Risk Preference

- Risk preferences(on which depends decision like investment, migration, employment etc.)

  - Subjects are given choice between several lotteries including one of the lottery consists of sure outcome(example sheet)? Subjects is to choose most preferred which she will then play for cash.

  - This is designed as aversion to risk is increasing as one moves towards lotteries option where expected value decreases

    - On-going: effect of disaster on risk preference and risk sharing

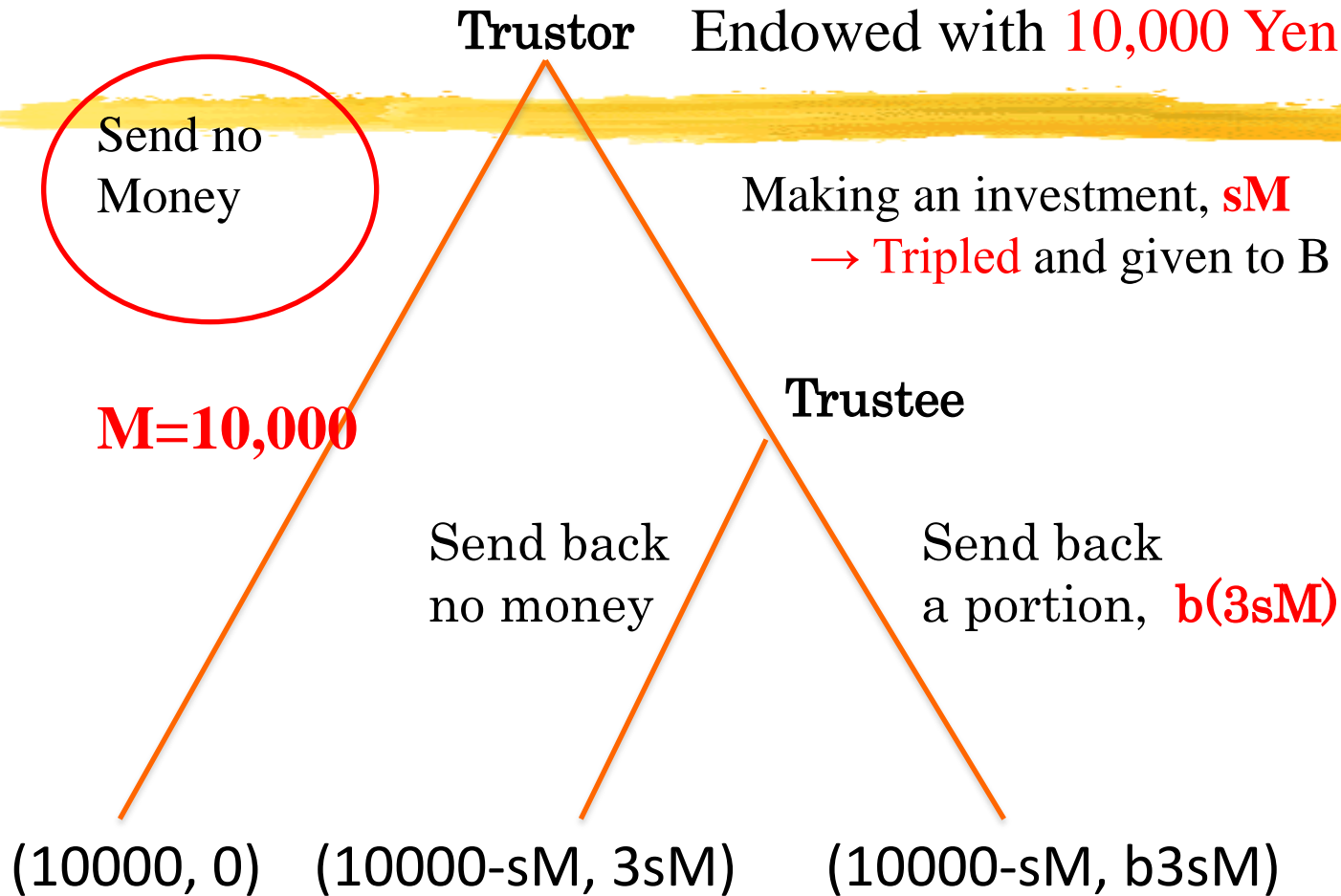# Social Capital :Cooperation and Trust

- Cooperation (or lack of it) is important when a group is responsible for the provision of good /services

