Not Playing Favorites: An Experiment on Parental Preferences for Educational Investment

James Berry [1] Rebecca Dizon-Ross [2] Maulik Jagnani [3]

April, 2019

[1]University of Delaware

[2]University of Chicago

[3]Cornell University

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
  - Maximize returns to investments, potentially leading to inequality across sibilings?
  - Averse to cross-sibling inequality?
    - Equality in outcomes – the amounts their children ultimately earn?
    - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
  - Maximize returns to investments, potentially leading to inequality across sibilings?
  - Averse to cross-sibling inequality?
    - Equality in outcomes – the amounts their children ultimately earn?
    - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
    - Maximize returns to investments, potentially leading to inequality across sibilings?
    - Averse to cross-sibling inequality?
        - Equality in outcomes – the amounts their children ultimately earn?
        - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
    - Maximize returns to investments, potentially leading to inequality across sibilings?
    - Averse to cross-sibling inequality?
        - Equality in outcomes – the amounts their children ultimately earn?
        - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
    - Maximize returns to investments, potentially leading to inequality across sibilings?
    - Averse to cross-sibling inequality?
        - Equality in outcomes – the amounts their children ultimately earn?
        - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
    - Maximize returns to investments, potentially leading to inequality across sibilings?
    - Averse to cross-sibling inequality?
        - Equality in outcomes – the amounts their children ultimately earn?
        - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
    - Maximize returns to investments, potentially leading to inequality across sibilings?
    - Averse to cross-sibling inequality?
        - Equality in outcomes – the amounts their children ultimately earn?
        - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

Motivation

- Parental investments have profound impacts on their children's outcomes (e.g., Cunha and Heckman, 2007; Cunha et al., 2006)
- What are parents' preferences for allocating resources among their children? (e.g., educational investment)
  - Maximize returns to investments, potentially leading to inequality across sibilings?
  - Averse to cross-sibling inequality?
    - Equality in outcomes – the amounts their children ultimately earn?
    - Equality in inputs – such as expenditure in tutoring or textbooks?
- Understanding these preferences can help governments design better policies; e.g., conditional cash transfer programs

It is challenging to identify parents' preferences

Difficult to:

1. Know full (perceived) production function and generate clean behavioral predictions
   - ex. if parents invest more in high-ability child, is that pure returns-maximization, returns-max. balanced with inequality aversion, or something else?

2. Find sufficient variation to separately identify parameters

We overcome these challenges by performing the first lab-in-the-field experiment to identify parents' preferences for investing in their children's education

It is challenging to identify parents' preferences

Difficult to:

1. Know full (perceived) production function and generate clean behavioral predictions
    - ex. if parents invest more in high-ability child, is that pure returns-maximization, returns-max. balanced with inequality aversion, or something else?
2. Find sufficient variation to separately identify parameters

We overcome these challenges by performing the first lab-in-the-field experiment to identify parents' preferences for investing in their children's education

It is challenging to identify parents' preferences

Difficult to:

1. Know full (perceived) production function and generate clean behavioral predictions
   - ex. if parents invest more in high-ability child, is that pure returns-maximization, returns-max. balanced with inequality aversion, or something else?

2. Find sufficient variation to separately identify parameters

We overcome these challenges by performing the first lab-in-the-field experiment to identify parents' preferences for investing in their children's education

It is challenging to identify parents' preferences

Difficult to:

1. Know full (perceived) production function and generate clean behavioral predictions
   - ex. if parents invest more in high-ability child, is that pure returns-maximization, returns-max. balanced with inequality aversion, or something else?
2. Find sufficient variation to separately identify parameters

We overcome these challenges by performing the first lab-in-the-field experiment to identify parents' preferences for investing in their children's education

It is challenging to identify parents' preferences

Difficult to:

1. Know full (perceived) production function and generate clean behavioral predictions
    - ex. if parents invest more in high-ability child, is that pure returns-maximization, returns-max. balanced with inequality aversion, or something else?
2. Find sufficient variation to separately identify parameters

We overcome these challenges by performing the first lab-in-the-field experiment to identify parents' preferences for investing in their children's education

Preview of findings

- Parents put some weight on maximizing returns
  - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
  - Average estimated WTP to equalize inputs >15% of annual average educational spending

Preview of findings

- Parents put some weight on maximizing returns
  - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
  - Average estimated WTP to equalize inputs >15% of annual average educational spending

Preview of findings

- Parents put some weight on maximizing returns
    - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
    - Average estimated WTP to equalize inputs >15% of annual average educational spending

Preview of findings

- Parents put some weight on maximizing returns
    - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
    - Average estimated WTP to equalize inputs >15% of annual average educational spending

Preview of findings

- Parents put some weight on maximizing returns
  - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
  - Average estimated WTP to equalize inputs >15% of annual average educational spending

Preview of findings

- Parents put some weight on maximizing returns
  - But we reject the null that they care only about returns maximization
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- Forgo 40-50% of their potential experimental earnings
  - Average estimated WTP to equalize inputs $>$15% of annual average educational spending

Conceptual framework

Parent utility function and predictions for behavior

$$\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) = \lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}})$$
$$- \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}})$$
$$- \beta g(\underbrace{\left|x_1 - x_2\right|}_{\text{Abs. inputs gap}})$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

1. Returns maximization ($\lambda > 0$)

Parent utility function and predictions for behavior

$$\max_{x_1,x_2} U(x_1,x_2|a_1,a_2) = \lambda u(\underbrace{R(x_1|a_1)+R(x_2|a_2)}_{\text{Total household earnings}})$$

$$-\alpha f(\underbrace{\left|R(x_1|a_1)-R(x_2|a_2)\right|}_{\text{Absolute earnings gap}})$$

$$-\beta g(\underbrace{\left|x_1-x_2\right|}_{\text{Abs. inputs gap}})$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1+x_2 \leq y_e$

1. Returns maximization ($\lambda > 0$)
   - a_i, x_i complements ($\frac{\partial^2 R_i}{\partial x_i \partial a_i} > 0$) $\rightarrow$ parents reinforce ($\frac{\partial x_i^*}{\partial a_i} > 0$)
   - a_i, x_i substitutes ($\frac{\partial^2 R_i}{\partial x_i \partial a_i} < 0$) $\rightarrow$ parents compensate ($\frac{\partial x_i^*}{\partial a_i} < 0$)

Parent utility function and predictions for behavior

$$
\begin{aligned}
\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) = & \lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}}) \\
& - \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}}) \\
& - \beta g(\underbrace{\left|x_1 - x_2\right|}_{\text{Abs. inputs gap}})
\end{aligned}
$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

1. Returns maximization ($\lambda > 0$)

2. Inequality aversion over outcomes ($\alpha > 0$)
   - Parents compensate regardless of complementarity ($\frac{\partial x_i^*}{\partial a_i} < 0$)

Parent utility function and predictions for behavior

$$\begin{aligned}\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) = &\lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}}) \\ &- \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}}) \\ &- \beta g(\underbrace{|x_1 - x_2|}_{\text{Abs. inputs gap}})\end{aligned}$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

1. Returns maximization ($\lambda > 0$)
2. Inequality aversion over outcomes ($\alpha > 0$)
3. Inequality aversion over inputs ($\beta > 0$)
   - Parents equalize inputs regardless of complementarity

Parent utility function and predictions for behavior

$$
\begin{aligned}
\max_{x_1, x_2} U(x_1, x_2 | a_1, a_2) = & \lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}}) \\
& - \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}}) \\
& - \beta g(\underbrace{\left|x_1 - x_2\right|}_{\text{Abs. inputs gap}}) \\
& + \gamma h(\underbrace{x_1 - x_2}_{\text{Relative inputs}})
\end{aligned}
$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

4. Child-specific preferences ($\gamma \neq 0$)
   - Parents give more to the preferred child
   - Discuss in paper but skip today; allow for in estimation

Parent utility function and predictions for behavior

$$
\begin{aligned}
\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) =&\lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}}) \\
&- \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}}) \\
&- \beta g(\underbrace{|x_1 - x_2|}_{\text{Abs. inputs gap}}) \\
&+ \gamma h(\underbrace{x_1 - x_2}_{\text{Relative inputs}})
\end{aligned}
$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

4. Child-specific preferences ($\gamma \neq 0$)
   - Parents give more to the preferred child
   - Discuss in paper but skip today; allow for in estimation

Parent utility function and predictions for behavior

$$\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) = \lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}})$$
$$- \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}})$$
$$- \beta g(\underbrace{\left|x_1 - x_2\right|}_{\text{Abs. inputs gap}})$$
$$+ \gamma h(\underbrace{x_1 - x_2}_{\text{Relative inputs}})$$

with: x_i inputs; a_i endowments; $R(x_i|a_i)$ earnings; $x_1 + x_2 \leq y_e$

4. Child-specific preferences ($\gamma \neq 0$)
   - Parents give more to the preferred child
   - Discuss in paper but skip today; allow for in estimation

Identifying the utility function

$$\begin{aligned}\max_{x_1,x_2} U(x_1, x_2 | a_1, a_2) = &\lambda u(\underbrace{R(x_1|a_1) + R(x_2|a_2)}_{\text{Total household earnings}}) \\ &- \alpha f(\underbrace{\left|R(x_1|a_1) - R(x_2|a_2)\right|}_{\text{Absolute earnings gap}}) \\ &- \beta g(\underbrace{\left|x_1 - x_2\right|}_{\text{Abs. inputs gap}}) \\ &+ \gamma h(\underbrace{x_1 - x_2}_{\text{Relative inputs}})\end{aligned}$$

- Our goal: Identify average preference weights λ, α, β
  - To do so, our experiment varies the $R(\cdot)$ functions
  - Ideally, shock long-run earnings; difficult so shock short-run instead

Experimental design

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
    - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
    - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
    - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
    - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
    - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
    - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
    - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
    - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
    - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
    - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental design overview

- Sample 300 parents with ≥ 2 kids enrolled in grades 5-7
- Tell parents 2 of their kids will be taking a test and receiving monetary earnings (outcomes) based on their test scores
- Give parent an input: 10 lottery tickets for tutoring
  - Winning ticket (1 per HH) receives 1 hr of tutoring focused on tested material
  - Clean prediction: Unless parents care about equality, should give all tickets to 1 child
- Parent allocates inputs (tickets) between her kids
  - Repeats 5 times under 5 scenarios for the payment function mapping test scores to payments ($R(x_i)$ functions)
  - One scenario randomly selected for each household $\rightarrow$ incentive-compatible to answer truthfully for each
  - Within-subject identification ("strategy method")

Experimental process

Experimental process

Elicit parents' beliefs

- Parents answered the following questions for their 2 children:
  - What math score do you think [CHILD] will get without tutoring?
  - How much do you think [CHILD's] score would increase because of tutoring?

Experimental process

Elicit parents' beliefs → Explain design

- Surveyors explain experimental design:
  - Walk parents through two practice (hypothetical) scenarios that used different payment function than real experiment.
  - Practice scenarios explained in the same way as the real experimental scenarios.

  ▸ Sample Script ▸ VisualAid ▸ VisualAid
- Surveyors conduct placebo lottery
  - Ask parents to allocate 10 lottery tickets between a 50MWK and 100 MWK prize.

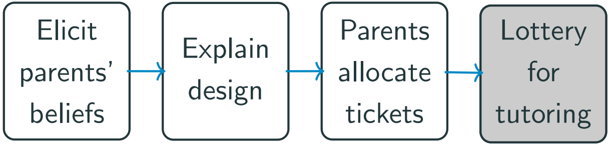
Experimental process

Elicit parents' beliefs → Explain design → Parents allocate tickets

For each of the 5 payment function scenarios ▸ Payment Functions:

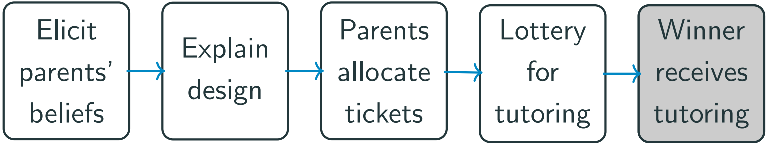
- Surveyor explain payment function.
- Surveyor walk parents through visual aids. ▸ VisualAid ▸ VisualAid
    - Tell parents what allocation would maximize expected returns, minimize expected outcomes or inputs inequality
- Parents allocate 10 lottery tickets between their 2 children.

Experimental process



- 1 scenario selected and tickets assigned based on parent's allocation for that scenario.
- Parents randomly select a ticket

Experimental process



- The "winning" child receives 1 hour of tutoring.

