Deadweight Losses or Gains from In-kind Transfers? Experimental Evidence

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Introduction

Two main ways to provide assistance to the disadvantaged: cash or in-kind transfers

- Both – a common feature of all modern welfare states
- Many alternatives to direct cash payments – free or subsidized food, fuel, textbooks, social housing

Which is better?

OR

Standard economic theory has a clear favourite

- In-kind transfers will generate deadweight losses
  - Say, a household consumes x units of a basic good (say, grains) at a subsidised price p_s which is below the market price p_m.
  - Government subsidy: $(p_m - p_s)x$
  - The household will definitely accept a cash transfer of $s = (p_m - p_s)x$ → can replicate the bundle it had before
  - Unless x is exactly the bundle that household would consume at market prices, it would likely accept a cash amount *less than s* for the freedom to use the cash for other purposes
  - s^*: the cash amount at which the household is indifferent between receiving cash or subsidized food
  - $s - s^*$ = deadweight loss
- Despite this compelling case against in-kind transfers, they are very common – for various reasons (e.g. paternalism)
- But measurement of DWL has received relatively limited attention

This paper

- Test the existence of the deadweight loss of in-kind benefits and quantify its magnitude through an incentivized field experiment
- In the context of India's food subsidy program (commonly known as PDS – the Public Distribution System)
  - which has been in operation for decades
  - world's largest in-kind transfer program with a reach of nearly 900 million people
- Incentivised experiment in low-income urban neighbourhoods in the state of Maharashtra
  - We offered households the choice between a free quantity (5 kg) of rice and a cash transfer
  - Elicited the amount of cash the households considered equivalent to the rice, in an incentive compatible way
  - Use the data to calculate deadweight losses (DWL)

Connections to the literature

1. Measuring deadweight loss of in-kind transfers or gifts

- Surveys and some experiments using indirect measures: Mixed findings (Waldfogel 1993; Solnick and Hemenway 1996; List and Shogren 1998; Cunha et al 2019)
- We find a Deadweight Gain using a direct measure.

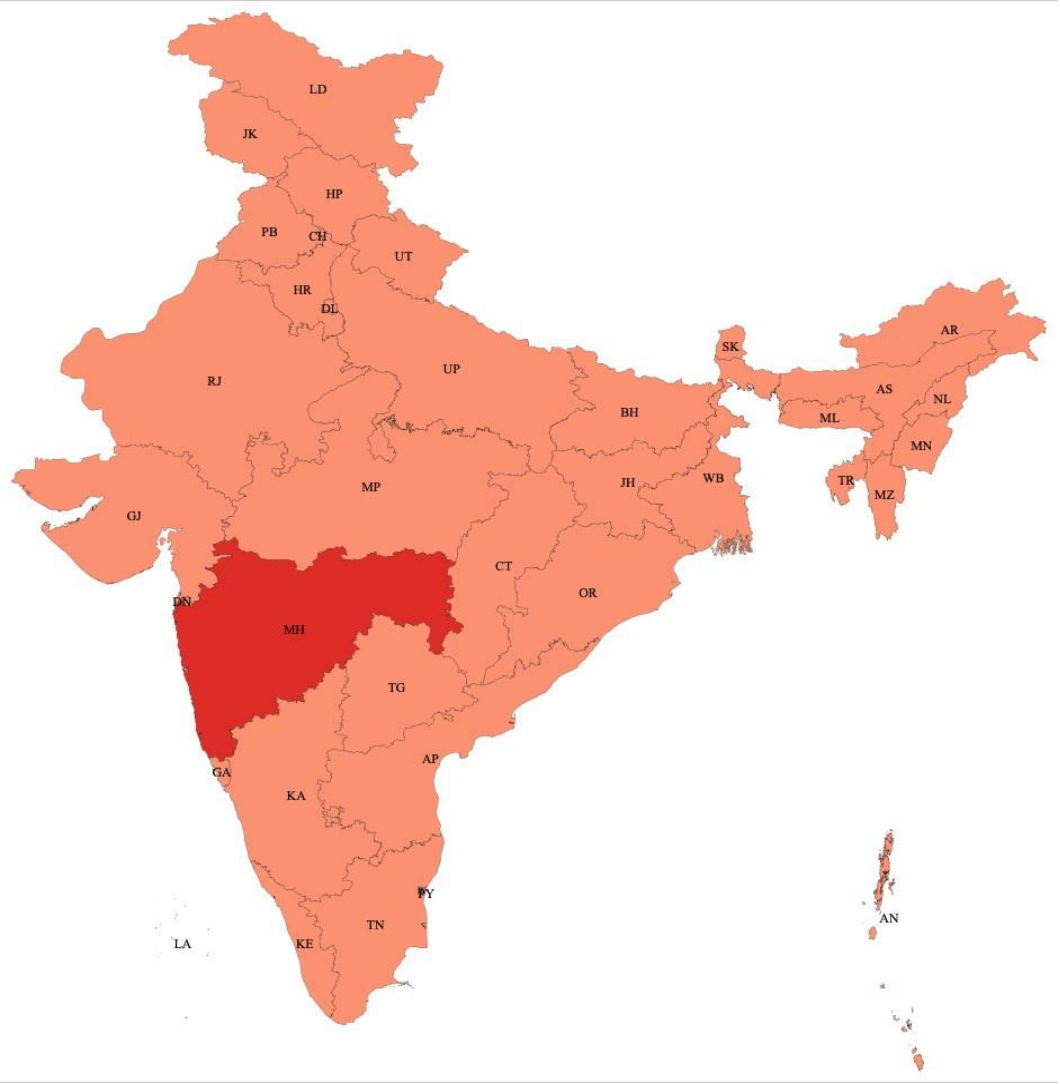
2. Debates around the Public Distribution System in India

- "leakages" in PDS (Jha and Ramaswami 2012, Himanshu and Sen 2013, Dreze and Khera 2015, Gulati and Saini 2015); survey evidence on beneficiary preferences (Khera 2011, 2014; Muralidharan, Niehaus and Sukhtankar 2011, 2017; Satapathy et al 2022)
- Incentivised experimental evidence embedded in the PDS environment