- "The degree to which people are willing to contribute to a public good is a measure of cooperation"

  - Typically, each subjects begins with an amount of money say 100 yen. They decide anonymously and simultaneously how much to contribute to the public good. Each contribution is doubled and then total contribution is distributed equally(e.g. for every 1 , they get back 0.4)

- People contribute; contribution decline in repeated setting; provision of punishment promote contribution

Trust

- Trust involves
  - ♦ A trustor who takes a risk of getting hurt/exploited to obtain a benefit
  - ♦ A trustee who has the possibility (and incentive) to exploit the trustor
- Trust relations can be mutually beneficial: Efficiency gain
- Examples: Investment, Lending, Incomplete contract
- Important for Growth, "Social Capital"

Measuring Trust: Trust Game

Trustor   Endowed with 10,000 Yen

Send no
Money

Making an investment, **sM**
→ Tripled and given to B

M=10,000

Trustee

Send back
no money

Send back
a portion, **b(3sM)**

(10000, 0)   (10000-sM, 3sM)   (10000-sM, b3sM)

Typical results (anonymous experiments: most people
send some *s* > 0, but not (very) profitable for sender

Cardenas and Carpenter (2008)
# Summary of Existing Studies on Trust

Study	Location	Students	Fraction sent	Fraction returned	Return ratio
Berg et al. (1995)	United States	Yes	0.52	0.30	0.90
Burks et al. (2003)	United States	Yes	0.65	0.40	1.31
Ashraf et al. (2005a)	United States	Yes	0.41	0.23	0.58
	Russia	Yes	0.49	0.29	0.80
	South Africa	Yes	0.43	0.27	0.73
Barr (2003a)	Zimbabwe	No	0.43	0.43	1.28
Buchan et al. (2003)	United States	Yes	0.65	0.45[a]	1.35
	China	Yes	0.73	0.50[a]	1.51
	Japan	Yes	0.68	0.50[a]	1.51
	South Korea	Yes	0.64	0.49[a]	1.47
Burns (2004b)	South Africa	Yes	0.33	0.23	0.70
Cardenas (2003b)	Colombia	Yes	0.50	0.41	1.22
Carter and Castillo (2002)	South Africa	No	0.53	0.38	1.14
Castillo and Carter (2003)	Honduras	No	0.49	0.42	1.26
Holm and Danielson (2005)	Tanzania	Yes	0.53	0.37	1.17
	Sweden	Yes	0.51	0.35	1.05
Danielson and Holm (2003)	Tanzania	No	0.56	0.46	1.40
Ensminger (2000)	Kenya	No	0.44	0.18	0.54
Fehr and List (2004)	Costa Rica	Yes	0.40	0.32	0.96
	Costa Rica	No	0.59	0.44	1.32
Greig and Bohnet (2005)	Kenya	No	0.30	0.41	0.82
Johansson-Stenman et al. (2004)	Bangladesh	No	0.46	0.46	1.38
Karlan (2005)	Peru	No	0.46	0.43	1.12
Koford (2001)	Bulgaria	Yes	0.63	0.46	1.34
Lazzarini, et al. (2004)	Brazil	Yes	0.56	0.34	0.80
Mosley and Verschoor (2003)	Uganda	No	0.49	0.33	0.99
Schechter (2004)	Paraguay	No	0.47	0.44	1.31
Wilson and Bahry (2002)	Russia	No	0.51	0.38	1.15
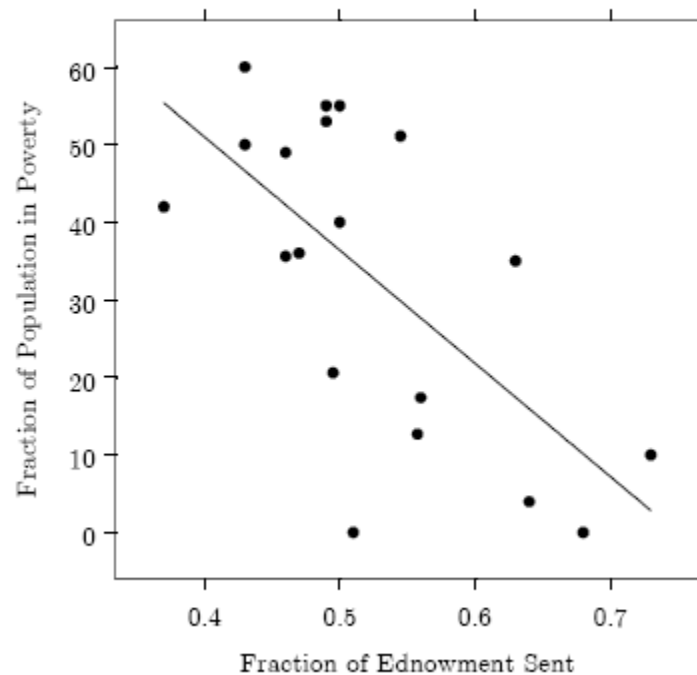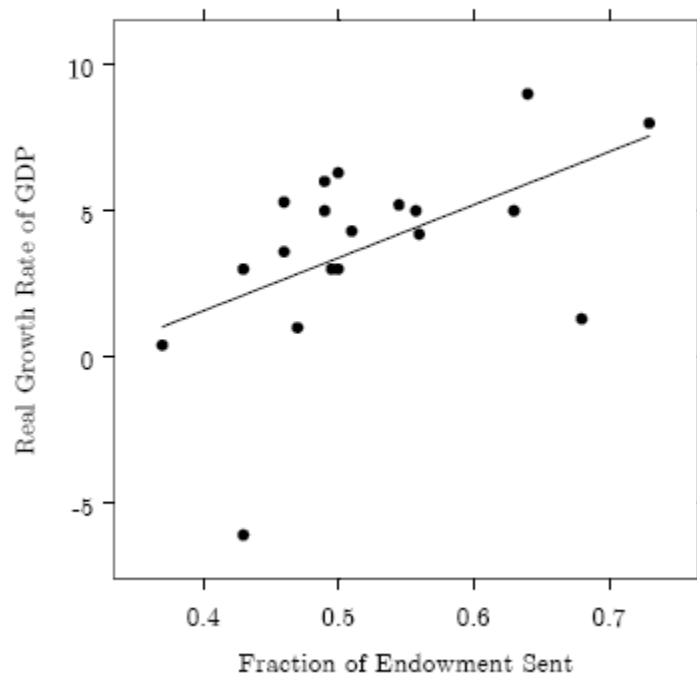
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Trust and Economic Indicators

