Effects of Incentives and Education on Financial Choices: An Experiment

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Choose a health insurance plan from an employer-sponsored list

4 out of 48 Offered Plans

Premiums	Deductible	Co-Ins	Co-Pay	MOOP	Choice
$930	$1000	90%	$15/$40	$1,500	4.5%
$1,463	$750	90%	$15/$40	$1,500	0.4%
$1,568	$500	90%	$15/$40	$1,500	2.9%
$2,134	$350	90%	$15/$40	$1,500	5.3%

- On average, employees could save $372 from non-dominated plans

Problem: People make mistakes in consumer finance
even when stakes are high and education is available

A. Substantial monetary loss from financial choices

- Agarwal et al (2009): $200 loss from payday loans instead of using credit cards in US

- Andersen et al (2019): Missed saving of $\sim$ $400 from failure to refinance mortgage debt in Denmark

- <u>Health insurance</u>:
    - Bhargava et al (2017): $372 loss from choosing dominated plan
    - Abaluck and Gruber (2011): loss of 23% of health expenditure from wrong Medicare choices

Problem: People make mistakes in consumer finance even when stakes are high and education is available

B. Financial education is ineffective in improving choices

- 66% of US adults scored $\leq 3/5$ in basic financial literacy test

- Studies generate mixed results

- Meta-analysis: Fernandes et al (2014)

This Project

- Question: what are the effects of incentives and providing education?

- Method: an experiment using simulated health insurance choices

- Result: education can be effective but effectiveness requires:
  - High incentives to motivate subjects to study
  - Easy problems to convert the study effort to better choices

- Suggestion: simplify the problem
  - Harder to make mistakes for simpler problems
  - Current choices are too hard for education to be effective

This Project

Set-up: Choose a health insurance for a medical scenario

A. Incentive treatment

- Random assignment to choices with costlier mistakes
- Effect of incentive on effort?
- Effect of incentive on choices?

B. Education treatment

- Random assignment to extra materials
- Effect of available education on effort?
- Effect of available education on choices?
- Interaction with incentives?

This Project

A. Incentive treament

A1. Effect of Incentive on Effort?

- Subjects do not spend more time under high incentives
- Same result even when subjects know the incentives

A2. Effect of Incentives on Choices?

- Subjects choose 20% more correctly under high incentives

This Project

- Are high-incentive questions easier?
    - Costs of plans are further apart in high-incentive treatments

- Follow-up experiment
    - High-incentives → "high-easy"
    - Low-incentive → "low-hard"
    - "High-easy" $\xrightarrow{\text{exchange rate}}$ "Low-easy"
    - **Result**: Subjects in "low-easy" do better without spending more time compared to "low-hard"

A. Incentive Treatment

1. Effort: Subjects do not spend more time under high incentives

2. Choices: Subjects do better under high incentives

3. Follow-up: same pattern for "low-easy" versus "low-hard"

**Surprising channel of incentives:
high incentives simplify the problems**

B. Education treatment

Effect of Education

Treatment	Overall Time	Choices
Low-Hard	+	0
High-Easy	+	+
Low-Easy	0	0

- Return of educational effort is positive for easy problems (16% improvement) but zero for hard problems
- Subjects are exactly wrong about the return of educational effort

This Project

Question: what are the effects of incentives and providing education?

- High incentives simplify the problems
  - This channel is confirmed in the low-stakes follow-up experiment

- High incentives do not increase baseline effort but motivate education
  - High incentives do not raise return to baseline effort
    but raise return to education

- Education is effective only under "high-easy" treatment
  - If problems are hard, actual returns to education is zero
  - If incentives are low, subjects may not want to study

Problem: people make mistakes under high stakes and available education

- Suggestion: simplifying the problem

- Subjects make better choices when problems are simpler

- Simplicity is a necessary condition to make education effective

Plan

Introduction

Experimental Design

Results

Literature & Conclusion

Experiment - Roadmap

- Set-up: Tasks

- Main Experiment Treatments
  - Incentive
  - Education
  - Disclosure

- Follow-up Experiment Treatments: Incentive vs. Difficulty

- Measurement: Effort, Choices

- Implementation

Experimental Tasks

1. Calculation task

   - Same for everyone

   - Measure "motivation" and "skills" for calculation to check for heterogeneous effects

2. Insurance task

   - Main experiment: 2×2×2 treatments

   - Follow-up experiment: incentive vs. difficulty treatments

Experimental Set-up - Timeline

1. Section 1: calculation
   - 4 questions; each with 4 options
   - No feedback
   - One question is randomized for payment

2. Section 2: health insurance
   - 5 questions; each with 4 options
   - No feedback
   - One question is randomized for payment

3. Debriefing questions
   - Qualitative questions related to insurance task
   - Demographics: age, gender, health insurance status, ...

Experiment – Insurance

Health insurance task

Consider a person with the following health care needs.