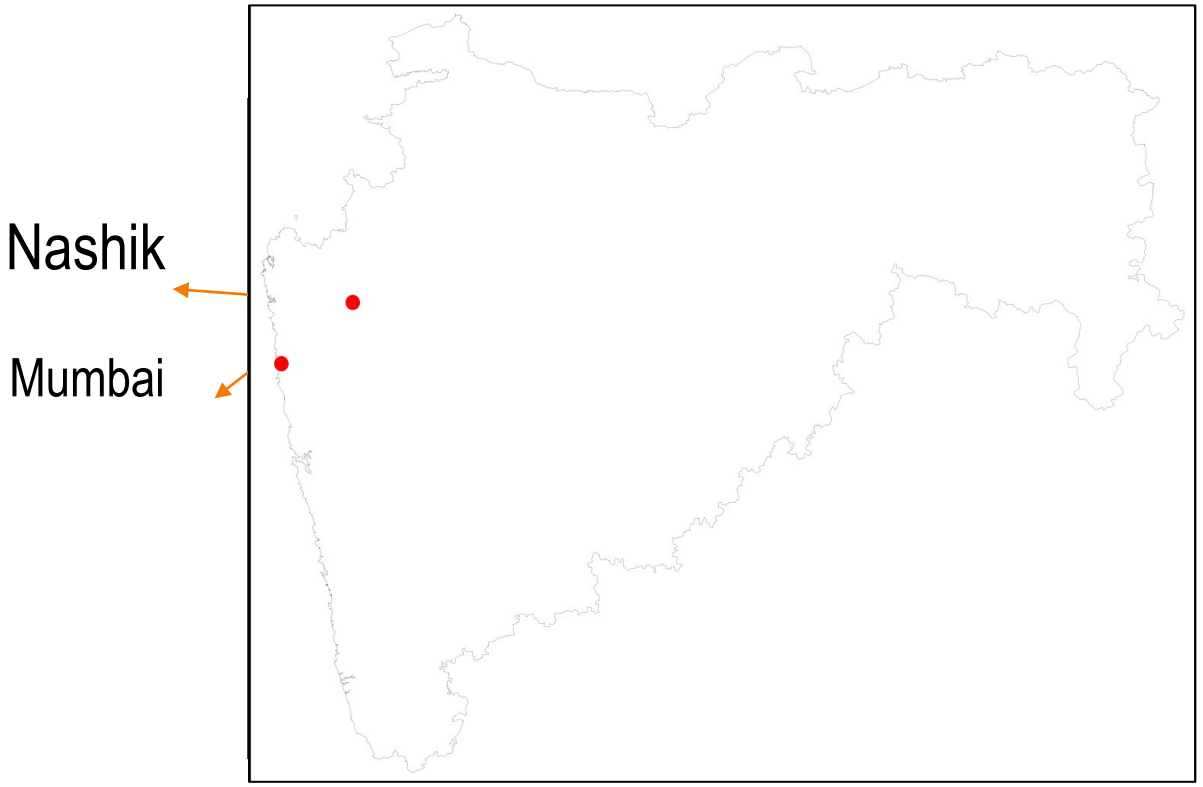
3. Intra-household bargaining and decision-making

- Unequal voice in decision making influences outcomes (Baland and Ziparo 2017, Munro 2018 and Doss and Quisumbing 2020)
- Examine households with male and female head to understand how intra-household bargaining can influence choices and DWL.

The Experiment

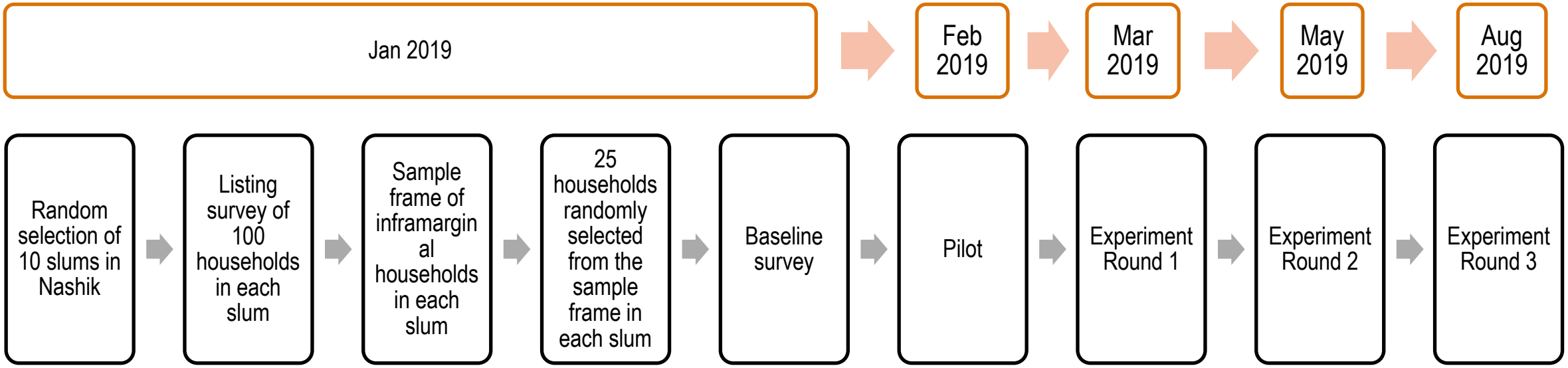


Conducted in 10 low-income urban neighborhoods ("slums") of Nashik city in the state of Maharashtra (western part of India)



The Experiment

- Sample selection: a two-step process:
  - ► listing operation to identify sample frame
  - ► then randomly select households from the list of inframarginal households (those consuming >5 kg of market rice).
- Respondent/decision maker: member who usually makes decisions about food, mostly women in our context



The Experiment

- A household offered choices between 5 kilograms of rice and nine alternative cash amounts.
- The going price of rice at the time of the experiment: Rs 32 per kg
  - With no significant variation across slums
- Market value of 5 kg of rice = Rs 160

Nine choice tasks		
5 kg of rice	Or	Rs 50
5 kg of rice	Or	Rs 100
5 kg of rice	Or	Rs 150
5 kg of rice	Or	Rs 200
5 kg of rice	Or	Rs 250
5 kg of rice	Or	Rs 300
5 kg of rice	Or	Rs 350
5 kg of rice	Or	Rs 400
5 kg of rice	Or	Rs 500

Screenshot of choice question

The image shows a sack of 5 kilograms of rice and 400 rupees in cash. Please look at the two images carefully and tell us which one do you choose.