Cardenas, J.C. and Carpenter, J., 2008. Behavioral development economics: lessons from field labs in the developing world. Journal of Development Studies 44, 337–64.

Trust and Economic Indicators
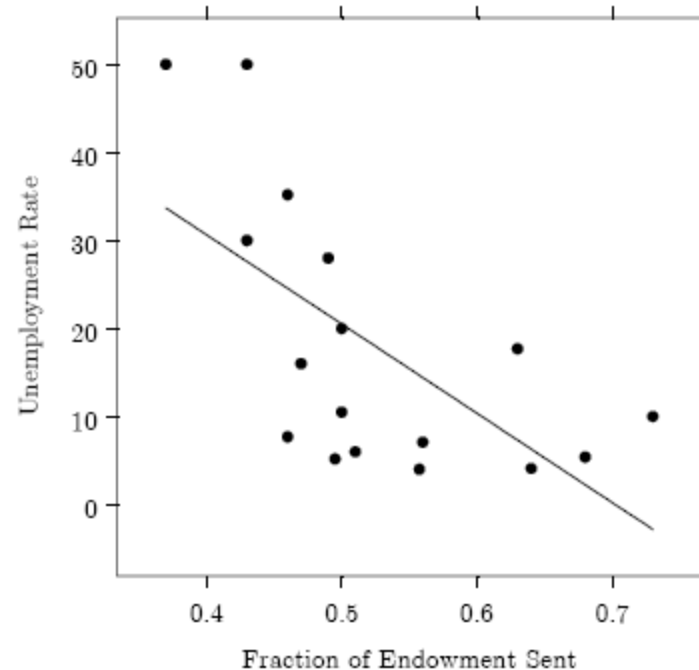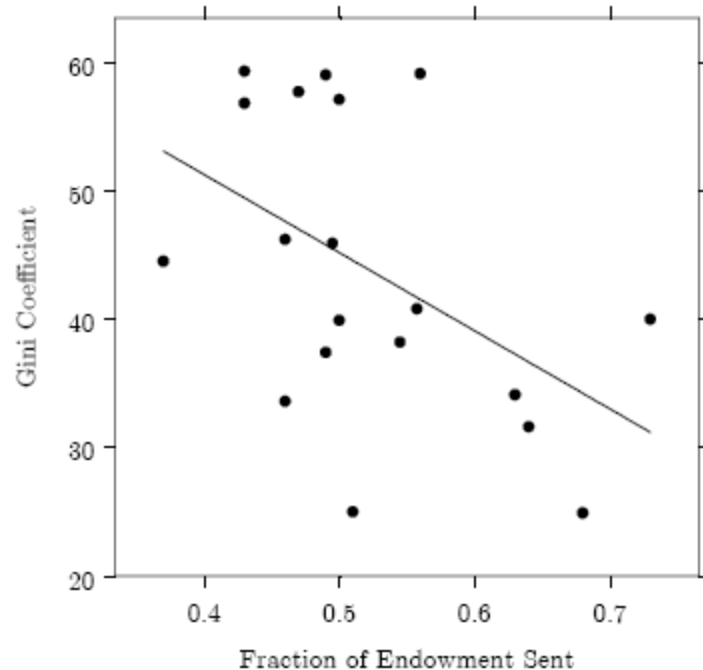
Cardenas, J.C. and Carpenter, J., 2008. Behavioral development economics: lessons from field labs in the developing world. Journal of Development Studies 44, 337–64.