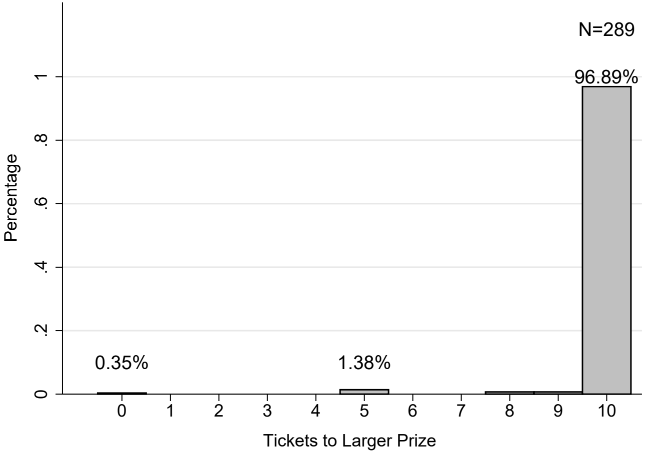
Experimental process

Elicit parents' beliefs → Explain design → Parents allocate tickets → Lottery for tutoring → Winner receives tutoring → **Kids take test, get reward**

- All children take a math test.
- Surveyors delivered cash payments to children based on their test scores and the payment function in the chosen scenario.
- Note: Use of cash biases us towards the null of the "standard model" (returns-maximization) $\rightarrow$ conservative for estimating inequality aversion ▸ Detail

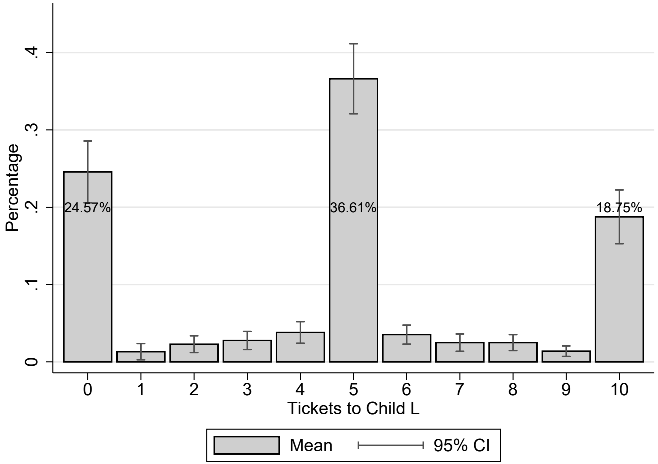
Results: Qualitative exploration of parents' preferences

In the placebo lottery, parents maximized returns...



...but with educational investments, inconsistent with pure returns-maximization, parents often choose "split" allocations

Raw choice data, pooled across scenarios



Now use cross-scenario variation to shed qualitative light on preferences

Do parents' preferences (on average) place positive weight on:

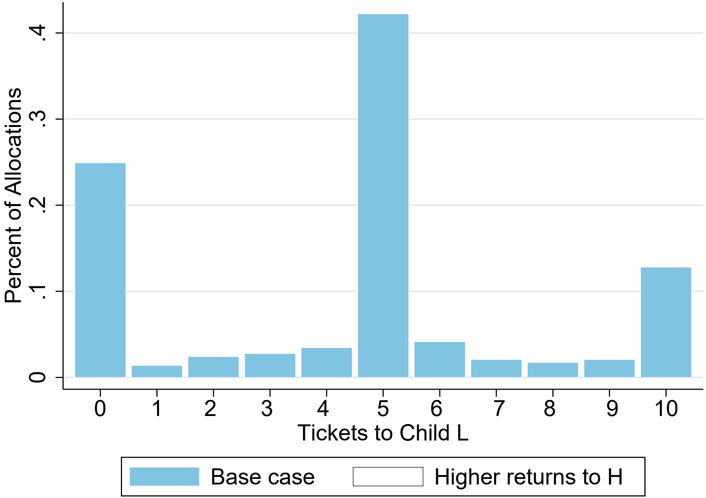
1. Returns maximization (λ)?
2. Inequality aversion (IA) over outcomes (α)?
3. Inequality aversion (IA) over inputs (β)?

Do parents respond to financial returns to tutoring?

	Scenarios	
	1. Base Case	2. Higher Returns to Child H
Payment functions		
Child L	$10\underline{S}_L$	$10\underline{S}_L$
Child H	$10\underline{S}_H$	$100\underline{S}_H$
Predictions		
Returns Max.	If $R_L < R_H$ (66%): H If $R_L = R_H$ (19%): ? If $R_L > R_H$ (14%): L	H
IA over Outcomes	If $R_L \leq R_H$ (86%): L If $R_L > R_H$ (14%): ?	L
IA over Inputs	Equal	Equal
Mean perceived earnings return to tutoring		
Child L	113	113
Child H	146	1,456
Mean perceived earnings without tutoring		
Child L	90	90
Child H	237	2,368

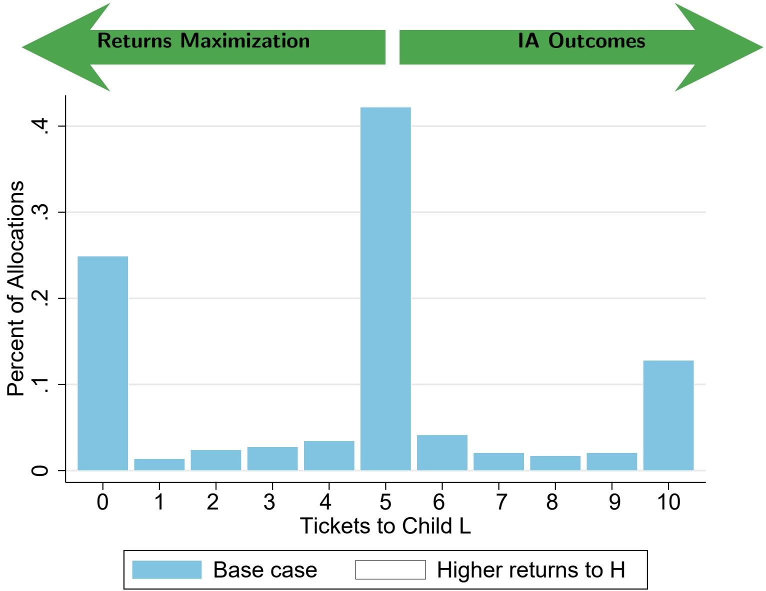
S_i: Child i's score (relative to test score threshold). R_i: Child i's test score gains to tutoring. ▸ Graph ▸ Payment Fx

1,456-113 MWK = 1 daily wage or 2.2 USD. 10 MWK = 0.014 USD. 100 MWK = 0.14 USD = 7% of daily wage.



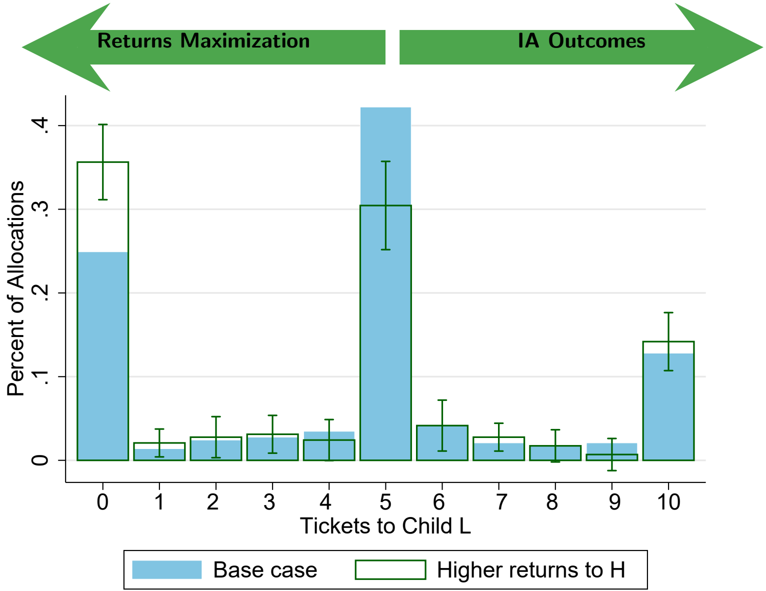
Limiting to people with different RM predictions

Individual-level changes



▸ Limiting to people with different RM predictions

▸ Individual-level changes



Implication: Parents place (moderate) weight on returns maximization

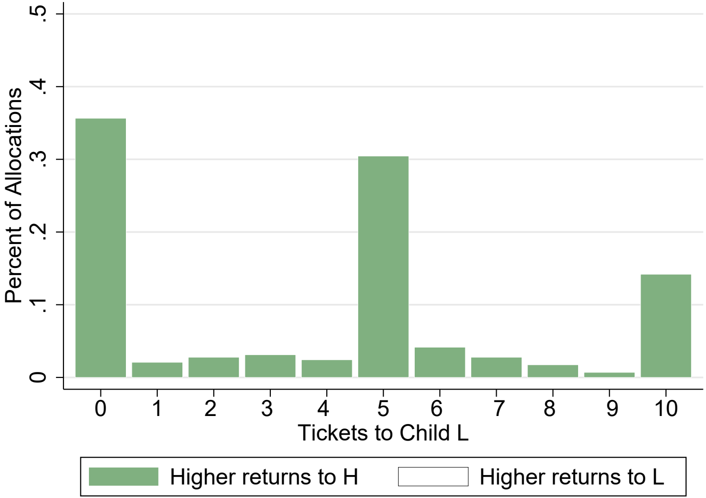
Limiting to people with different RM predictions
Individual-level changes

Does returns maximization or inequality aversion over outcomes dominate?

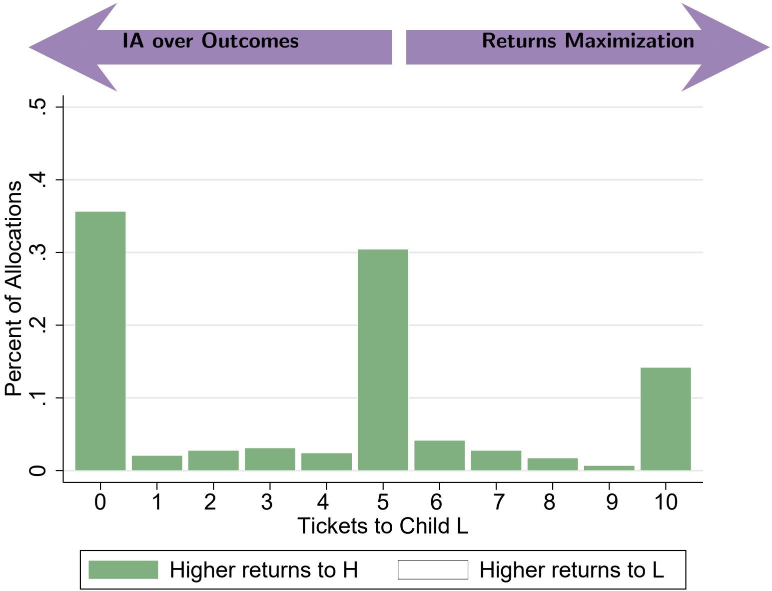
	Scenarios	
	2. Higher Returns to H	**3. Higher Returns to L**
Payment functions		
Child L	$10\underline{S}_{\mathrm{L}}$	$100\underline{S}_{\mathrm{L}}$
Child H	$100\underline{S}_{\mathrm{H}}$	$10\underline{S}_{\mathrm{H}}$
Predictions		
Returns Max.	H	L
IA over Outcomes	L	H
IA over Inputs	Equal	Equal

S_i: Child i's score (relative to test score threshold). R_i: Child i's test score gains to tutoring.
Returns Max. predictions for Scenario 3 hold for 96% of people

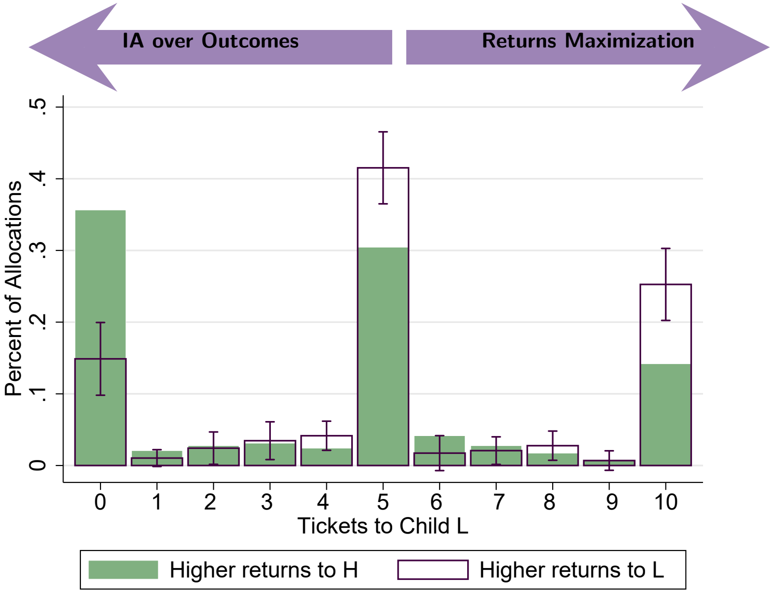
▸ Expected Earnings: Scenario 2 vs. Scenario 3 ▸ Graph



▶ Individual level changes



Individual level changes



Implication: Returns maximization dominates inequality aversion over outcomes on average

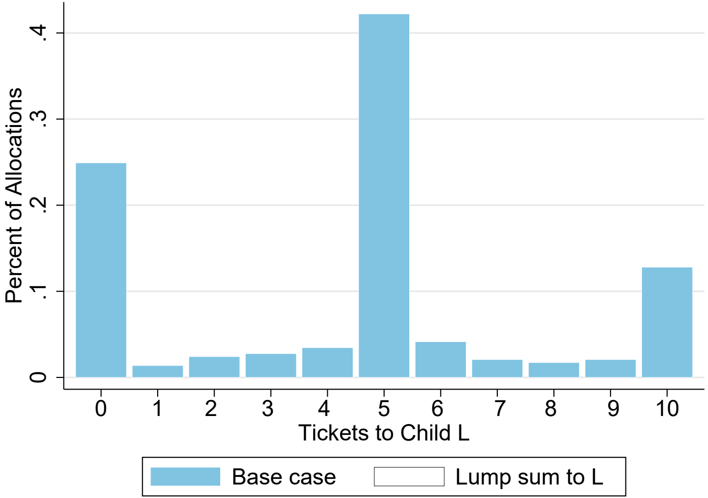
▸ Individual level changes

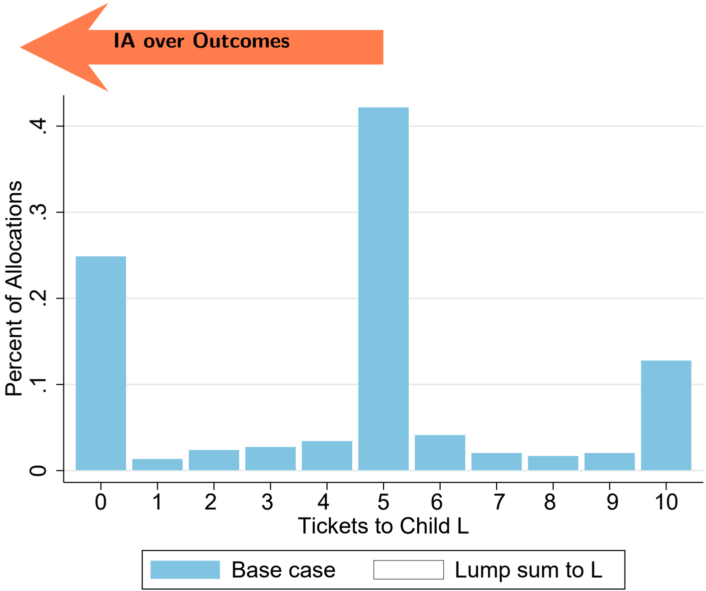
Are parents averse to inequality in outcomes?