Select one of the two options listed below	SINGLE-SELECT ch400 01 ○ I want 5 kilogram rice 02 ○ I want 400 rupees

Respondent choices were incentivized

- Once all the choices were made, the respondent was asked to draw a chit from a bag, which contained nine chits bearing one of the nine cash amounts (50, 100, … 500)
- For example:
  - ► If the respondent drew a chit with number 250 printed on it,

  and
  - ► for the choice option of Rs 250 versus rice, the respondent had chosen rice,
  - ► then the respondent was given a voucher for 5 kilos of rice;
  - ► If the respondent has chosen cash instead, they were given a voucher for Rs 250
- Same transaction costs for rice and cash: vouchers for cash or rice redeemable exactly in the same way through the local shopkeeper

Switch point and willingness to pay (WTP) for rice

Rice or cash?			Choice
5 kg of rice	Or	Rs 50	Rice
5 kg of rice	Or	Rs 100	Rice
5 kg of rice	Or	Rs 150	Rice
5 kg of rice	Or	Rs 200	Rice
5 kg of rice	Or	Rs 250	Cash
5 kg of rice	Or	Rs 300	Cash
5 kg of rice	Or	Rs 350	Cash
5 kg of rice	Or	Rs 400	Cash
5 kg of rice	Or	Rs 500	Cash

Market price of 5 kg of rice = Rs 160

Switch point

WTP = 225
DWL = 225 -160 = 65

Three types of households:

(1) Single-switch households

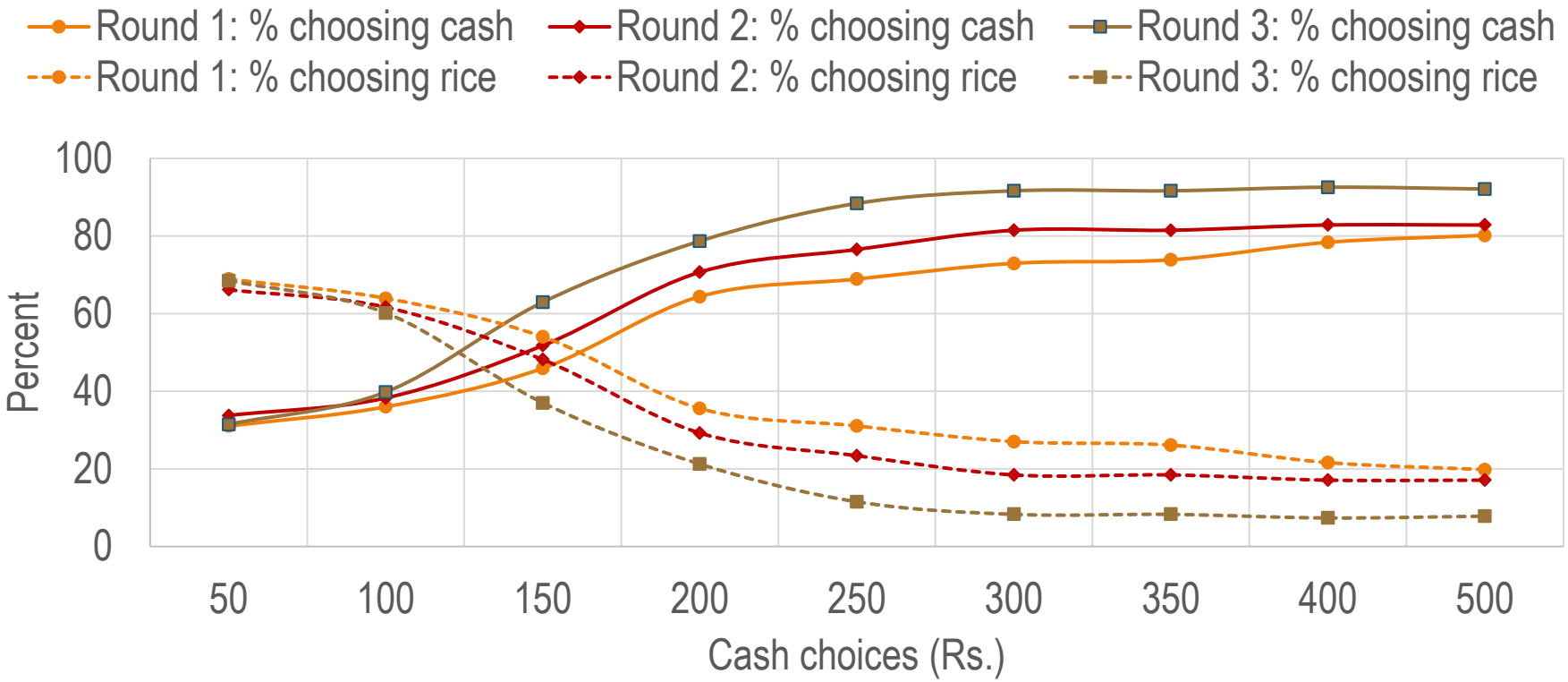
(2) Rice-only households (always chose rice for all nine cash amounts)

(3) Cash-only households (always chose cash)

$$DWL = \begin{cases} (160 - WTP) & if\ single\ switch \\ (160 - 550) & if\ rice\ only \\ (160 - 25) & if\ cash\ only \end{cases}$$

Results: (1) Fewer choose rice as more cash is offered

Cash choices (Rs)	50	100	150	200	250	300	350	400	500
% of households choosing cash over rice	32.0	37.7	52.3	70.0	76.5	80.2	81.2	83.2	83.6



Results: (2) Overall deadweight gain: Puzzle?

Respondent type	Number of cases	Percent of cases	WTP (Rs)	DWL (Rs)
Cash-only	208	32.7	25	135
Single-switch	341	53.5	177	-17
Rice-only	88	13.8	550	-390
All	637	100	179	-19

The prevalence of deadweight gain is widespread in our sample.

Potential explanations for the puzzle?