1) Trust Experiment in Bangladesh Previous findings

What have we learned?

- People send a lot in the trust game, and get back a lot. These high levels of apparent trust are not in line with what people say about trust or say they expect to get back

- With high stakes people send less (but many people send everything back)

- No marked differences in trust game w.r.t. religion(Social Distance)

Measuring Trust in Bangladesh and India(West Bengal): New findings

- Minority/Majority status rather than religion *per se* dictates behavior : Trust based on status

- In both locations individuals belonging to the minority group(Muslims in West Bengal and Hindus in Bangladesh) exhibit positive in-group bias in trust behavior.

- Individuals belonging to the majority group in both locations (Hindus in West Bengal and Muslims in Bangladesh) show positive out-group bias in trustworthiness.

- Mechanisms are however slightly different in the two countries.

Experimental Design: Treatments

- **Trust Game in 8 Hindu majority and 8 Muslim majority villages in each country**

  - We control for these confounds by making each participant take part in dictator game and risk game.

- *Information_Same*: **Trustor and Trustee belongs to same religion**

- **Hindu_Hindu; Muslim_Muslim**

- *Information_Different*: **Trustor and Trustee belongs to different religions**

  - **Hindu_Muslim; Muslim_Hindu**

- *No_Information* **Treatments: no information on partner's religion is provided**