	Scenarios	
	1. Base Case	4. Lump Sum to Child L
Payment functions		
Child L	$0 + 10\underline{S}_{\text{L}}$	$1000 + 10\underline{S}_{\text{L}}$
Child H	$0 + 10\underline{S}_{\text{H}}$	$0 + 10\underline{S}_{\text{H}}$
Predictions		
Returns Max.	If $R_L < R_H$ (66%): H	If $R_L < R_H$ (66%): H
	If $R_L = R_H$ (19%): ?	If $R_L = R_H$ (19%): ?
	If $R_L > R_H$ (14%): L	If $R_L > R_H$ (14%): L
IA over Outcomes	If $R_L < R_H$ (66%): L	
	If $R_L = R_H$ (19%): L	H
	If $R_L > R_H$ (14%): ?	
IA over Inputs	Equal	Equal

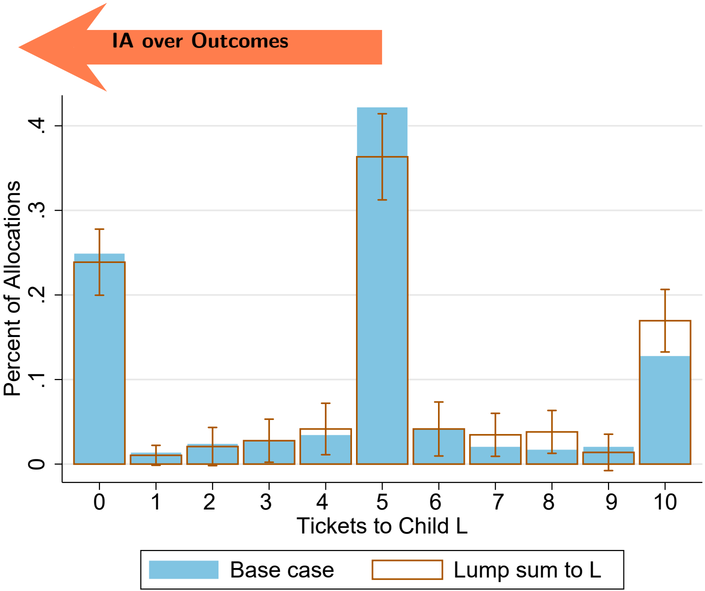
S_i: Child i's score (relative to test score threshold). R_i: Child i's test score gains to tutoring.
Returns Max. for Scenario 4 hold for 95% of people.

▸ Expected Earnings: Scenario 1 vs. Scenario 4 ▸ Graph


Percent of Allocations
0
.1
.2
.3
.4
0
1
2
3
4
5
6
7
8
9
10
Tickets to Child L
Base case
Lump sum to L



Scenario 3 vs 5 | Individual-level Changes | Limiting to people with different IAO predictions



Implication: No evidence of inequality aversion over outcomes

Scenario 3 vs 5 | Individual-level Changes | Limiting to people with different IAO predictions

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
   - Is that due to *ex post* equalizing?
     Possibly, but we get similar evidence from another experiment where parents could not *ex post* equalize, so likely not.
3. Inequality aversion over inputs (β)?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
   - Is that due to *ex post* equalizing?
     Possibly, but we get similar evidence from another experiment where parents could not *ex post* equalize, so likely not.
3. Inequality aversion over inputs (β)?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
   - Is that due to *ex post* equalizing?
     Possibly, but we get similar evidence from another experiment where parents could not *ex post* equalize, so likely not.
3. Inequality aversion over inputs (β)?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
   - Is that due to *ex post* equalizing?
     Possibly, but we get similar evidence from another experiment where parents could not *ex post* equalize, so likely not.
3. Inequality aversion over inputs (β)?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
   - Is that due to *ex post* equalizing?
     Possibly, but we get similar evidence from another experiment where parents could not *ex post* equalize, so likely not.
3. Inequality aversion over inputs (β)?

Testing for inequality aversion in inputs

Identified less from cross-scenario variation since prediction does not change across scenarios

Tests:

1. Are there "split" allocations? Yes (57% of choices)
    - Evidence of inequality aversion over either inputs or outcomes $\rightarrow$ suggests inputs since none over outcomes
2. Does the distribution have a peak at 50%?

Testing for inequality aversion in inputs

Identified less from cross-scenario variation since prediction does not change across scenarios

Tests:

1. Are there "split" allocations? Yes (57% of choices)
    - Evidence of inequality aversion over either inputs or outcomes → suggests inputs since none over outcomes
2. Does the distribution have a peak at 50%?

Testing for inequality aversion in inputs

Identified less from cross-scenario variation since prediction does not change across scenarios

Tests:

1. Are there "split" allocations? Yes (57% of choices)
    - Evidence of inequality aversion over either inputs or outcomes $\rightarrow$ suggests inputs since none over outcomes
2. Does the distribution have a peak at 50%?

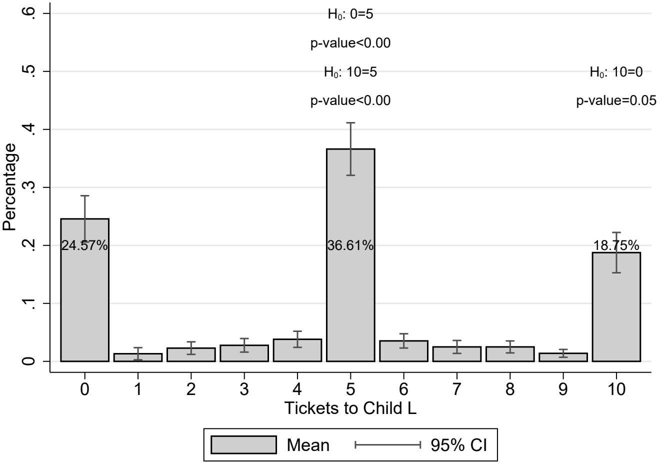
Testing for inequality aversion in inputs

Identified less from cross-scenario variation since prediction does not change across scenarios

Tests:

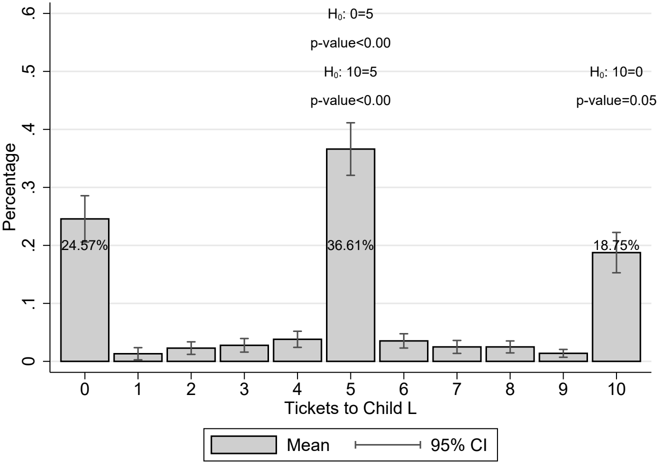
1. Are there "split" allocations? Yes (57% of choices)
    - Evidence of inequality aversion over either inputs or outcomes $\rightarrow$ suggests inputs since none over outcomes
2. Does the distribution have a peak at 50%?

Equal allocation is the modal choice



- Substantial equalizing in all scenarios ▸ Graph

Equal allocation is the modal choice



- Substantial equalizing in all scenarios ▸ Graph

Are there other reasons that parents equally split besides an aversion to inequality in inputs?

1. Were parents indifferent between their children?
   - Unlikely: Knife's edge explanation, and many parents equalized in multiple scenarios even when the returns change ▸ Stability
2. Did parents not understand how to maximize?
   - Unlikely: we told them how to, and more-educated parents equalize more
3. Were parents uncertain about which child to choose?
   - Unlikely: Heterogeneity analysis and direct survey evidence refute this
4. Are they simply balancing inequality aversion in outcomes against returns-maximization?
   - No: equalize as much when inequality aversion in outcomes and returns maximization have the same vs. diff predictions. ▸ Detail

▸ Back

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
3. Inequality aversion over inputs (β)? Yes

Next: Explore parents' preferences more quantitatively

1. How much less do parents earn (according to their beliefs) than if they maximized returns?
   - Parents earn roughly 40% less than if they maximized returns ▸ Graph
2. What are their average preference weights? How much are they willing to pay to equalize inputs?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
3. Inequality aversion over inputs (β)? Yes

Next: Explore parents' preferences more quantitatively

1. How much less do parents earn (according to their beliefs) than if they maximized returns?
   - Parents earn roughly 40% less than if they maximized returns ▸ Graph
2. What are their average preference weights? How much are they willing to pay to equalize inputs?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
3. Inequality aversion over inputs (β)? Yes

Next: Explore parents' preferences more quantitatively

1. How much less do parents earn (according to their beliefs) than if they maximized returns?
   - Parents earn roughly 40% less than if they maximized returns ▸ Graph
2. What are their average preference weights? How much are they willing to pay to equalize inputs?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
3. Inequality aversion over inputs (β)? Yes

Next: Explore parents' preferences more quantitatively

1. How much less do parents earn (according to their beliefs) than if they maximized returns?
   - Parents earn roughly 40% less than if they maximized returns ▸ Graph
2. What are their average preference weights? How much are they willing to pay to equalize inputs?

Results so far

Do parents' preferences (on average) place positive weight on:

1. Returns maximization (λ)? Yes
2. Inequality aversion over outcomes (α)? No
3. Inequality aversion over inputs (β)? Yes

Next: Explore parents' preferences more quantitatively

1. How much less do parents earn (according to their beliefs) than if they maximized returns?
   - Parents earn roughly 40% less than if they maximized returns ▸ Graph
2. What are their average preference weights? How much are they willing to pay to equalize inputs?