- Transaction costs and rice quality: Not a likely explanation for deadweight gains
  - ► experiment designed to mitigate these effects

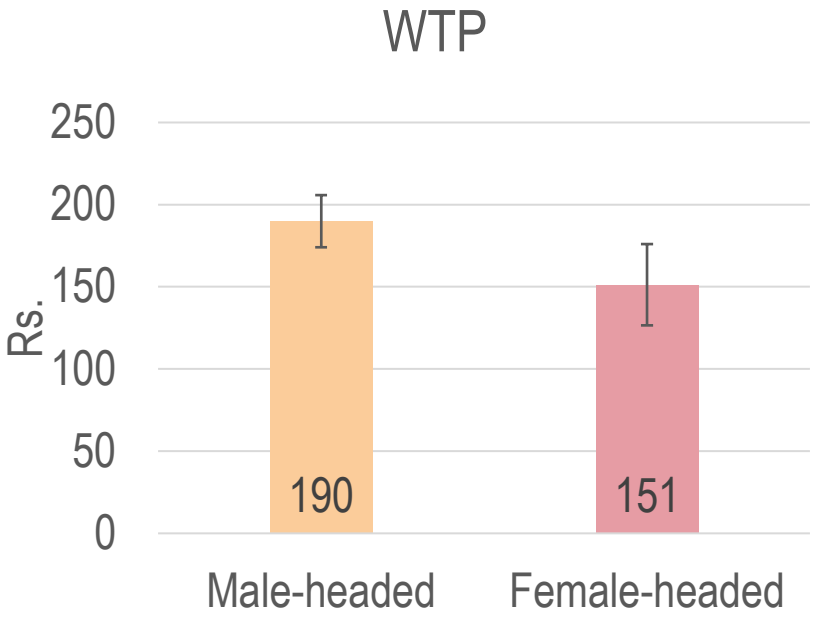
- Trust: Not a likely explanation either
  - ► pilot; vouchers for both options; no concerns reported.

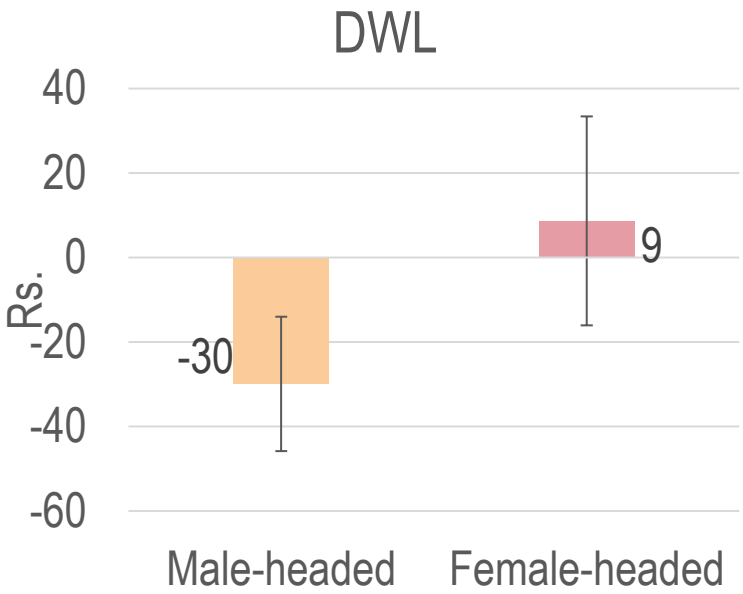
- Intra-household bargaining: Data supports this mechanism

Potential explanations for the puzzle: Intra-household control of household budget

- Mechanism: role of intra-household inequality and gender in influencing the choice over in-kind transfers or cash: Qualitative/survey-based evidence: Khera 2011, 2014, Dreze and Sen 2013.
  - "Cash is also more easily deflected towards the purchase of goods that are consumed mainly by adult members of the family, especially men, at the expense of undernourished girls and other children". Dreze and Sen (2013)
  - "The ration we get is quite alright. Cash will be spent on alcohol, and nothing will remain for our children. If we get rice, everyone will share [eat] it." (Khera, 2014)
- We therefore look further into the "puzzle" of the deadweight gain by investigating if the results differ by a measure of gender differentials in control over the household budget.
- One such measure in our data is the gender of the head of the household (26% female headed households).
- In line with the survey-based evidence, we would expect female-headed household to favour cash over rice.

Result: DWG for male-headed households, DWL for female-headed households



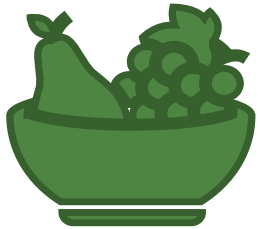


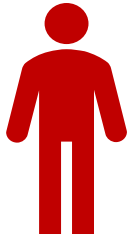
- Female-headed households have a significantly lower WTP for rice (Rs 151 versus Rs 190; p-value=0.006), i.e., are more likely to choose cash than male-headed households.
- Thus: a deadweight loss for female-headed households on average of Rs 9 (5% of the value of subsidized rice) and a deadweight gain for male-headed households of Rs 30 (19% of the value of subsidized rice).

A simple framework

- Intra-household bargaining

controls





controls

► If the person (typically the woman) who controls and makes decisions about subsidized food is not the same as the one who controls cash (typically the man):

  - then a bias in favour of in-kind benefits can indeed occur.

A simple framework

- A household makes a choice between receiving a cash benefit or the option to buy rice at a subsidised price p_s per unit.
- The market price is $p_m > p_s$.
- Subsidy is infra-marginal: the maximum quantity of subsidised rice R_s is smaller than the household's total rice consumption R (assumed to be fixed) over a given time period
- Subsidized and market rice are perfect substitutes
  - In our experiment, subsidised rice offered to the respondents was of comparable quality and sourced from the same local shops where the respondents bought their market rice
- The household has a fixed budget of Y in the given time period, say, a month

A simple framework

- Assume: The woman and the man of the household have control over a certain part of the budget, but the woman is responsible for food spending.
- The woman controls a fraction of $\alpha(b)Y$, hence the man controls $(1-\alpha)Y$.
- Total expenditure for rice is $E_R = p_m R_m + p_s R_s$, where R_m is the quantity of market rice purchased

$$R_s + R_m = R.$$

- The woman's decision: whether to accept a cash transfer T or buy R_s units of subsidised rice at p_s
  - If she accepts cash transfer, her budget increases by αT.
  - If she accepts subsidized rice, no expansion of her budget (still αY), but savings on rice purchases from her budget equal to $(p_m - p_s)R_s$