  - **Hindu_NoInfo; Muslim_NoInfo**

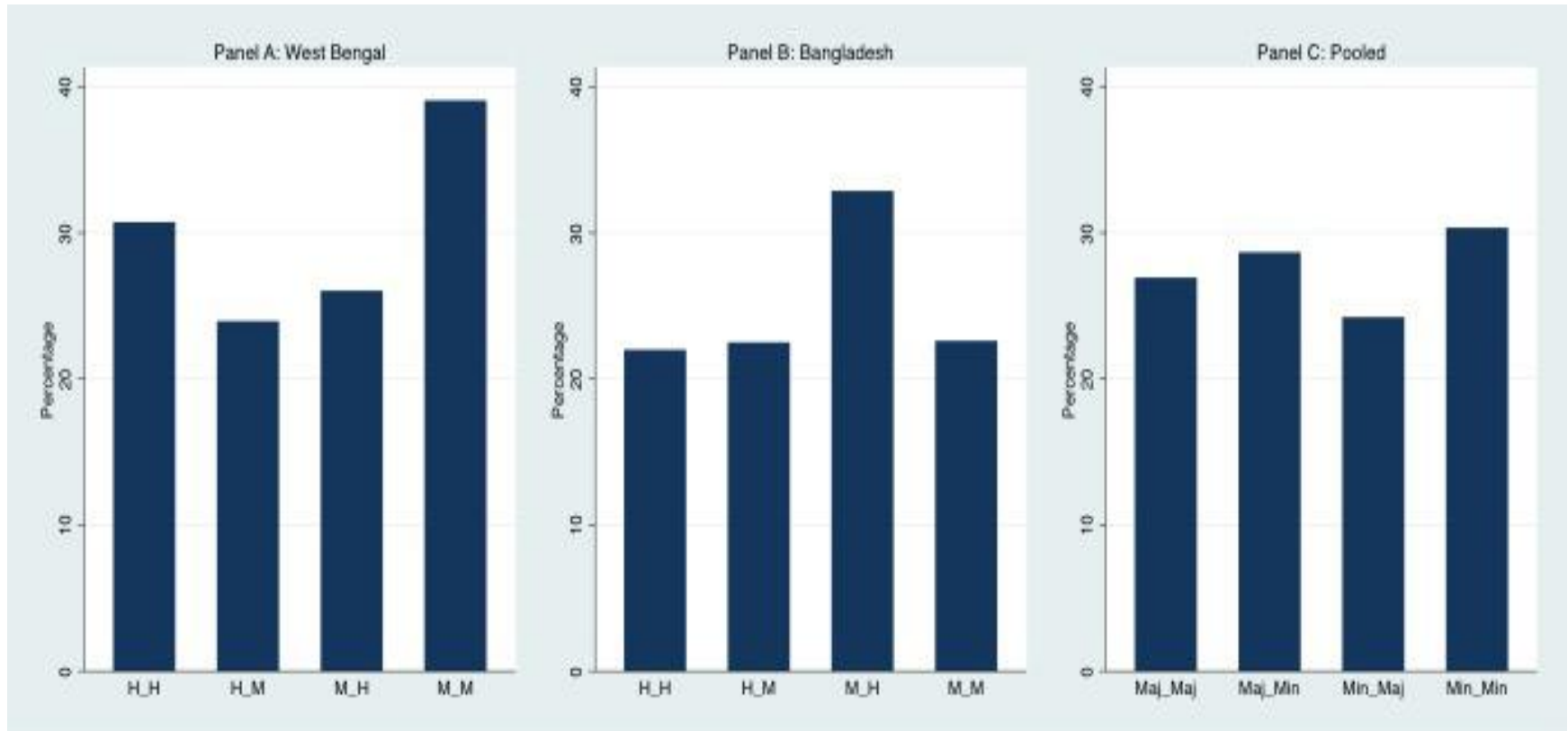# Figure: Trust by Religion, Location and Majority/Minority Status

Table: Trust Regressions. Differences between Groups

| | By Location | | Pooled Regressions Status Defined at | |
	WB	BD	National	Village
Hindu_Hindu − Hindu_Muslim	-4.97	7.42*		
Muslim_Hindu − Muslim_Muslim	-10.88*	18.88		
Hindu_Muslim − Muslim_Muslim	-1.84	3.39		
Hindu_Hindu − Muslim_Hindu	14.01	-8.07		
Majority_Majority − Majority_Minority			-6.91	3.76
Minority_Majority − Minority_Minority			-13.48***	-15.09***
Majority_Minoirty − Minority_Minority			-1.54	-2.65
Majority_Majority − Minority_Majority			5.03	16.2***
Sample Size	96	98	194	194

Trust in Bangladesh and India: Common Theme

- In both locations, the majority Trustees exhibit significant positive out-group bias:

  - Majority Trustees return more to minority Trustors than to majority Trustors.

  - This holds irrespective of how majority/minority status is defined.

  - A minority Trustor is better off matched with a majority Trustee.

- Robust to village level and other characteristics including survey trust

1) Trust Experiment: Conclusions

- That trust can be conditional depending on who we are interacting with even all are strangers

- Rather that viewing segmented societies through the just through the prism of religion, it would be more worthwhile to view interaction between groups in such societies through the lens of status as well.

- As Sen(2005) has argued that a general sense of social identity and priorities does considerable part in economic decisions such as investments and with better understanding of these issues we will be more aware about fractionalization within the communities.

2) Randomized Evaluation

Using auction experiment to measure demand for water treatment products in Bangladesh

Objective and Hypothesis

- **How hands-on experience and peer experience affects demand for four point-of-use (POU) water treatment products- with experience demand increases**
  - ◆ **Three "chemical products" rely on chlorine to disinfect**
  - ◆ **Siphon driven porous ceramic filter**
- **Social influence- if a consumer likes as safe water product after experience with it, their peers or neighbors may similarly learn about product's value- increases demand**
- **Measure willingness to pay(WTP)(using real money auction) for each product after they have experience with all of them.**

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Figure 1. Tested POU Products.