Structural preference estimation (Preliminary)

Mixed logit regression model: Parent i has the following utility in scenario j from choosing ticket allocation k (e.g., 10/0, 5/5):

$$
\begin{aligned}
u_{ijk} = & \lambda_i TotalPay_{ijk} - \alpha_i OutcomeInequality_{ijk} - \beta_i InputInequality_{ijk} \\
& + \gamma_i InputsToChildLvsH_{ijk} + \varepsilon_{ijk}
\end{aligned}
$$

- $\lambda_i, \alpha_i, \beta_i, \gamma_i$: normally distributed with SD's and correlations estimated through estimation
- ε_{ijk}: type I extreme value, independent across i, j, and k

▸ Identification

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE
Household earnings ('00)	0.2471***	0.2297***
	(0.0557)	(0.0454)
Gap between children's earnings ('00)	0.0347	0.0108
	(0.0353)	(0.0292)
Absolute difference in inputs	-0.3645***	
	(0.0613)	
Inputs not equally split (0/1)		-2.9763***
		(0.2921)
Tickets to child L	-0.0831	-0.1398**
	(0.0643)	(0.0684)
WTP for 1 unit lower input inequality (MWK100)	1.48	
WTP for equal inputs (MWK100)		12.96
Observations	15,895	15,895

- High weight on equalizing inputs: Mean WTP 1,296 MWK ▸ CF results
  - 2.1 USD; 92% of daily wage; 16% annual per-child educ. exp.
- Estimated WTP for equal inputs also correlates with more equal allocations of expenditures and parental time ▸ Table

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE
Household earnings ('00)	0.2471***	0.2297***
	(0.0557)	(0.0454)
Gap between children's earnings ('00)	0.0347	0.0108
	(0.0353)	(0.0292)
Absolute difference in inputs	-0.3645***	
	(0.0613)	
Inputs not equally split (0/1)		-2.9763***
		(0.2921)
Tickets to child L	-0.0831	-0.1398**
	(0.0643)	(0.0684)
WTP for 1 unit lower input inequality (MWK100)	1.48	
WTP for equal inputs (MWK100)		12.96
Observations	15,895	15,895

- High weight on equalizing inputs: Mean WTP 1,296 MWK ▸ CF results
  - 2.1 USD; 92% of daily wage; 16% annual per-child educ. exp.
- Estimated WTP for equal inputs also correlates with more equal allocations of expenditures and parental time ▸ Table

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE
Household earnings ('00)	0.2471***	0.2297***
	(0.0557)	(0.0454)
Gap between children's earnings ('00)	0.0347	0.0108
	(0.0353)	(0.0292)
Absolute difference in inputs	-0.3645***	
	(0.0613)	
Inputs not equally split (0/1)		-2.9763***
		(0.2921)
Tickets to child L	-0.0831	-0.1398**
	(0.0643)	(0.0684)
WTP for 1 unit lower input inequality (MWK100)	1.48	
WTP for equal inputs (MWK100)		12.96
Observations	15,895	15,895

- High weight on equalizing inputs: Mean WTP $1,296$ MWK ▸ CF results
    - 2.1 USD; 92% of daily wage; 16% annual per-child educ. exp.
- Estimated WTP for equal inputs also correlates with more equal allocations of expenditures and parental time ▸ Table

Conclusion

We perform the first experiment to estimate parents' preferences for investing in their children

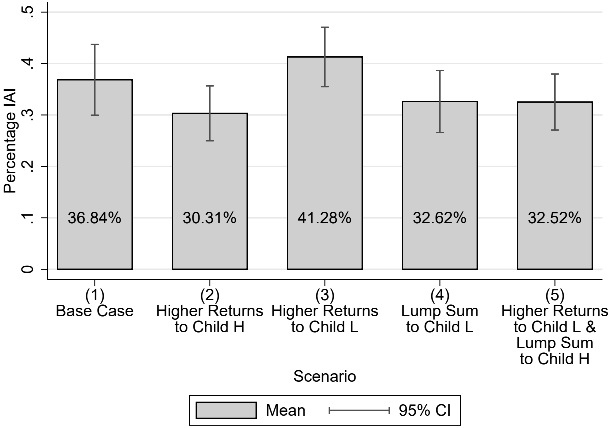
- Parents put some weight on maximizing returns
- But they don't only care about maximizing returns
- Deviate from returns maximization primarily because of a strong preference for equality in inputs
- High average WTP to equalize inputs (>15% of annual average educational spending)

Thank you!

Results: Quantifying parents' preferences

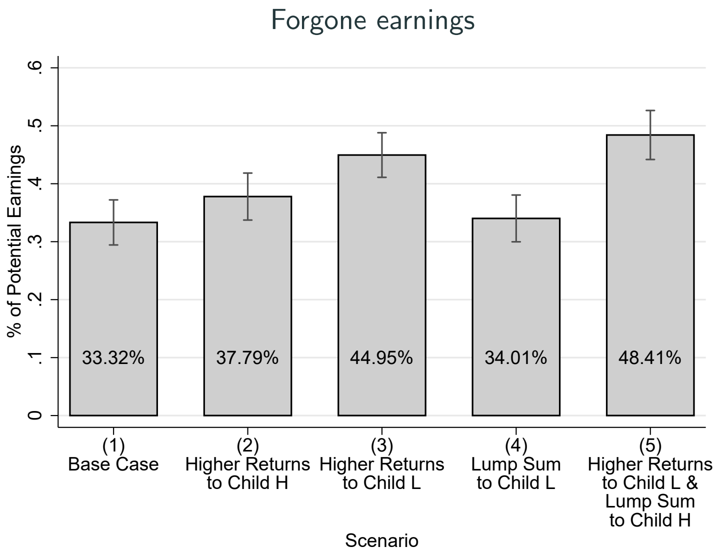
Conclusion

A substantial share of parents choose exactly-equal inputs in each scenario



Back

Parents forgo substantial expected earnings



In MWK   Back

Further exploration

- A different experiment where parents can't ex post equalize

- Other Reasons for Equalizing Inputs

- Mixed Logit, with OLS and IV

Why use lottery tickets as input?

Absent inequality aversion, expected utility is linear in probability, and hence lottery tickets

Linearity advantageous:

1. Clean predictions: Parents who do not care about equality should allocate all tickets to the child they'd prefer to receive tutoring $\rightarrow$ Only split if indifferent
   - Unlike other settings, concave returns to tutoring or risk aversion (i.e., concave utility in money) do not cause splitting
2. Clean measurement: Only need to elicit beliefs about returns to tutoring for each child

▸ Standard utility ▸ Back

A similar setting where parents could not ex post equalize

Dizon-Ross (2018)

- RCT in Malawi that delivered information to randomly selected parents with children in primary school about children's academic performance
- Measured effects of information on parents' investments and decisions
- To measure changes in level of investment across children:
  - Conducted a lottery, in which prize is 4 years of secondary school fees for one child in every 100 households
  - Parents given 9 tickets to allocate between children
  - Secondary school very expensive and most parents can't afford $\rightarrow$ Can't *ex post* equalize outcomes.

Back

A similar setting where parents could not ex post equalize

Dizon-Ross (2018)

- RCT in Malawi that delivered information to randomly selected parents with children in primary school about children's academic performance
- Measured effects of information on parents' investments and decisions
- To measure changes in level of investment across children:
  - Conducted a lottery, in which prize is 4 years of secondary school fees for one child in every 100 households
  - Parents given 9 tickets to allocate between children
  - Secondary school very expensive and most parents can't afford $\rightarrow$ Can't *ex post* equalize outcomes.

▸ Back

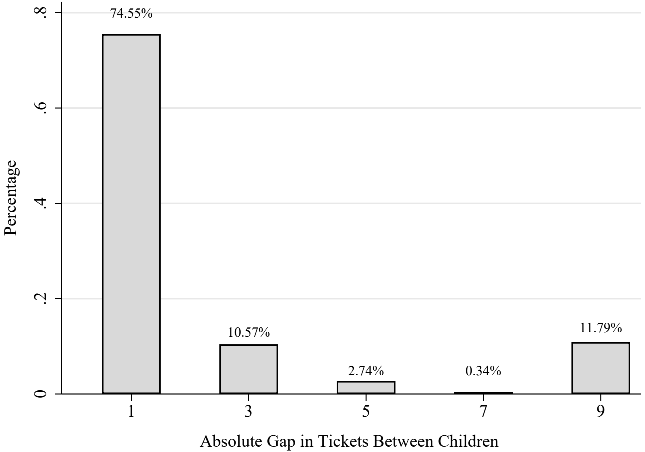
Predictions

1. Returns maximization
   - All tickets to child with higher perceived secondary school return (normally: high performer)
2. Inequality aversion over outcomes
   - More (or all) tickets to perceived lower performing child
3. Inequality aversion over inputs
   - Split tickets as evenly as possible (4/5)

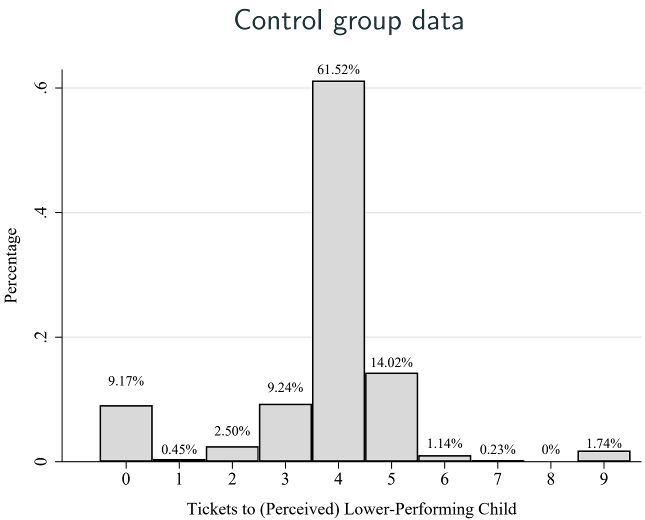
Back

Parents equalize inputs (not outcomes) even when cannot ex-post equalize outcomes

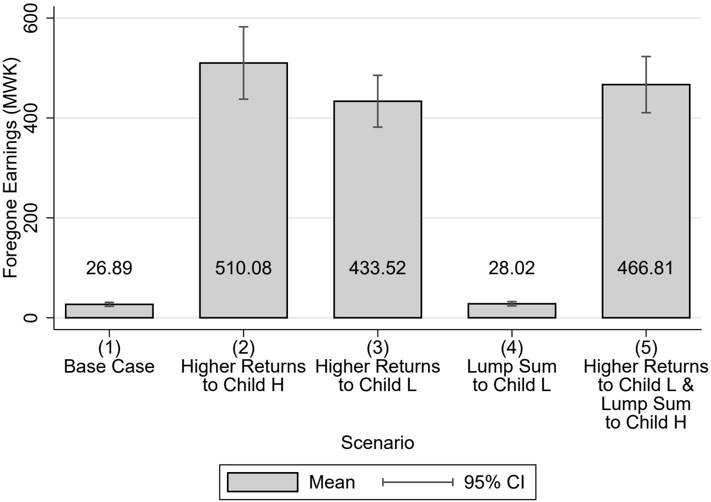
Control group data



Parents equalize inputs (not outcomes) even when cannot ex-post equalize outcomes



Parents forgo substantial expected earnings



In MWK

500 MWK: 0.81 USD; 35% of daily wage; 6% annual per-child educ. exp. Back

2. Structural preference estimation (Preliminary): Identification

Mixed logit regression model: Parent i utility in scenario j from ticket allocation k:

$$\begin{aligned} u_{ijk} = &\lambda_i TotalPay_{ijk} - \alpha_i OutcomeInequality_{ijk} - \beta_i InputInequality_{ijk} \\ &+ \gamma_i InputsToChildLvsH_{ijk} + \varepsilon_{ijk} \end{aligned} \tag{1}$$

- $TotalPay_{ijk}$ and $OutcomeInequality_{ijk}$ vary for two reasons:
  1. Cross-scenario variation in payment fx's (exogenous)
  2. Parent beliefs about returns to tutoring (endogenous)
- To address, also implement control function approach (Petrin and Todd 2010):
  1. Calculate OLS residuals from regressing $OutcomeInequality_{ijk}$ and $TotalPay_{ijk}$ on:
     - Instruments (scenario $\times$ ticket allocation dummies, τ_{jk})
     - The other regressors from equation (1)
  2. Include residuals $\hat{\eta}_{ijk}$, $\hat{\mu}_{ijk}$ as control function in second stage estimation.
     - ρ_i, τ_i normally distributed

Back

2. Structural preference estimation (Preliminary): Identification

Mixed logit regression model: Parent i utility in scenario j from ticket allocation k:

$$\begin{aligned} u_{ijk} = & \lambda_i TotalPay_{ijk} - \alpha_i OutcomeInequality_{ijk} - \beta_i InputInequality_{ijk} \\ & + \gamma_i InputsToChildLvsH_{ijk} + \varepsilon_{ijk} \end{aligned} \tag{1}$$

- $TotalPay_{ijk}$ and $OutcomeInequality_{ijk}$ vary for two reasons:
  1. Cross-scenario variation in payment fx's (exogenous)
  2. Parent beliefs about returns to tutoring (endogenous)
- To address, also implement control function approach (Petrin and Todd 2010):
  1. Calculate OLS residuals from regressing $OutcomeInequality_{ijk}$ and $TotalPay_{ijk}$ on:
     - Instruments (scenario $\times$ ticket allocation dummies, τ_{jk})
     - The other regressors from equation (1)
  2. Include residuals $\hat{\eta}_{ijk}$, $\hat{\mu}_{ijk}$ as control function in second stage estimation.
     - ρ_i, τ_i normally distributed

Back

2. Structural preference estimation (Preliminary): Identification

Mixed logit regression model: Parent i utility in scenario j from ticket allocation k:

$$\begin{aligned} u_{ijk} = & \lambda_i TotalPay_{ijk} - \alpha_i OutcomeInequality_{ijk} - \beta_i InputInequality_{ijk} \\ & + \gamma_i InputsToChildLvsH_{ijk} + \rho_i \hat{\eta}_{ijk} + \tau_i \hat{\mu}_{ijk} + \varepsilon'_{ijk} \end{aligned} \tag{1}$$

- $TotalPay_{ijk}$ and $OutcomeInequality_{ijk}$ vary for two reasons:
  1. Cross-scenario variation in payment fx's (exogenous)
  2. Parent beliefs about returns to tutoring (endogenous)
- To address, also implement control function approach (Petrin and Todd 2010):
  1. Calculate OLS residuals from regressing $OutcomeInequality_{ijk}$ and $TotalPay_{ijk}$ on:
     - Instruments (scenario × ticket allocation dummies, τ_{jk})
     - The other regressors from equation (1)
  2. Include residuals $\hat{\eta}_{ijk}$, $\hat{\mu}_{ijk}$ as control function in second stage estimation.
     - ρ_i, τ_i normally distributed

Back

2. Structural preference estimation (Preliminary): Identification

Mixed logit regression model: Parent i utility in scenario j from ticket allocation k:

$$
\begin{aligned}
u_{ijk} = & \lambda_i TotalPay_{ijk} - \alpha_i OutcomeInequality_{ijk} - \beta_i InputInequality_{ijk} \\
& + \gamma_i InputsToChildLvsH_{ijk} + \rho_i \hat{\eta}_{ijk} + \tau_i \hat{\mu}_{ijk} + \varepsilon'_{ijk}
\end{aligned}
\tag{1}
$$