A simple framework

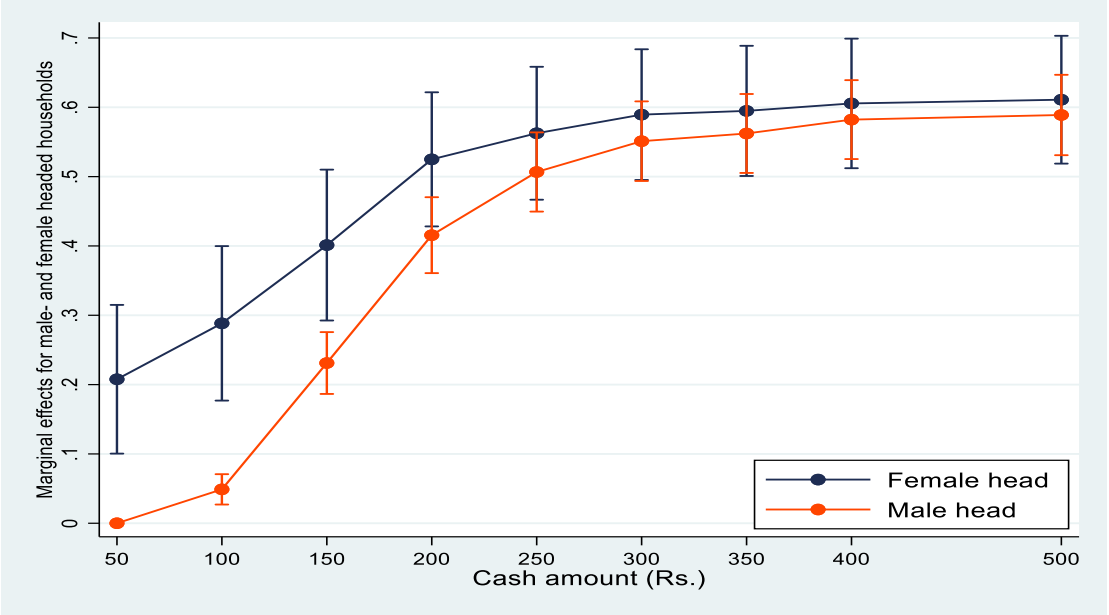
- When deciding for in-kind benefits or cash transfers, the respondent (woman) compares her savings from the subsidised rice against the budget expansion through a cash transfer. She will prefer cash transfer (T) over subsidized rice (R_s) if:
  - $\alpha T > (p_m - p_s)R_s$,
  - i.e., $T > \frac{p_m - p_s}{\alpha} R_s$
- Prediction: Lower the bargaining power (α) of the woman the higher the amount of cash transfer T needed for her to prefer cash over rice.
  - Intuition: This is because the woman realises the full value of the subsidy if she receives subsidised rice, but only a fraction α of it if she accepts the cash transfer
- In male-headed households where $\alpha(b)$ is low, we could expect a relatively greater preference for rice and a lower deadweight loss or possibly even a deadweight gain,
- while in female-headed households with a high $\alpha(b)$, we would expect to observe larger deadweight losses.

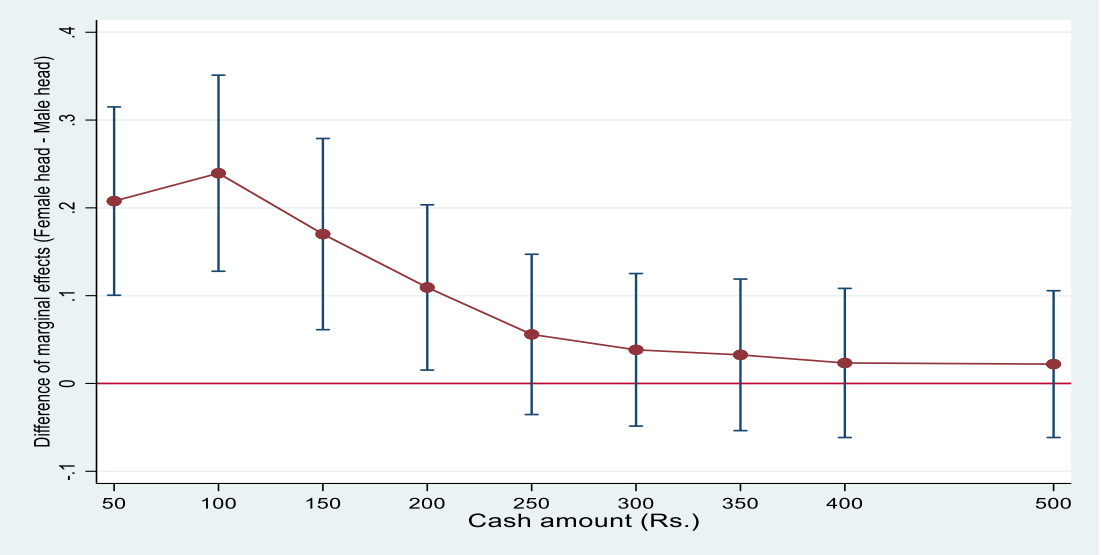
Results: "Cash or rice?" Female headship increases the probability of choosing cash

Dependent Variable: 1 if respondent chose cash, 0 if they chose rice	(1)	(2)	(3)
Cash 100	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)
Cash 150	0.22***	0.22***	0.22***
	(0.02)	(0.02)	(0.02)
Cash 200	0.39***	0.39***	0.39***
	(0.02)	(0.02)	(0.02)
Cash 250	0.46***	0.46***	0.46***
	(0.02)	(0.02)	(0.02)
Cash 300	0.50***	0.50***	0.50***
	(0.02)	(0.02)	(0.03)
Cash 350	0.51***	0.51***	0.51***
	(0.02)	(0.02)	(0.02)
Cash 400	0.53***	0.53***	0.53***
	(0.03)	(0.03)	(0.03)
Cash 500	0.53***	0.53***	0.53***
	(0.03)	(0.03)	(0.03)
Female head		0.11***	0.10**
		(0.04)	(0.04)
Round 2	0.06**	0.06**	0.06**
	(0.03)	(0.03)	(0.03)
Round 3	0.13***	0.13***	0.12***
	(0.03)	(0.03)	(0.03)
Constant	0.17***	0.17***	0.02
	(0.04)	(0.04)	(0.14)
Slum effects	Yes	Yes	Yes
Respondent/household-level controls	No	No	Yes
N	5733	5733	5724
R^2	0.21	0.22	0.23