Luoto J, Najnin N, Mahmud M, Albert J, et al. (2011) What Point-of-Use Water Treatment Products Do Consumers Use? Evidence from a Randomized Controlled Trial among the Urban Poor in Bangladesh. PLoS ONE 6(10): e26132. doi:10.1371/journal.pone.0026132
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0026132

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PLOS ONE

Design

- At baseline we select several neighborhoods known to be relatively poor

- Select every fifth household and checked if there was a child under 5. if not they approach next household and repeated.

- Interview on basic assets (income), water supply. Water treatment, sanitation and hygiene behavior

- Baseline sample of 800 households: 200 control
  - During the baseline visits enumerators explained the health risk associated with un-treated water
  - Detailed presentation of products in randomized order
  - Ask them to rank preferences for each of the product

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Design-2

- For 600 treatment households, enumerators then provided one of the four products for a two month free trial (order randomized)

- Spot check: At the end of each two month trial period- follow up survey to determine updated product preferences

- Each household then assigned new product in random order

- The cycle was repeated four times, so that over eight months they experience each product

- Both treatment and control homes were visited at the final survey round to collect information on product preferences and WTP for each product.

- Concurrently we identified the nearest neighbor of all households generally within the same compound and introduced the product and elicit WTP

The Setting

- Disadvantaged community

- Only a third completed primary school

- The majority of per capita household incomes were less than global poverty line of $2(ppp) per day

- Most residents have cement floors (82%) and corrugated iron roof(92%) with shared walls

- 73% of treatment versus 76% control reported piped water supply at baseline

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Demand (willingness to pay)Elicitation Procedure

- Elicit WTP with a Becker-DeGroot-Marschak(BDM) auction
- Households bid their own money for the product against a computer generated price hidden in an envelope.
  - If bid exceeds random price a respondent win and buy at the random price

- A bid affects if someone wins a product but not how much they pay if they win- incentive compatible- truthful reporting of WTP- if they win they pay the price in the envelope which is always less than or equal to their bid

- Explain with Examples of decisions why it is to their best interest to bid truthfully

- Elicit bid for each product one by one

- Randomly draw one product for sale and compare bid and random price for the product
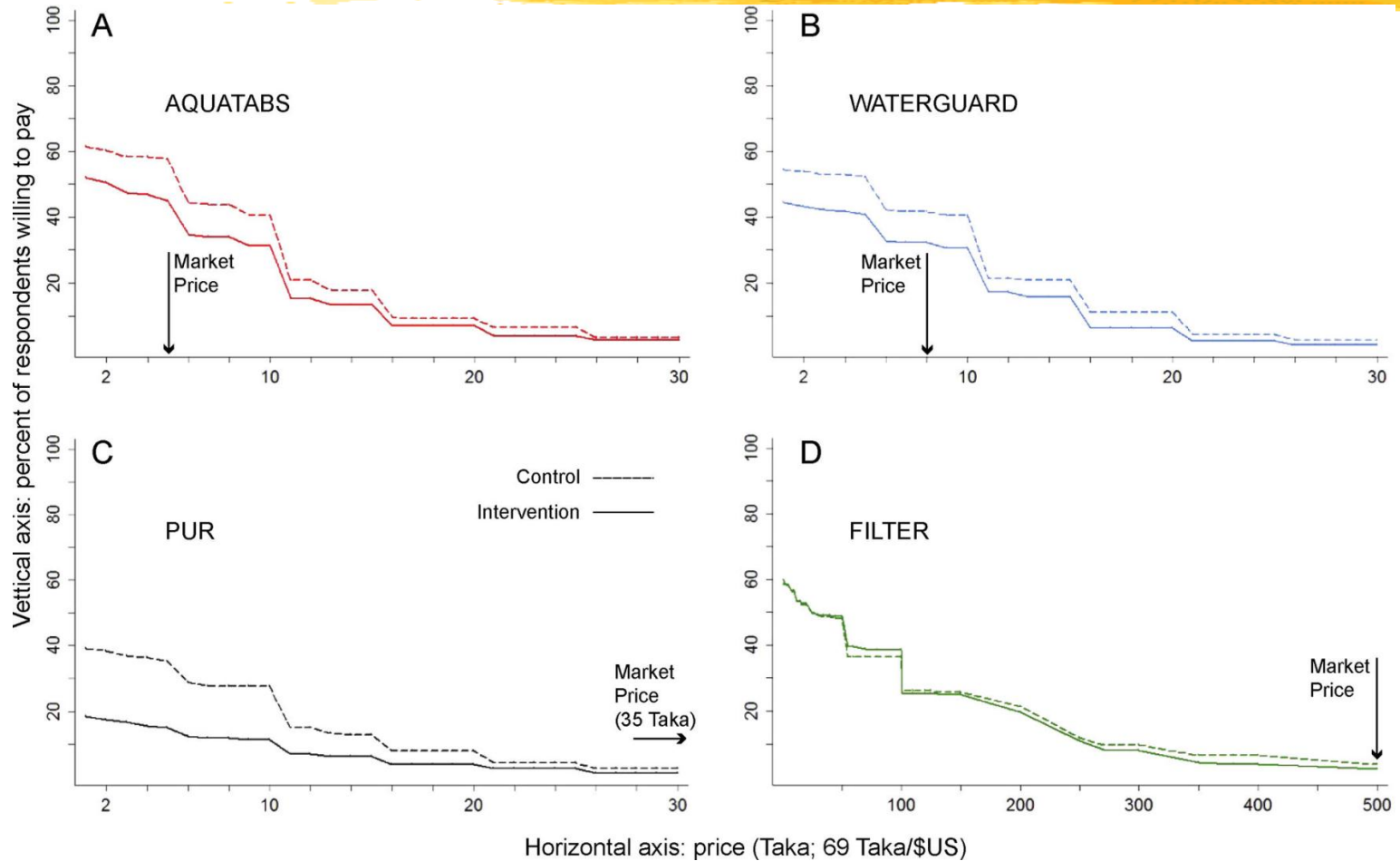
Results