1. He first needs to go through a procedure at an outpatient facility. The full price of the procedure is $11,000.

2. He then fills a prescription 4 times. The full price of each prescription is $15.

What is the plan you would choose for this person? You can consult some materials below to answer this question.

Plan		A	B	C	D
Monthly Premium		$517	$624	$646	$807
Deductibles		$1,500	$2,350	$2,000	$0
Co-Insurance/Co-Payment after Deductible	Per Doctor Visit	20%	$35	$30	$10
	Per Usage of Outpatient Facility	20%	$100	$100	$100
	Per Prescription	20%	$10	$10	$5
Maximum Out-of-Pocket		$4,500	$7,150	$6,750	$2,000

A	B	C	D

Experiment - Insurance

- Deterministic health care to abstract from risk aversion

- 4 health plans: mimic typical US health insurance

- Point = 10,000 - total cost of choice
    - Total cost = premiums + costs of medical services
    - Best option = lowest-cost option

- 1 point to 1 cent

Experiment - Insurance

What are the potential obstacles of choosing the right plan?

Decision-making process

1. Form a perception of the underlying stakes
   - Difference in costs is not obvious
   - Disclosure: display transparently the cost difference

2. Decide how much effort to put in choosing a plan
   - Effort is costly
   - But more effort may result in better choices

3. Choose a plan

Main Experiment Treatments

Between-subject treatment: $2 \times 2 \times 2$

- High vs low incentives
- Undisclosed vs disclosed
- No education vs education

Main Experiment Treatments

		No Education	Education
Low	Undisclosed	LU0	LU1
	Disclosed	LD0	LD1
High	Undisclosed	HU0	HU1
	Disclosed	HD0	HD1

Main Experiment Treatments

Components of Insurance Task

1. Incentive Display: disclosure

2. 5 questions: incentive

3. Materials in each question: available education

Treatment: LU0

1. Incentive Display

If you **choose a plan randomly**, you will receive **on average $2.25**.

In this section, there is a **50% chance** that you are in group X and a **50% chance** that you are in group Y.

If you are in **group X**, the **lowest-cost plan** gives you **on average $3.5**.

If you are in **group Y**, the **lowest-cost plan** gives you **on average $7**.

Treatment: LU0

2. Question + 3. Materials: glossary

Consider a person with the following health care needs.

1. He first needs to go through a procedure at an outpatient facility. The full price of the procedure is $11,000.

2. He then fills a prescription 4 times. The full price of each prescription is $15.

What is the plan you would choose for this person? You can consult some materials below to answer this question.

Plan		A	B	C	D
Monthly Premium		$517	$624	$646	$807
Deductibles		$1,500	$2,350	$2,000	$0
Co-Insurance/Co-Payment after Deductible	Per Doctor Visit	20%	$35	$30	$10
	Per Usage of Outpatient Facility	20%	$100	$100	$100
	Per Prescription	20%	$10	$10	$5
Maximum Out-of-Pocket		$4,500	$7,150	$6,750	$2,000

A	B	C	D

The following materials are designed to help you answer the above question. These materials appear in every question.

Glossary

Coinsurance

The percentage of costs of a covered health care service you pay (20%, for example) after you've paid your deductible.

Copayment

A fixed amount ($20, for example) you pay for a health care service after you've paid your deductible.
Copayments (sometimes called "copays") can vary for different services within the same plan, like drugs, lab tests, and visits to specialists.

Deductibles

Treatment: **LU0 → LD0**

Undisclosed

If you **choose a plan randomly**, you will receive **on average $2.25**.

In this section, there is a **50% chance** that you are in group X and a **50% chance** that you are in group Y.

If you are in **group X**, the **lowest-cost plan** gives you **on average $3.5**.

If you are in **group Y**, the **lowest-cost plan** gives you **on average $7**.

Disclosed

If you **choose a plan randomly**, you will receive **on average $2.25**.

If you always choose the **lowest-cost plan**, you will receive **on average $3.5**.

Treatment: LU0 → HU0

1. Incentive Display

2. 5 questions: change premiums

3. Materials in each question: glossary definitions

Low incentive

Consider a person with the following health care needs.

1. He first needs to go through a procedure at an outpatient facility. The full price of the procedure is $11,000.
2. He then fills a prescription 4 times. The full price of each prescription is $15.

What is the plan you would choose for this person? You can consult some materials below to answer this question.

Plan		A	B	C	D
Monthly Premium		$517	$624	$646	$807
Deductibles		$1,500	$2,350	$2,000	$0
Co-Insurance/Co-Payment after Deductible	Per Doctor Visit	20%	$35	$30	$10
	Per Usage of Outpatient Facility	20%	$100	$100	$100

High incentive

Consider a person with the following health care needs.

1. He first needs to go through a procedure at an outpatient facility. The full price of the procedure is $11,000.
2. He then fills a prescription 4 times. The full price of each prescription is $15.

What is the plan you would choose for this person? You can consult some materials below to answer this question.