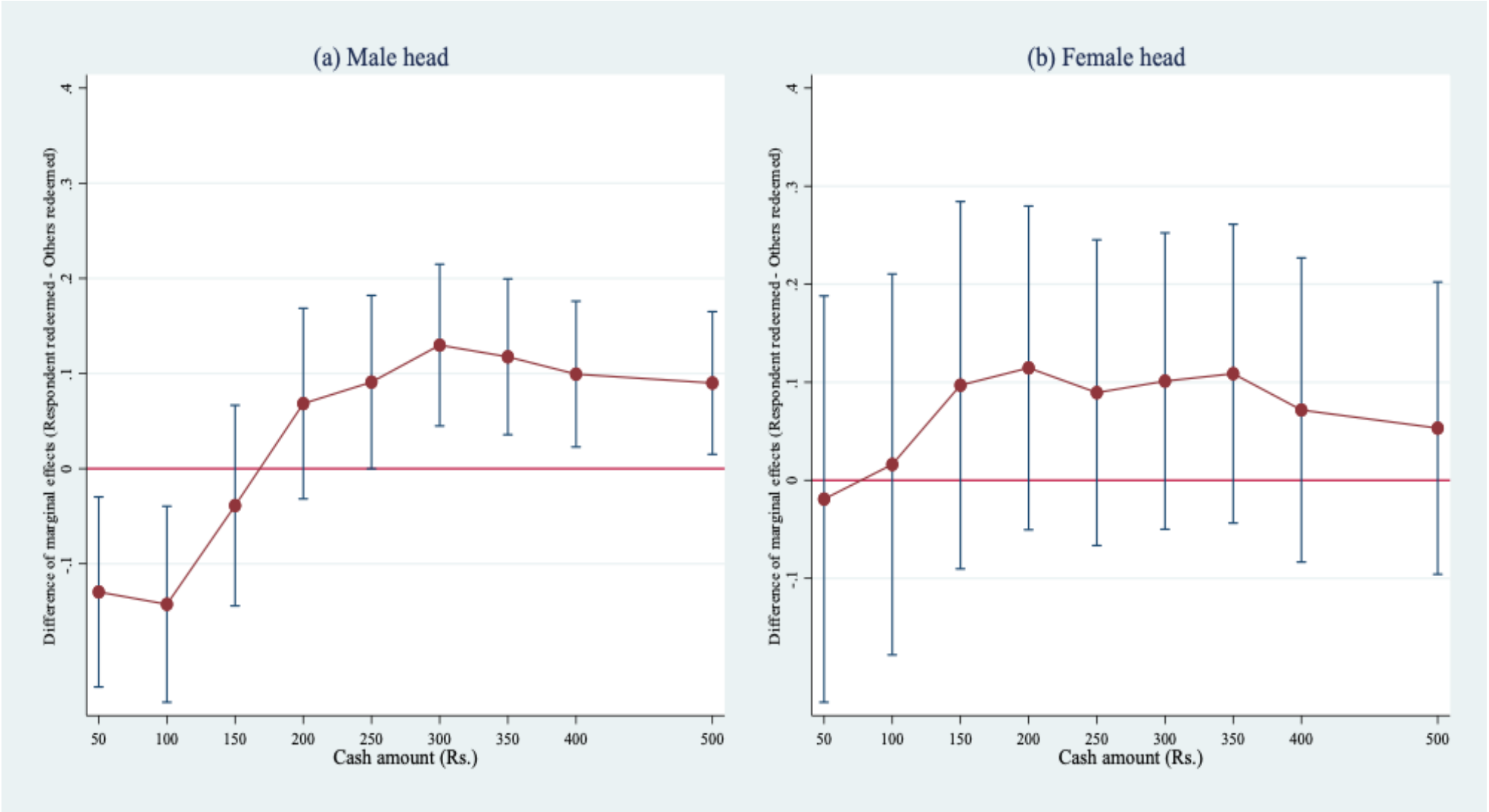
Results: Marginal effects on the probability of choosing cash sig. higher for female-headed households up to cash offer of Rs. 200

- Marginal effects on the probability of choosing cash is increasing in the cash amount.
- Higher for female headed households at every cash amount:
  - Difference higher at lower cash offers (21-24 pp), then reduces (2 pp).





Difference in the probability of choosing cash for women respondents who redeemed voucher themselves and those who did not, by male- and female-headed households



Results: Deadweight loss regression

$$DWL_{ist} = \gamma^{DWL}\, Female\_head_{is} + X_{is}\delta^{DWL} + \theta_s^{DWL} + \mu_t^{DWL} + v_i^{DWL} + w_{ist}^{DWL} \qquad (3)$$

	Dependent variable: DWL				
	Random effects (RE)		Robustness checks		
			RE with different bounds for willingness to pay (WTP) for rice		
	WTP=25 for rice only, WTP=550 for cash only resp., WTP=mid-point of switch interval for others		WTP=0 for rice only, WTP=650 for cash only, WTP=mid-point of switch interval for others	WTP=lower bound of switch interval	WTP=upper bound of switch interval
	(1)	(2)	(3)	(4)	(5)
Female head	49.97**	46.53**	55.18**	45.15**	41.88**
	(20.16)	(20.96)	(25.55)	(20.08)	(19.11)
Round 2	27.89*	26.02*	29.08	25.76*	24.40*
	(15.18)	(15.47)	(18.92)	(14.80)	(14.17)
Round 3	66.45***	63.40***	74.49***	61.03***	60.35***
	(14.76)	(14.83)	(18.09)	(14.23)	(13.55)
Constant	-91.17***	-155.74**	-182.32**	-177.44***	-117.66*
	(19.20)	(66.01)	(79.83)	(63.63)	(60.37)
Respondent/household controls	No	Yes	Yes	Yes	Yes
Slum effects	Yes	Yes	Yes	Yes	Yes
N	637	636	636	636	636
R^2	0.08	0.10	0.10	0.10	0.10

- Female headship increases DWL by Rs 47, or 29% of the value of rice.
- Women in male-headed households put a 29% premium on subsidized rice.

Further exploration of the mechanism: renegotiation and commitment

Deadweight gains (DWG) are lower in round 3: Is it learning or re-negotiation within the household?

- But DWG only lower for respondents in male-headed households, so learning doesn't explain this pattern.
- Our results are consistent with re-negotiation as an explanation.
  - ► Male head could reduce the woman's allocation by an amount less than or equal to the value of the rice or cash received.
  - ► Thus, there is a reduced bargaining premium to choosing rice for women in these households.
  - ► In female-headed households, such renegotiation is not relevant

Further exploration of the mechanism: renegotiation and commitment

Rice as a commitment device:

- ► The mechanism relating to intra-household bargaining is also supported by the responses given by women for their choice of rice over cash.
- ► While many women report using rice as a commitment device (fearing that cash may be spent on other things), the proportion reporting this as the primary reason for their choice is significantly higher in male- than female-headed households.