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- 32% of all respondents won the auction

- However of these 13%(4% of all) refused to pay (no significant difference across groups, p value=0,56 on three-way Wald test)) mostly because of lack of funds at the time

- All products show high dispersion in WTP : Each product received zero bids over 40% experienced consumers

- A significant minority were WTP the expected retail price for Auatabs(47% bids 5 taka or more) and WG(33% bid 8 taka or more)

- Nearly 80% bid zero for five sachets of PUR

- 42% respondents bid zero for filter, while 20% bid 200 taka or more and one percent bid 500 Taka

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WTP for POU products:
Intervention vs Control Households

Vertical axis: percent of respondents willing to pay

Horizontal axis: price (Taka; 69 Taka/$US)

A — AQUATABS — Market Price

B — WATERGUARD — Market Price

C — PUR — Market Price (35 Taka) — Control, Intervention

D — FILTER — Market Price

Results-2

- For all chemical products mean WTP was significantly lower for experienced compared to control respondents

- The reduction in mean WTP was over 50% for a weeks supply of PUR(from around 4 to 2 Taka), around 18% for 10 day supply of Aquatabs(from about 6 to just under 5 Taka) and 20% for a two-week supply of WG(6 to 5 Taka)

- Mean WTP for filter remains same(75 Taka)

- Results are similar for a non-parametric comparison of medians as based on quantile regressions

Auction WTP is much lower than stated WTP for all products.

	Aquatabs	Filter	WG	PUR
Lower Bound Stated WTP	15.3	279.2	16.7	10.5
Upper bound stated WTP	17.2	289.6	17.9	10.5
Auction bid	6.3	75.5	6.3	4.2
Difference of bid from midpoint of stated WTP	-9.2	-207.9	-10.3	-5.6
% Auction WTP within stated WTP upper and lower bounds	0.16	0.103	0.18	0.10

Product Uptake: Discussion

- Inadequate understanding of benefits of safe water cannot explain results neither can product complaints(31% (21%) reported their water safe to drink at baseline(exit)- statistically significant difference(p <0.001)

- Also consistent with the low levels of POU products in general(other studies)

- Designing product considering End user preference , choices and aspirations

- Further tests of Marketing strategies, sale offer and product design as the search for ways to safe water access continues