- $TotalPay_{ijk}$ and $OutcomeInequality_{ijk}$ vary for two reasons:
  1. Cross-scenario variation in payment fx's (exogenous)
  2. Parent beliefs about returns to tutoring (endogenous)
- To address, also implement control function approach (Petrin and Todd 2010):
  1. Calculate OLS residuals from regressing $OutcomeInequality_{ijk}$ and $TotalPay_{ijk}$ on:
     - Instruments (scenario $\times$ ticket allocation dummies, τ_{jk})
     - The other regressors from equation (1)
  2. Include residuals $\hat{\eta}_{ijk}$, $\hat{\mu}_{ijk}$ as control function in second stage estimation.
     - ρ_i, τ_i normally distributed

Back

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE	(3) Mixed Logit with CF β / SE
Household earnings ('00)	0.2471***	0.2297***	0.1885***
	(0.0557)	(0.0454)	(0.0554)
Gap between children's earnings ('00)	0.0347	0.0108	0.0160
	(0.0353)	(0.0292)	(0.0292)
Absolute difference in inputs	-0.3645***		
	(0.0613)		
Inputs not equally split (0/1)		-2.9763***	-3.1775***
		(0.2921)	(0.3281)
Tickets to child L	-0.0831	-0.1398**	-0.2115***
	(0.0643)	(0.0684)	(0.0723)
WTP for 1 unit lower input inequality (MWK100)	1.48		
WTP for equal inputs (MWK100)		12.96	16.86
Observations	15,895	15,895	15,895

Back

WTP for equal inputs correlates with other behaviors

	Above-med. absolute gap in exp.	
	(1)	(2)
	β / SE	β / SE
WTP to decrease absolute gap in inputs (MWK 100's)	-0.012**	
	(0.006)	
WTP to equally split inputs (MWK 100's)		-0.003
		(0.002)
Constant	0.519***	0.545***
	(0.031)	(0.040)
Observations	288	288
R^2	0.013	0.009

Note: Above-med. absolute gap in expenditures is a dummy for whether the absolute value of the between-child gap in shares of total human capital expenditures is above-median. Back

WTP for equal inputs correlates with other behaviors

	Mother's time not equally split (0/1)	
	(1)	(2)
	β / SE	β / SE
WTP to decrease absolute gap in inputs (MWK 100's)	-0.012**	
	(0.006)	
WTP to equally split inputs (MWK 100's)		-0.005**
		(0.002)
Constant	0.410***	0.455***
	(0.033)	(0.043)
Dep. var mean	0.39	0.39
Observations	251	251
R^2	0.015	0.019

▸ Back

1. Reduced-form approach

- The "cost" of equalizing inputs (forgone household earnings) varies across scenarios
- We use this cross-scenario variation to trace out how parents trade off household earnings vs. inputs inequality
- Steep slope of equalizing on cost implies lower value of equality (when cost increases, stop doing it)
- Flat slope implies higher value of equality, i.e., that (some) parents equalize even when high cost to doing so

1. Reduced-form approach

$$Equalized_{ij} = d_0 + d_1 * Foregone_{ij} + \tau_i + \varepsilon_{ij},$$

- $Equalized_{ij}$: Dummy for respondent i equalizing inputs in scenario j
- $Foregone_{ij}$ Difference between HH earnings from the returns-maximizing choice vs. the input-equalizing choice.
- $Foregone_{ij}$ varies for two reasons:
    1. Cross-scenario variation in functions mapping scores to payments (exogenous)
    2. Parent beliefs about their children's returns to tutoring (endogenous)
- IV strategy: Instrument for $Foregone_{ij}$ with scenario dummies

1. Reduced-form approach

	(1) OLS β / SE	(2) IV β / SE
Foregone Earnings from Splitting ('00)	-0.006**	-0.010***
	(0.003)	(0.003)
Observations	1445	1445
R^2	0.664	0.664

- IV: Additional MWK 1000 (1.38 USD or 12% annual per-child educ. exp.) in cost of equalizing decreases equalizing by 10pp
- Relatively flat → Some parents have substantial willingness to pay for equal inputs

1. Reduced-form approach

	(1) OLS β / SE	(2) IV β / SE
Foregone Earnings from Splitting ('00)	-0.006**	-0.010***
	(0.003)	(0.003)
Observations	1445	1445
R^2	0.664	0.664

- IV: Additional MWK 1000 (1.38 USD or 12% annual per-child educ. exp.) in cost of equalizing decreases equalizing by 10pp
- Relatively flat $\rightarrow$ Some parents have substantial willingness to pay for equal inputs

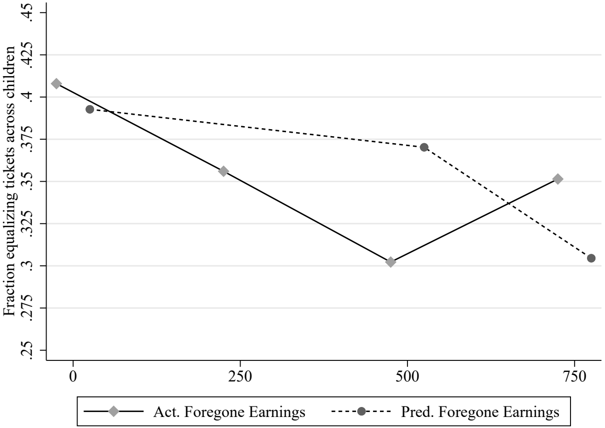
1. Reduced-form approach

	(1)	(2)
	OLS	IV
	β / SE	β / SE
Foregone Earnings from Splitting ('00)	-0.006**	-0.010***
	(0.003)	(0.003)
Observations	1445	1445
R^2	0.664	0.664

- IV: Additional MWK 1000 (1.38 USD or 12% annual per-child educ. exp.) in cost of equalizing decreases equalizing by 10pp
- Relatively flat $\rightarrow$ Some parents have substantial willingness to pay for equal inputs

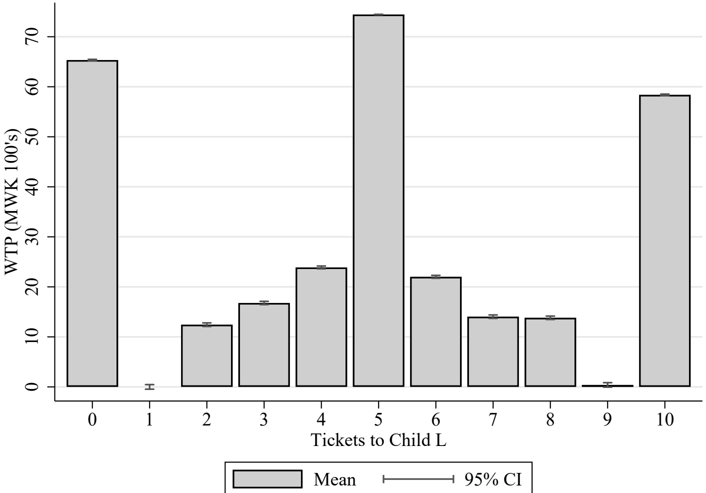
1. Reduced-form approach

Fraction of equalizers by bin of foregone earnings



Parents have a high WTP for equal inputs

Mixed logit estimates of willingness to pay for different ticket allocations



	Father's time not equally split (0/1)	
	(1)	(2)
	β / SE	β / SE
WTP to decrease absolute gap in inputs (MWK 100's)	-0.014**	
	(0.007)	
WTP to equally split inputs (MWK 100's)		-0.005**
		(0.002)
Constant	0.409***	0.449***
	(0.040)	(0.051)
Observations	175	175
R^2	0.022	0.022

WTP for equal inputs correlates with other behaviors

	Mother's time not equally split (0/1)	
	(1)	(2)
	β / SE	β / SE
WTP to decrease absolute gap in inputs (MWK 100's)	-0.012**	
	(0.006)	
WTP to equally split inputs (MWK 100's)		-0.005**
		(0.002)
Constant	0.410***	0.455***
	(0.033)	(0.043)
Dep. var mean	0.39	0.39
Observations	251	251
R^2	0.015	0.019

▸ Conclusion

Standard returns-maximizing utility as function of tickets

$$U(x_L, x_H) = \frac{x_L}{10} Eu(R_L^T + R_H) + \frac{x_H}{10} Eu(R_L + R_H^T) \quad (2)$$

with:

- R_i expected earnings without tutoring
- R_i^T expected earnings with tutoring
- $Eu(\cdot)$ taken over the risk in parents' beliefs about their children's scores with and without tutoring.

Note: linear in x_L and x_H

Back

Utility function with uncertainty

$$
\begin{aligned}
\max_{x_1,x_2} U(x_1, x_2|a_1, a_2) = & \lambda \underbrace{\mathbb{E}\left[R(x_1|a_1) + R(x_2|a_2)\right]}_{\text{Total household earnings}} \\
& - \alpha \underbrace{\left|\mathbb{E}\left[R(x_1|a_1) - R(x_2|a_2)\right]\right|}_{\text{Absolute earnings gap}} \\
& - \beta \underbrace{\left|\mathbb{E}\left[x_1 - x_2\right]\right|}_{\text{Absolute inputs gap}} \\
& + \gamma \underbrace{\mathbb{E}\left[x_1 - x_2\right]}_{\text{Relative inputs}}
\end{aligned}
$$

▸ Back

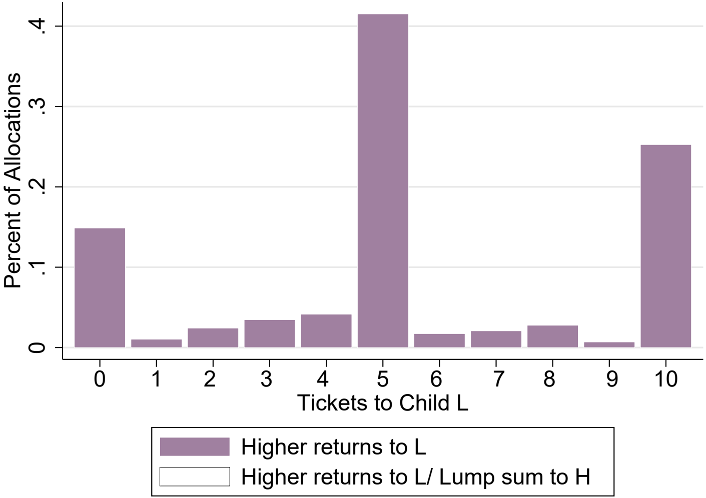
Parents' Preferences: Scenario 3 vs. Scenario 5

	Scenarios	
	3. Higher Returns to Child L	5. Higher Returns to L & Lump Sum to H
Payment functions		
Child L	$0 + 100\underline{S}_{\mathrm{L}}$	$0 + 100\underline{S}_{\mathrm{L}}$
Child H	$0 + 10\underline{S}_{\mathrm{H}}$	$6000 + 10\underline{S}_{\mathrm{H}}$
Predictions		
Returns Max.	L	L
IA over Outcomes	H	L
IA over Inputs	Equal	Equal

R_i: Child i's test score gains to tutoring.

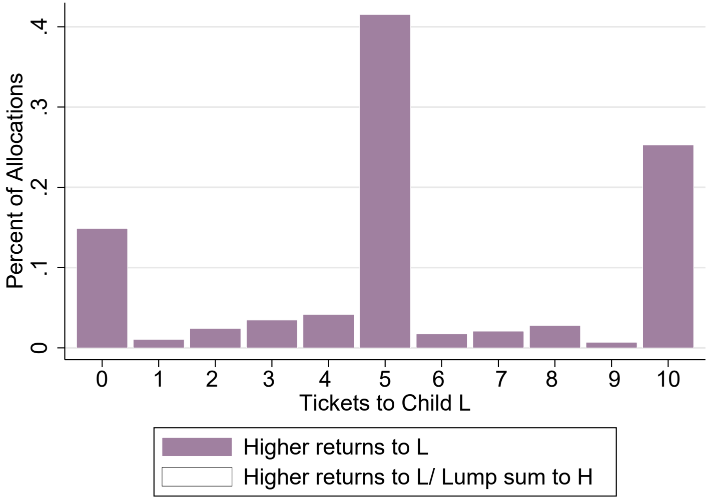
RM predictions for Scenario 5 hold for 95% of people. IAO predictions for Scenario 5 hold for 96% of people.