- In our data, female headship is indicative of greater bargaining power

Female headship as an indicator of greater bargaining power of women

	Female head		
	Coefficient	Std. error	N
Socioeconomic variables:			
Proportion of literate members	0.04	0.03	250
Dependency ratio	-0.05	0.09	249
Monthly per capita expenditure	53.44	109.2	250
Share of food in total expenditure	-0.01	0.01	250
Asset count	0.24	0.36	250
Own house	-0.05	0.05	250
Religion: Hindu	-0.04	0.07	250
Have a ration card	0.02	0.06	250
Decision-making/bargaining power variables:			
Proportion of decisions made by female	0.25***	0.07	248
Female buys market grain	0.27***	0.06	250
Female uses bank account	0.50***	0.06	233
Female is food supplies manager	0.55***	0.06	233

For our sample, female headship does not represent adverse socio-economic circumstances of the household; instead, it is indicative of women's greater bargaining power.

Conclusion

- Contrary to standard theory, instead of a deadweight loss of in-kind transfers, we find evidence of deadweight gain on average in our incentivized experimental data
- But striking differences between respondents from male- and female-headed households
  - ► Deadweight gains for male-headed households
  - ► Deadweight losses for female-headed households
- Respondents who choose rice often indicate this to be a commitment device: but this is higher when household head is male as compared to female.
- Overall, results suggest that deadweight gains from in-kind transfers can arise in contexts where bargaining power considerations are salient
- A key policy insight:
  - ► There is a case for offering respondents a choice between cash or kind.
  - ► The offer of such a choice can be important for those with weaker bargaining power to sustain a measure of control over the household budget.

Additional Slides

Potential explanations for the puzzle: Transactions costs, Rice quality

- **Transaction costs and rice quality**: experiment designed to mitigate these effects.
  - Cash transfers are typically delivered through deposits into respondent accounts with financial institutions (banks or post offices). Transaction costs for the cash option are thus determined by several factors such as the density and capacity of the financial network, the ease of operating bank accounts, and the financial literacy of respondents. Similarly, transaction costs for the rice option depend on the proximity to and familiarity with the local rice shop.
    - Transaction costs for the cash and rice options are identical in our experiment since cash or rice are both delivered through vouchers redeemable at the same local shop.
  - Respondent choice could also be influenced by the quality of subsidized rice, with higher willingness to pay for better quality rice:
    - In our experiment, the respondents were offered rice vouchers for rice of a quality comparable to what the PDS provides. Thus, superior quality of rice offered cannot explain a higher willingness to pay for rice.

Potential explanations for the puzzle: Trust

- **Trust**: several reasons why this may not be an explanatory factor:
  - First, the experiment was preceded by a pilot, which was run as a practice round with the full sample of respondents. The pilot was implemented with full protocols of the experiment, and all vouchers for cash or rice issued in the pilot run were successfully redeemed. Thus, by end of the pilot the respondents trusted the implementation of the incentivization mechanism.
  - Second, since the vouchers were given for both cash or rice, any potential trust issues would be similar for both cash and rice; nor can they explain the differential willingness to pay for rice between respondents from male- and female-headed households.
  - Third, none of the respondents in the three rounds reported any concerns or difficulties with redeeming the vouchers for cash or rice at the local shop.

Summary stats of sample households

Variable	Mean	SD
Female respondent	0.89	0.32
Age of the respondent	37	12
Female head	0.26	0.44
Total household consumption of rice per month (kg.)	17.3	16.2
Household consumption of PDS rice per month (kg.)	4.9	4.4
Household consumption of market rice per month (kg.)	12.4	15.8

Market consumption of rice is well above 5 kg.

Results: Random Effects (linear probability) model of choosing cash

$$Y_{cist} = \beta_c + \gamma Female\_head_{is} + X_{is}\delta + \theta_s + \mu_t + v_i + w_{ist} \qquad (1)$$

where

c denotes the cash option,

i denotes the household,

s denotes the slum,

t denotes the round of the experiment.

Y is a binary variable which equals 1 if the respondent chose cash instead of rice, and 0 otherwise.

β_c are the parameters for the nine cash options representing the marginal effects on the probability of choosing cash as the amount of cash offered increases.

Results: RE model of choosing cash with varying marginal effects for FHH and MHH

Allow marginal effects on the probability of choosing cash to differ for female- and male-headed households:

$$Y_{cist} = \beta_c^F (Offer_c * Female\ head_{is}) + \beta_c^M (Offer_c * Male\ head_{is}) + X_{is}\delta + \theta_s + \mu_t + v_i + w_{ist} \quad (2)$$

Regressions of deadweight loss (with interactions for rounds)

	Dependent variable: DWL	
	Random effects (RE)	
	DWL	DWL=1 if DWL>0
	(1)	(2)
Female head	55.74*	0.16**
	(31.02)	(0.07)
Round 2	25.70	0.06
	(18.64)	(0.05)
Round 3	71.95***	0.18***
	(17.04)	(0.05)
Female head × Round 2	0.41	-0.02
	(33.19)	(0.09)
Female head × Round 3	-29.14	-0.08
	(34.44)	(0.10)
Constant	-157.02**	0.07
	(65.82)	(0.18)
Respondent/household controls	Yes	Yes
Slum effects	Yes	Yes
N	636	636
R^2	0.10	0.14

Estimate of bargaining power

- Within our theoretical framework, it is possible to infer the implicit bargaining power of women (α) from the revealed switch points from rice to cash, as the standardized ratio of the market value of rice to WTP (i.e., $160/WTP$).

- For single-switch households, the average value of α is 0.4.

- As expected, the average α for female-headed households (0.47) is significantly higher than that for male-headed households (0.38) with a p-value of 0.009 for the difference.

Other explanations for the puzzle?