3) Pilot Experiment on Drivers Strategic Risk Preferences in Bangladesh

Note :the main purpose was to test the design and the results(analysis) are preliminary and incomplete
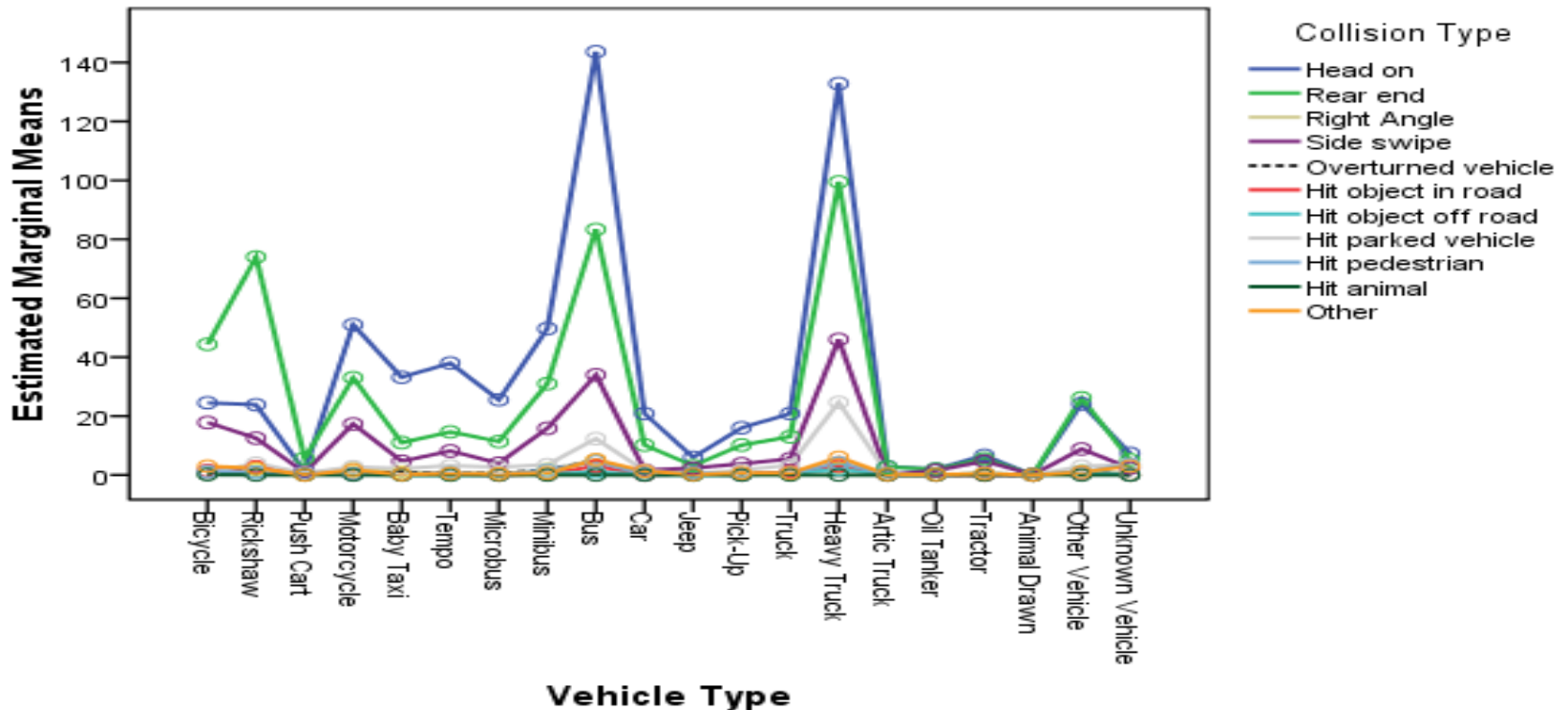
Chicken?

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Background

■ Road Safety in Bangladesh

Estimated Marginal Means of Involved Vehicle by Type and Collision Type (at Multiple Vehicles per Accident)

Objectives

- Using a standard Chicken Game, also known as Hawk-Dove Game, among a pool of drivers of high occupancy and low occupancy vehicles

- We assess strategic risk taking behavior by looking at choices they make in one shot simultaneous move 2x2 game

Policy Insights from Experiments

- Field experiments would generate valuable insights for development issues and policies

    - Understanding behavior can be crucial for designing policies and institutions

- Randomized experiments facilitates better evaluation of development policy options

    - Knowing what works and what does not

    - Systematic use of randomized evaluations can be very useful to improve policy effectiveness"