▸ Expected Earnings: Scenario 3 vs. Scenario 5 ▸ Graph ▸ Back


Percent of Allocations
0
.1
.2
.3
.4
0
1
2
3
4
5
6
7
8
9
10
Tickets to Child L
Higher returns to L
Higher returns to L/ Lump sum to H

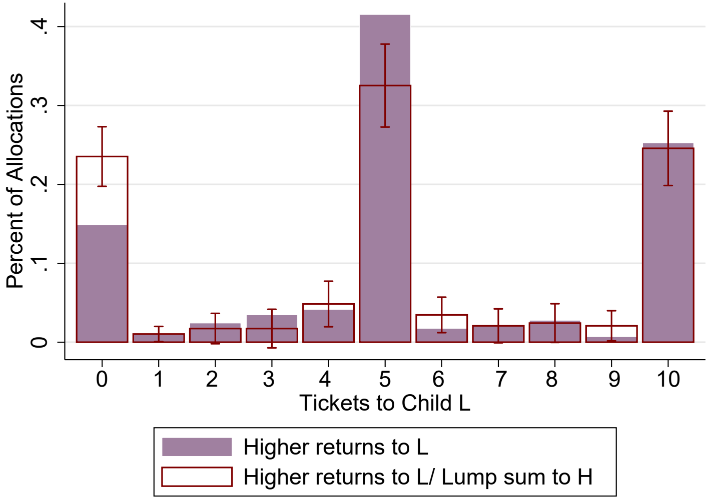
Back

IA over Outcomes and Returns Maximization



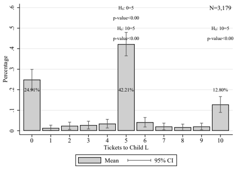
Back

IA over Outcomes and Returns Maximization

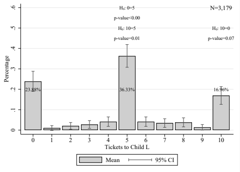


Back

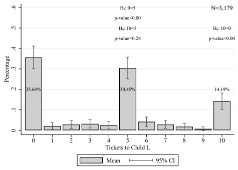
Ticket allocations, by scenario



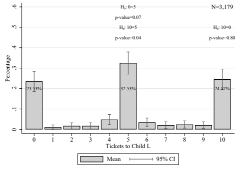
(a) Scenario 1 (*Base Case*)



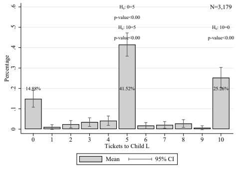
(b) Scenario 2 (*Lump Sum to Child L*)



(c) Scenario 3 (*Higher Returns to Child H*)

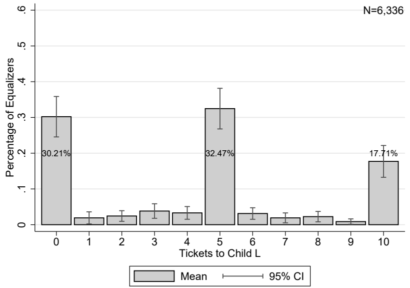


(d) Scenario 4 (*Higher Returns to Child L & Lump Sum to Child H*)

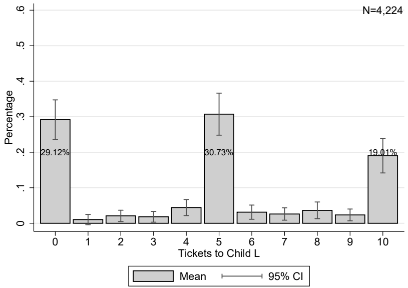


(e) Scenario 5 (*Higher Returns to Child L*)

Ticket allocations, by whether inequality aversion in outcomes (IAO) and returns maximization (RM) have the same or opposite predictions: People with $R_L < R_H$ only



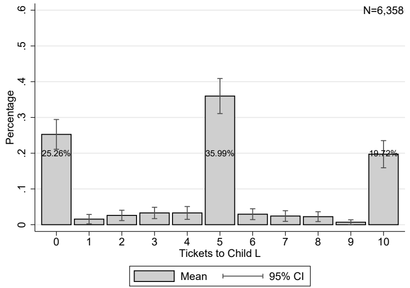
Scenarios where IAO and RM have opposite predictions



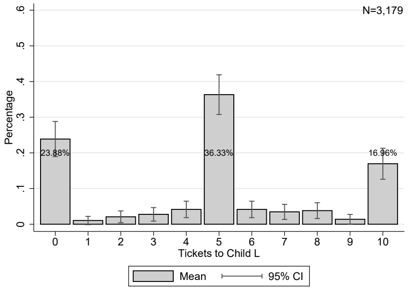
Scenarios where IAO and RM have the same prediction

cards 3-5 only

Ticket allocations, by whether inequality aversion in outcomes (IAO) and returns maximization (RM) have the same or opposite predictions: Cards 3-5 only



Scenarios where IAO and RM have opposite predictions



Scenarios where IAO and RM have the same prediction

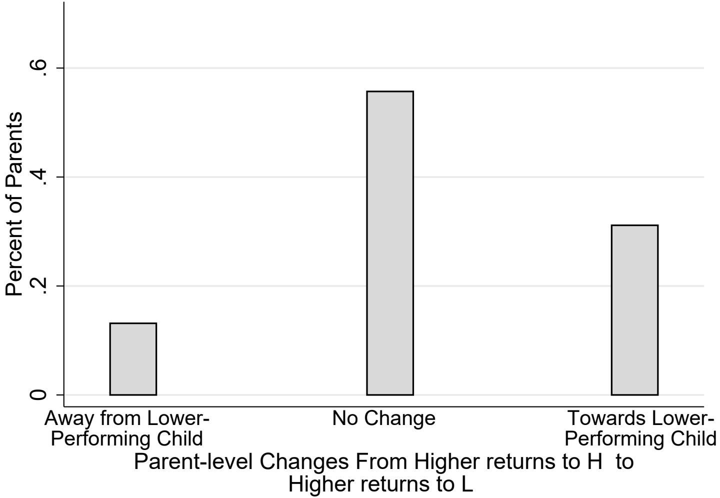
Back

Summary of Outcomes

Total Households			289
	Child L	**Child H**	**p-value**
Received Tutoring (% received tutoring)	0.43	0.57	0.00
Math test score Mean (out of 100)	41.92	44.14	0.01
Weighted average returns to tutoring	13.08	-6.68	N/A

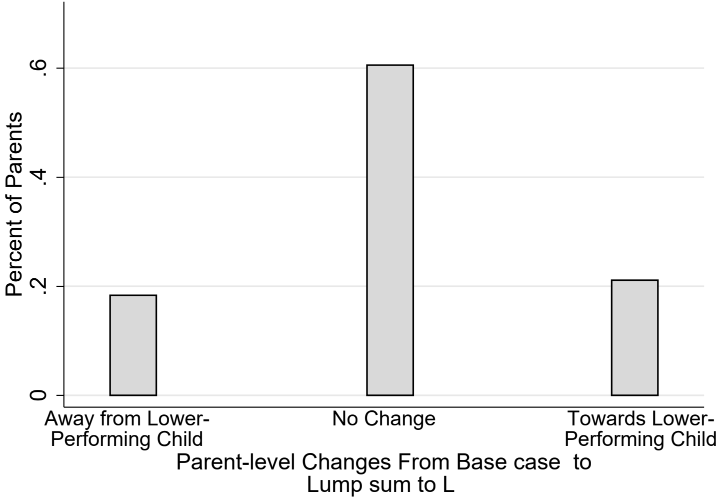
Back

Individual parent-level changes: S2 to S3



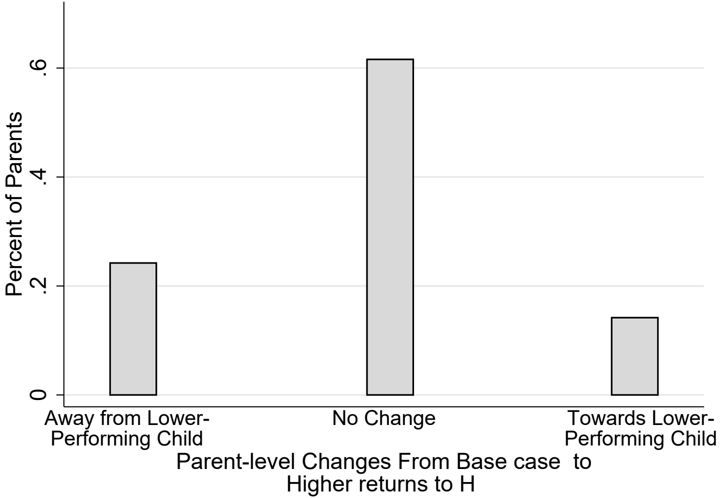
▸ Back

Individual parent-level changes: S1 to S4



▸ Back

Individual parent-level changes: S1 to S2



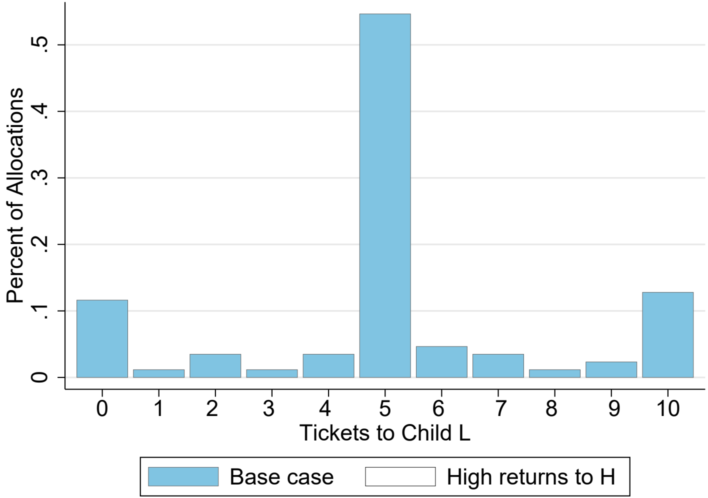
Back

Stability of preferences

Total Households	289
Stability of Preferences Across Scenarios:	
IAI all scenarios (% of parents)	0.19
RM all scenarios (% of parents)	0.06
IAO all scenarios % of parents)	0.00

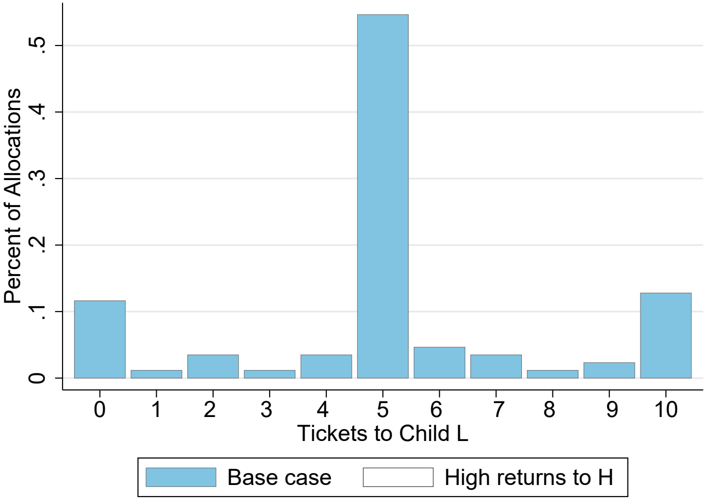
Notes: This table presents the proportion of parents who only preferred to equalize inputs, maximize returns, or equalize outcomes for all scenarios.

Back

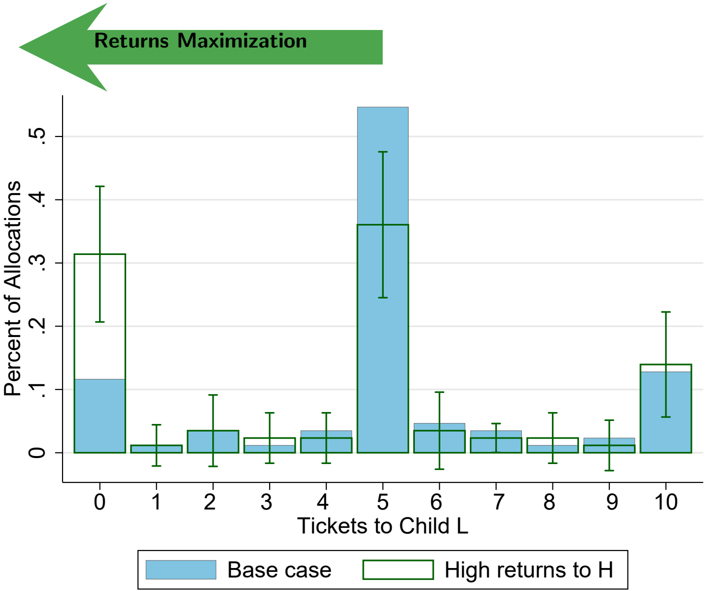

Percent of Allocations
0
.1
.2
.3
.4
.5
0
1
2
3
4
5
6
7
8
9
10
Tickets to Child L
Base case
High returns to H

Back

Returns Maximization

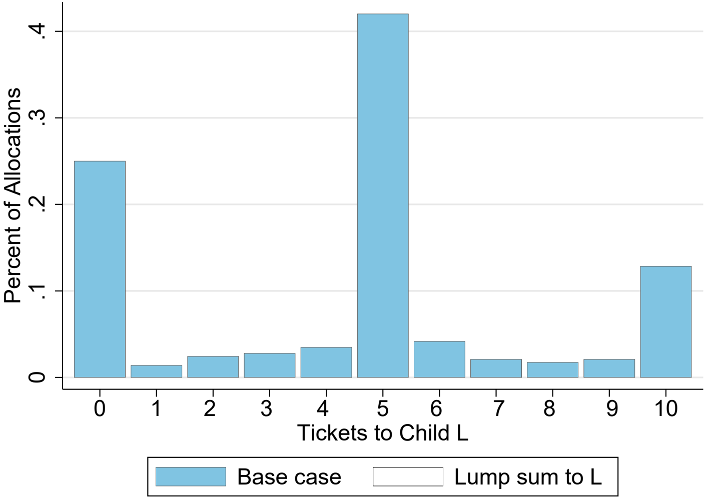


Back



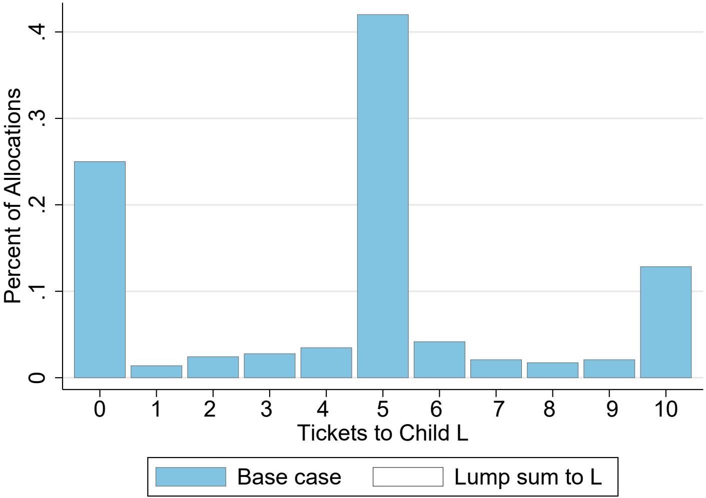
Returns Maximization
Percent of Allocations
0
.1
.2
.3
.4
.5
0
1
2
3
4
5
6
7
8
9
10
Tickets to Child L
Base case
High returns to H