- **Learning or renegotiation**:
- Controlling for interactions with rounds, female headship continues to be positive and significant for deadweight loss regressions.
- We test for the stability of marginal effects on the probability of choosing cash across the three rounds separately for female- and male-headed households.
  - See next slide

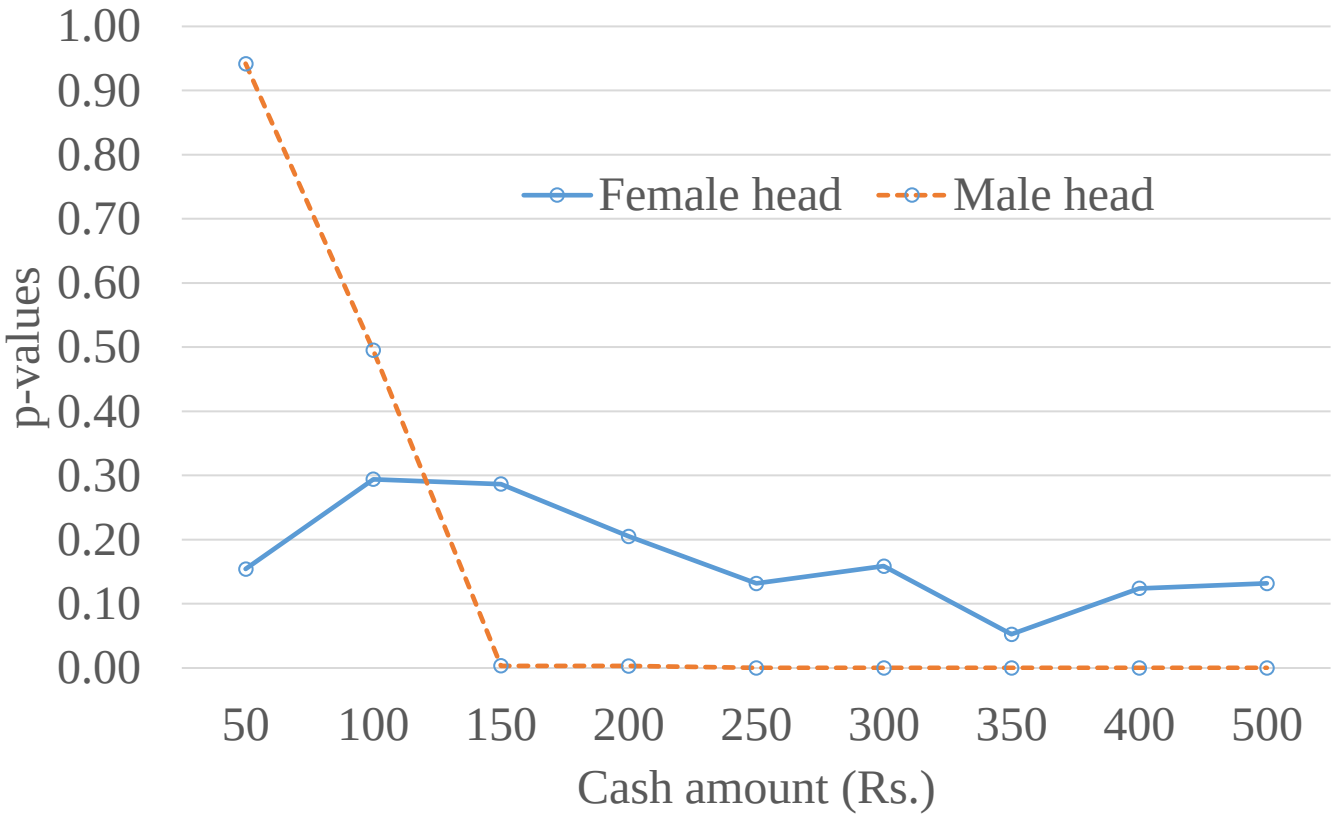
- To interpret these results in terms of learning over time, one would have to assume differential rates of learning across women from male- and female-headed households.
  - However, there is no a priori reason to expect this given that for our sample many socioeconomic characteristics are similar for female- and male-headed households

- In male-headed households there is a renegotiation of the food budget allocated to the woman?
  - One can expect that the male head would reduce the woman's allocation by an amount less than or equal to the value of the rice or cash received.
  - Thus, there is a reduced bargaining premium to choosing rice for women in these households.
  - In female-headed households, such renegotiation is not relevant.

Significance level of the difference across rounds in marginal effects on the probability of choosing cash by respondents from male- and female-headed households (p-values)

We test for the stability of marginal effects on the probability of choosing cash across the three rounds separately for female- and male-headed households.

- For FHH, the marginal effects are not statistically different across rounds for all cash offers with the exception of cash 350.
- In contrast, the marginal effects for MHH are statistically different across rounds for all cash offers except cash 50 and cash 100.
- Thus, the lack of a significant effect of female headship on deadweight loss in round 3 is attributable to a change in choices by women not from female-headed households, but to those from male-headed households.



Intra-household bargaining? Rice as a commitment device

- The mechanism relating to intra-household bargaining is also supported by the responses given by women for their choice of rice over cash.
- While many women report using rice as a *commitment device* (fearing that cash may be spent on other things), the proportion reporting this as the primary reason for their choice is significantly higher in male- than female-headed households.
- The greater need for a commitment device among male-headed households points to the role of intra-household bargaining power in influencing this choice.
- The possible reasons for choosing rice included:

(i) I chose rice because the cash amount is less than the value of 5 kilos of rice: 27%

(ii) I chose rice because cash will get spent on less useful things than rice: 27%

(iii) I chose rice because we are running short of rice: 30%

(iv) I chose rice because it is hard to control how cash will get spent: 14%

(v) others: 2%

	Dependent variable: Rice as Commitment Device (binary)	
	(1)	(2)
Female head	-0.066**	-0.064**
	(0.028)	(0.028)
Lottery amount (=1 if lottery amount < 200)		0.100**
		(0.033)
Respondent/ household controls	Yes	Yes
Slum effects	Yes	Yes
N	636	636
R^2	0.08	0.1

Comparison between male- and female-headed households, restricted to female heads who are widowed/ separated/ with an absentee husband (Table B6,corresponding to column 2 of Table 5)

Female-headed households (FHH) comprise 29% of our sample, of which 73% (19% of the total sample) reported the husband either dead, separated or not present in the household. The rest of the FHH report their marital status as currently married with a living husband, but in these cases the husband is either away (e.g. working on construction sites or as security guard) or is unable to work (likely due to disability).

	Dependent variable: DWL Sample with only female respondents
Female head	44.43* (23.33)
Round 2	28.54* (16.02)
Round 3	64.05*** (15.27)
Constant	-119.86* (66.80)
Slum effects	Yes
Household effects	No
Respondent/ household-level controls	Yes
N	589