Back


Percent of Allocations
0
.1
.2
.3
.4
0
1
2
3
4
5
6
7
8
9
10
Tickets to Child L
Base case
Lump sum to L

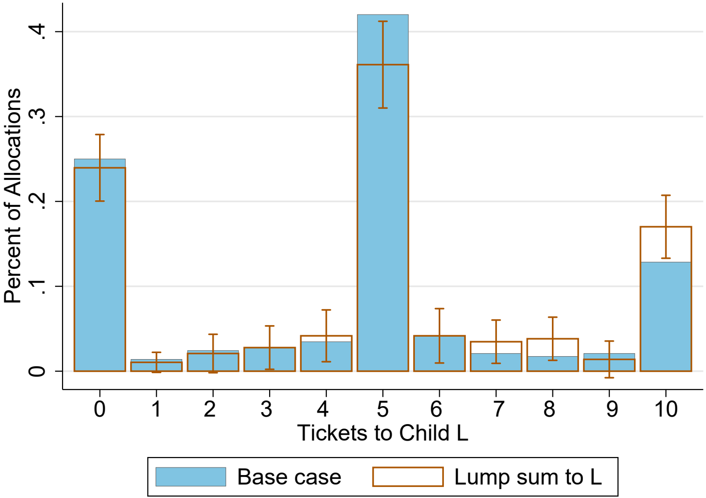
Back

IA over Outcomes



Back

IA over Outcomes



Back

Sample card: Script ▸ Back

Here's your first card. With this card, both children get 10 MWK for every point scored over 40 on the test. So, if Child A gets 50 points and Child B gets 70 points, with this card, Child A would get a reward worth (50-40) points X 10 MWK per point = 100 MWK, and Child B would get a reward worth (70-40) points X 10 MWK per point = 300 MWK. So, the expected reward for each child depends on the score they receive, but with this card, both children get 10 MWK for each point scored.

	Card 1					
	Beliefs w/o T	**Beliefs w T**	**Scenario**	**Payoff w/o T**	**Payoff w T**	**# Tickets o/f 10**
Child A	50	60	10*(TS-40)	100	200	
Child B	70	80	10*(TS-40)	300	400	

Without tutoring, you expected Child A to score 50 on the test; if they do in fact score 50, then Child A would get a prize worth 10*(50-40) = 100 MWK. With tutoring, you expected Child A to get a score of 60. If she did score 60, he/she will receive a prize worth 10*(60-40) = 200 MWK. So, then the more tickets you give to Child A, the higher chance you move them from a prize worth 100 MWK to a prize worth 200 MWK.

Similarly, without tutoring, you expected Child B to score 70 on the test, which means that Child B would get a prize worth 10*(70-40) = 300 MWK. With tutoring, you expected Child B to get a score of 80. With this reward card, he/she will receive 10*(80-40) = MWK 400. So, then the more tickets you give to Child B, the higher chance you move them from a prize worth MWK 300 to a prize worth MWK 400.

Sample card: Visual aid 1 ‣ Back

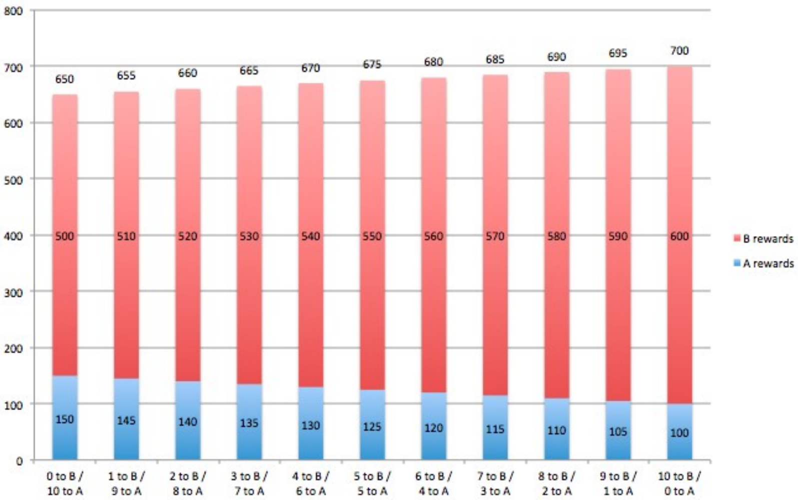
Tickets to Child A	0	1	2	3	4	5	6	7	8	9	10
Child A's Expected Reward	100	110	120	130	140	150	160	170	180	190	200
Child B's Expected Reward	400	390	380	370	360	350	340	330	320	310	300
Tickets to Child B	10	9	8	7	6	5	4	3	2	1	0

Sample card: Visual aid 1 ▸ Back

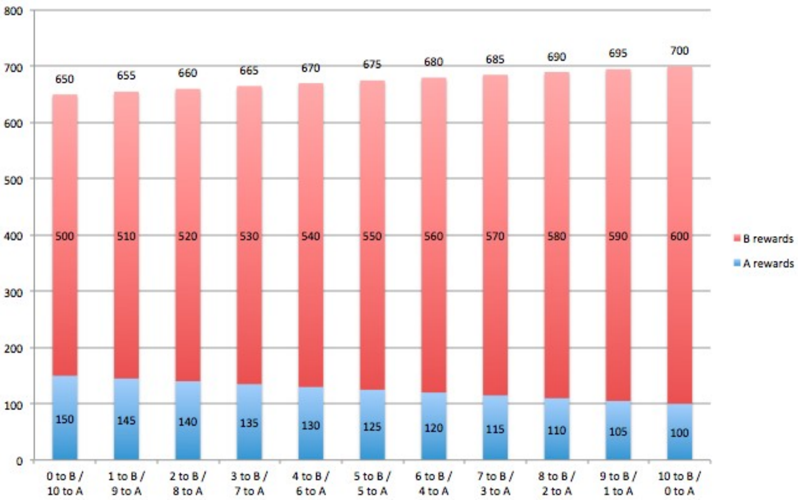
Tickets to Child A	0	1	2	3	4	5	6	7	8	9	10
Child A's Expected Reward	100	110	120	130	140	150	160	170	180	190	200
Child B's Expected Reward	400	390	380	370	360	350	340	330	320	310	300
Tickets to Child B	10	9	8	7	6	5	4	3	2	1	0

Sample card: Visual aid 2

Back



Sample card: Visual aid 2 ▸ Back

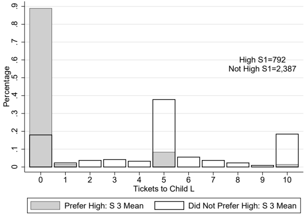


The use of cash as a reward

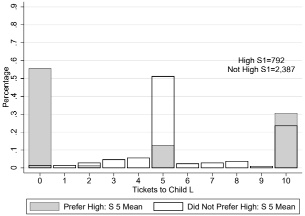
- Any reward could be seen as biasing us in one direction or the other.
- Cash is potentially transferable within the household, which biases us:
    - Towards returns-maximization
    - Away from inequality aversion over outcomes
- Experiment thus lower bound on level of inequality aversion: biased towards the null of the "standard model"
- Other option (non-fungible consumption): utility could be highly concave, biasing us towards inequality aversion

Back

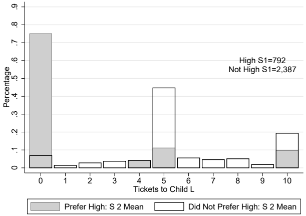
Heterogeneity in allocations for Scenarios 2-5, by whether parents allocated more tickets to Child H in Scenario 1 ▸ Back

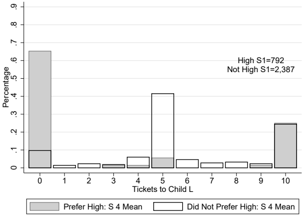


Scenario 2 *(Higher Returns to Child H)*

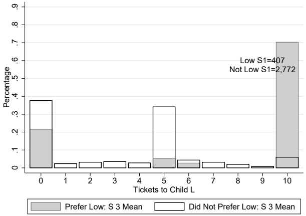


Scenario 3 *(Higher Returns to Child L)*

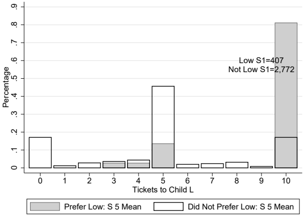




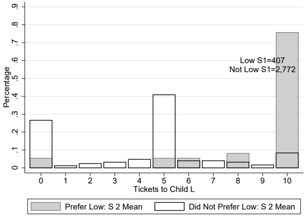
Heterogeneity in allocations for Scenarios 2-5, by whether parents allocated more tickets to Child L in Scenario 1 ▸ Back

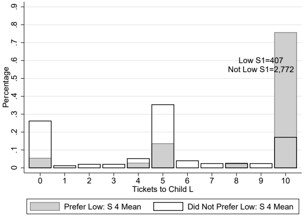


Scenario 2 *(Higher Returns to Child H)*



Scenario 3 *(Higher Returns to Child L)*





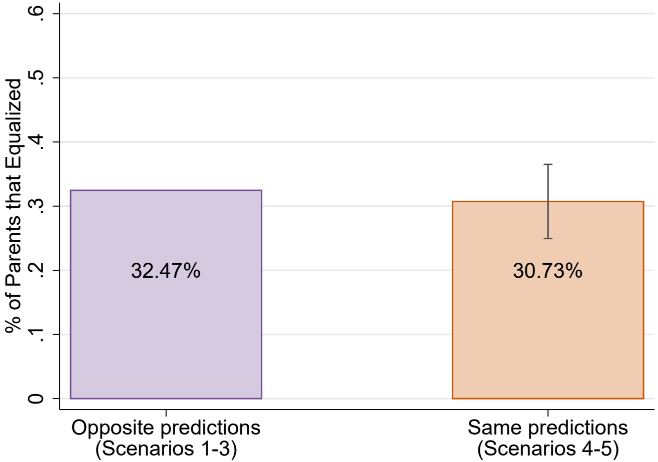
Do ticket allocations differ when returns-maximization and inequality aversion of outcomes have the same prediction?

Scenario	Returns Maximization	Inequality Aversion of Outcomes	Inequality Aversion of Inputs
1. Base Case L = 0 + 10(Score_L - Threshold) H = 0 + 10(Score_H - Threshold)	H (If $R_L < R_H$) (66% of sample)	L (If $R_L < R_H$) (66% of sample)	Equal
2. Higher Returns to Child H L = 0 + 10(Score - Threshold) H = 0 + 100(Score - Threshold)	H	L	Equal
3. Higher Returns to Child L L = 0 + 100(Score - Threshold) H = 0 + 10(Score - Threshold)	L	H	Equal
4. Lump Sum to Child L L = 1000 + 10(Score_L - Threshold) H = 0 + 10(Score_H - Threshold)	H (If $R_L < R_H$) (66% of sample)	H	Equal
5. Higher Returns to L & Lump Sum to H L = 0 + 100(Score_L - Threshold) H = 6000 + 10(Score_H - Threshold)	L	L	Equal

RM and IAO have same predictions. RM and IAO have different predictions

R_i: Child i's test score gains to tutoring. Threshold: Child L's score, rounded down.

Ticket allocations, by whether inequality aversion in outcomes and returns maximization have the same predictions



Limiting to people with $R_L < R_H$

Child-specific preferences?

- Data suggest many parents may have a preference for one child or the other
    - Those who allocated more to one child in "base case" continue to do so throughout
      ▸ Heterogeneity 1 ▸ Heterogeneity 2
- Can we predict these preferences?
    - No significant child-level predictors (e.g., no gender bias)
    - One parent-level predictor: Less-educated parents more likely to prefer high-performing child

Child-specific preferences?

- Data suggest many parents may have a preference for one child or the other
  - Those who allocated more to one child in “base case” continue to do so throughout

    Heterogeneity 1 Heterogeneity 2
- Can we predict these preferences?
  - No significant child-level predictors (e.g., no gender bias)
  - One parent-level predictor: Less-educated parents more likely to prefer high-performing child

Child-specific preferences?

- Data suggest many parents may have a preference for one child or the other
  - Those who allocated more to one child in “base case” continue to do so throughout

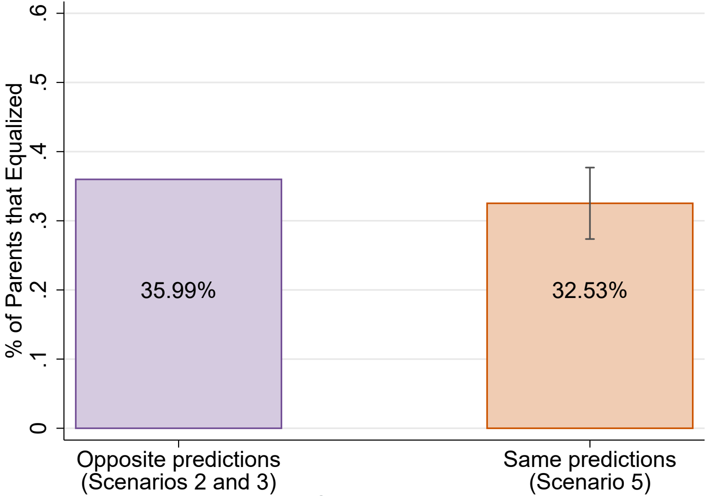
    Heterogeneity 1 Heterogeneity 2
- Can we predict these preferences?
  - No significant child-level predictors (e.g., no gender bias)
  - One parent-level predictor: Less-educated parents more likely to prefer high-performing child

Child-specific preferences?

- Data suggest many parents may have a preference for one child or the other
  - Those who allocated more to one child in "base case" continue to do so throughout

    ▸ Heterogeneity 1 ▸ Heterogeneity 2
- Can we predict these preferences?
  - No significant child-level predictors (e.g., no gender bias)
  - One parent-level predictor: Less-educated parents more likely to prefer high-performing child

Ticket allocations, by whether inequality aversion in outcomes and returns maximization have the same predictions



Limiting to Scenarios 2, 3, and 5

Back

Average perceived scores and returns to tutoring

	Average Perceived:	
	$Score_i^{NoTut}$ - Threshold	Test score gains from tutoring ("R_i")
Child L	8.96	11.29
Child H	23.68	14.56

Back

2. High Returns to H vs. 3. High Returns to L

	Scenarios	
	2. Higher Returns to H	**3. Higher Returns to L**
Payment functions		
Child L	$10\underline{S}_L$	$100\underline{S}_L$
Child H	$100\underline{S}_H$	$10\underline{S}_H$
Predictions		
Returns Max.	H	L
IA over Outcomes	L	H
IA over Inputs	Equal	Equal
Mean perceived earnings return to tutoring		
Child L	113	1,129
Child H	1456	146
Mean perceived earnings without tutoring		
Child L	90	896
Child H	2,368	237

R_i: Child i's test score gains to tutoring.

1,129 - 146 $\equiv$ 983 $\equiv$ 0.7 daily wage $\equiv$ 1.38 USD

Back

1. Base Case vs. 4. Lump Sum to L

	Scenarios	
	1. Base Case	4. Lump Sum to Child L
Payment functions		
Child L	$0 + 10\underline{S}_L$	$1000 + 10\underline{S}_L$
Child H	$0 + 10\underline{S}_H$	$0 + 10\underline{S}_H$
Predictions		
Returns Max.	If $R_L < R_H$ (66%): H	If $R_L < R_H$ (66%): H
	If $R_L = R_H$ (19%): ?	If $R_L = R_H$ (19%): ?
	If $R_L > R_H$ (14%): L	If $R_L > R_H$ (14%): L
IA over Outcomes	If $R_L < R_H$ (66%): L	
	If $R_L = R_H$ (19%): L	H
	If $R_L > R_H$ (14%): ?	
IA over Inputs	Equal	Equal
Mean perceived earnings return to tutoring		
Child L	113	113
Child H	146	146
Mean perceived earnings without tutoring		
Child L	90	1,090
Child H	237	237

R_i: Child i's test score gains to tutoring.

146-113 ≡ 33 ≡ 0.02 daily wage ≡ 0.05 USD

Back

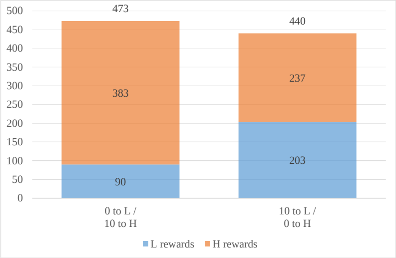
3. High Returns to L vs. 5. High Returns to L/Lump Sum to H

	Scenarios	
	3. Higher Returns to Child L	5. Higher Returns to L & Lump Sum to H
Payment functions		
Child L	$0 + 100\underline{S}_L$	$0 + 100\underline{S}_L$
Child H	$0 + 10\underline{S}_H$	$6000 + 10\underline{S}_H$
Predictions		
Returns Max.	L	L
IA over Outcomes	H	L
IA over Inputs	Equal	Equal
Mean perceived earnings return to tutoring		
Child L	1,129	1,129
Child H	146	146
Mean perceived earnings without tutoring		
Child L	896	896
Child H	237	6,237

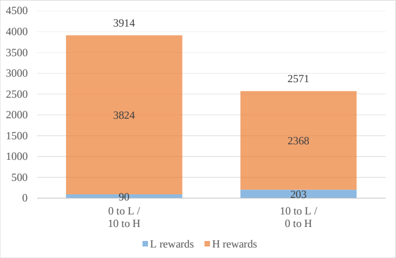
R_i: Child i's test score gains to tutoring.

1,129 - 146 $\equiv$ 983 $\equiv$ 0.7 daily wage $\equiv$ 1.38 USD

Back

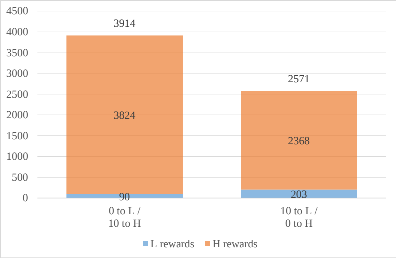


Scenario 1 *(Base Case)*

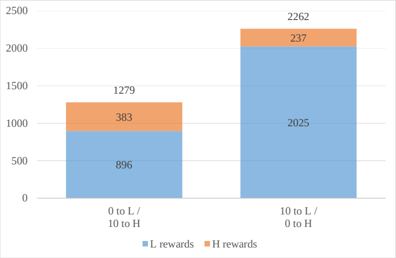


Scenario 2 *(Higher Returns to Child H)*

▸ Back

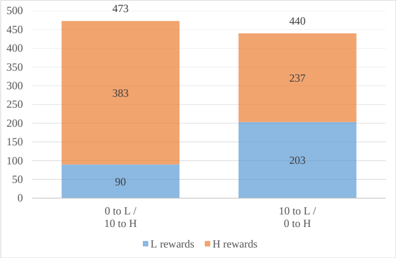


Scenario 2 *(Higher Returns to Child H)*

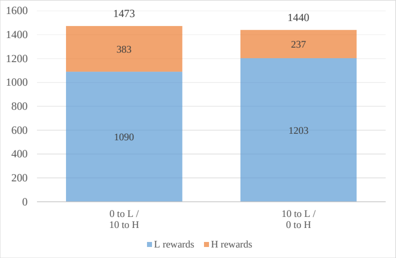


Scenario 3 *(Higher Returns to Child L)*

Back

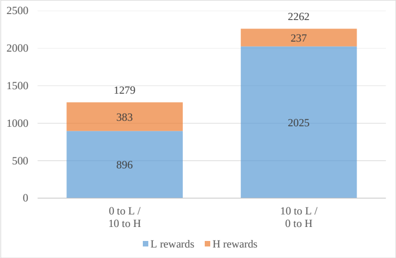


Scenario 1 *(Base Case)*

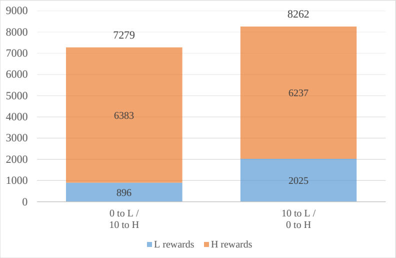


Scenario 4 *(Lump Sum to Child L)*

Back



Scenario 3 *(Higher Returns to Child L)*



Scenario 5 *(Higher Returns to Child L Lump Sum to Child H)*

Back

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE	(3) OLS β / SE	(4) IV β / SE
Household earnings ('00)	0.2471***	0.2297***	0.0046***	0.0050***
	(0.0557)	(0.0454)	(0.0009)	(0.0010)
Gap between children's earnings ('00)	0.0347	0.0108	0.0006	0.0011*
	(0.0353)	(0.0292)	(0.0006)	(0.0007)
Absolute difference in inputs	-0.3645***			
	(0.0613)			
Inputs not equally split (0/1)		-2.9763***	-0.3027***	-0.3027***
		(0.2921)	(0.0267)	(0.0254)
Tickets to child L	-0.0831	-0.1398**	-0.0030**	-0.0029**
	(0.0643)	(0.0684)	(0.0015)	(0.0014)
WTP for 1 unit lower input inequality (MWK100)	1.48			
WTP for equal inputs (MWK100)		12.96		
Observations	15,895	15,895	15,895	15,895

- High weight on equalizing inputs: Mean WTP 1,296 MWK
  - 2.1 USD; 92% of daily wage; 16% annual per-child educ. exp.

Back

Mixed logit estimates of parental preference parameters

	(1) Mixed Logit β / SE	(2) Mixed Logit β / SE	(3) OLS β / SE	(4) IV β / SE
Household earnings ('00)	0.2471***	0.2297***	0.0046***	0.0050***
	(0.0557)	(0.0454)	(0.0009)	(0.0010)
Gap between children's earnings ('00)	0.0347	0.0108	0.0006	0.0011*
	(0.0353)	(0.0292)	(0.0006)	(0.0007)
Absolute difference in inputs	-0.3645***			
	(0.0613)			
Inputs not equally split (0/1)		-2.9763***	-0.3027***	-0.3027***
		(0.2921)	(0.0267)	(0.0254)
Tickets to child L	-0.0831	-0.1398**	-0.0030**	-0.0029**
	(0.0643)	(0.0684)	(0.0015)	(0.0014)
WTP for 1 unit lower input inequality (MWK100)	1.48			
WTP for equal inputs (MWK100)		12.96		
Observations	15,895	15,895	15,895	15,895

- High weight on equalizing inputs: Mean WTP $1,296$ MWK
  - 2.1 USD; 92% of daily wage; 16% annual per-child educ. exp.

Back

Payment functions by scenario

	Scenarios				
	1.Base Case	**2.Higher Returns to Child H**	**3.Higher Returns to Child L**	**4.Lump Sum to Child L**	**5.Higher Returns to L & Lump Sum to H**
L	$10\underline{S}_L$	$10\underline{S}_L$	$100\underline{S}_L$	$1000 + 10\underline{S}_L$	$100\underline{S}_L$
H	$10\underline{S}_H$	$100\underline{S}_H$	$10\underline{S}_H$	$10\underline{S}_H$	$6000 + 10\underline{S}_H$

10 MWK = 0.014 USD

100 MWK = 0.14 USD = 7% of daily wage.

Note: $\underline{S}_L \equiv \text{Score}_L$ - Threshold. $\underline{S}_H \equiv \text{Score}_H$ - Threshold.

▸ Back

Parents allocate tickets under 5 payment function scenarios

Payment function for child i ($i \in \{L, H\}$) from household k in scenario j:

$$Payment_{ijk} = a_{ij} + b_{ij}(Score_{ik} - Threshold_k)$$
$$\equiv a_{ij} + b_{ij}\underline{S}_{ik}$$

$Threshold_k$: Perceived $Score_{Lk}$ without tutoring, rounded down to nearest 10

Predictions (all based on *perceived* test scores; suppress k going forward):

1. Returns maximization
   - All to child with higher payment return to tutoring
   - Child i's payment return to tutoring $= b_{ij}(\underline{S}_i^{Tut} - \underline{S}_i^{NoTut}) \equiv b_{ij}R_i \Rightarrow$ Only b_{ij} matters
2. Inequality aversion of outcomes
   - (Normally) more to child with lower $Payment_i^{NoTut} \Rightarrow$ Both a_{ij} and b_{ij} matter
3. Inequality aversion of inputs
   - Split regardless $\Rightarrow$ Neither a_{ij} or b_{ij} matters

Average perceived scores and gains Back

Parents allocate tickets under 5 payment function scenarios

Payment function for child i ($i \in \{L, H\}$) from household k in scenario j:

$$Payment_{ijk} = a_{ij} + b_{ij}(Score_{ik} - Threshold_k)$$
$$\equiv a_{ij} + b_{ij}\underline{S}_{\text{ik}}$$

$Threshold_k$: Perceived $Score_{Lk}$ without tutoring, rounded down to nearest 10

Predictions (all based on *perceived* test scores; suppress k going forward):

1. Returns maximization
   - All to child with higher payment return to tutoring
   - Child i's payment return to tutoring $= b_{ij}(\underline{S}_{\text{i}}^{Tut} - \underline{S}_{\text{i}}^{NoTut}) \equiv b_{ij}R_i \Rightarrow$ Only b_{ij} matters
2. Inequality aversion of outcomes
   - (Normally) more to child with lower $Payment_i^{NoTut}$ $\Rightarrow$ Both a_{ij} and b_{ij} matter
3. Inequality aversion of inputs
   - Split regardless $\Rightarrow$ Neither a_{ij} or b_{ij} matters

Average perceived scores and gains Back