Plan		A	B	C	D
Monthly Premium		$490	$623	$651	$816
Deductibles		$1,500	$2,350	$2,000	$0
Co-Insurance/Co-Payment after Deductible	Per Doctor Visit	20%	$35	$30	$10
	Per Usage of Outpatient Facility	20%	$100	$100	$100

Treatment: LU0 → LU1

1. Incentive Display

2. 5 questions

3. Materials in each question: glossary definitions and 2 examples

Main Experiment Treatments

No Education

Glossary

Coinsurance

The percentage of costs of a covered health care service you pay (20%, for example) after you've paid your deductible.

Copayment

A fixed amount ($20, for example) you pay for a health care service after you've paid your deductible.

Copayments (sometimes called "copays") can vary for different services within the same plan, like drugs, lab tests, and visits to specialists.

Deductibles

The amount you pay for health care services before your insurance plan starts to pay. With a $2,000 deductible, for example, you pay the first $2,000 of services yourself.

After you pay your deductible, you usually pay only a copayment or coinsurance for covered services. Your insurance company pays the rest.

Maximum Out-of-Pocket

The most you have to pay for services in a plan year. After you spend this amount on deductibles, copayments, and coinsurance, your health plan pays 100% of the costs of covered benefits.

The out-of-pocket limit doesn't include your monthly premium.

Premiums

The amount you pay for your health insurance every month. In addition to your premium, you usually have to pay other costs for your health care, including a deductible, copayments, and coinsurance.

Education

Maximum Out-of-Pocket

The most you have to pay for services in a plan year. After you spend this amount on deductibles, copayments, and coinsurance, your health plan pays 100% of the costs of covered benefits.

The out-of-pocket limit doesn't include your monthly premium.

Premiums

The amount you pay for your health insurance every month. In addition to your premium, you usually have to pay other costs for your health care, including a deductible, copayments, and coinsurance.

To understand the above terms better, you can check out an example below, which calculates the health care cost of Joe, who is recovering from an accident.

Show me Joe's example

Let's look at **Joe's healthcare needs** after the accident.
- He needs a procedure at an outpatient facility. The full price is $5,000.
- He then needs 7 follow-up doctor visits. The full price of each visit is $100.

He is considering these two **healthcare plans**.

Plan		A	B
Monthly Premium		$500	$600
Annual Deductible		$4000	$2000
Co-insurance/Co-payment after deductible	Per Doctor visit	50%	$30
	Per Usage of Outpatient	50%	$100

Main Experiment Treatments

1. Incentive Display: disclosure

2. 5 questions: incentive

3. Materials in each question: available education

Main Experiment

High incentives → "High-Easy"

- "High": Δ payment = \$4.75

- "Easy": Δ point = 475

Low incentives → "Low-Hard"

- "Low": Δ payment = \$1.25

- "Hard": Δ point = 125

⇒ **Follow-up Experiment**: "Low-Easy" or "High-Hard" ~~or "High-hard"~~

- Δ payment = \$1.25

- Δ point = 475 (same questions as "high-easy")

- Different exchange rate: 1 point to 0.25 cents

3 treatments

- Low-Hard-NoEdu (LD0)

- Low-Easy-NoEdu

- Low-Easy-Edu

- Choices: number of correct answers
  - Alternative: amount of money earned

- Effort: proxy through time and clicks
  - Overall effort: total time spent
  - Educational effort: time on educational materials

Implementation

- Recruitment: Amazon Mechanical Turk
  - At least 18 years old & located in the US
  - MTurk approval rate $\geq 95\%$

- Experiment posted as a "Human Intelligence Task" (MTurk)
  - Experiment in Qualtrics

- Compensation
  - $2 for completing the survey
  - Additional payment depending on their choices

Plan

Results - Roadmap

- Overview of Subjects

- Treatment Effects in Insurance
  - Effects of Incentives

  - Effects of Education

- Other Result: subjects' mistakes

Overview

- Number of subjects: 2,612
  - Main experiment: 2,009; each treatment: 249 - 253
  - Follow-up experiment: 603; each treatment: 201
  - Variety of background Demographics

- No selection bias
  - Randomization by design
  - No attrition bias
  - Balance of demographics across treatments

- Subjects completed the experiment in 23 minutes on average
  - Analysis on time is done in log Level vs Log

- Subjects earned $0.7 for calculation, $2.6 for insurance task on average

- Time is a reasonable proxy for effort:
  correlation between lg(time) and performance is 0.32***

Insurance Task

On average,

- Subjects spent 5.3 minutes on the insurance task

- Subjects chose the best plan in 1.6 questions

- 33% of subjects used the educational materials

- If they used the materials, they spent 37 seconds

Main Experiment Baseline Specification:

$$y_i = \beta_0 + \beta_1 \mathbf{1}\{s_i = H\} + \beta_2 \mathbf{1}\{d_i = D\} + \beta_3 \mathbf{1}\{l_i = 1\} + \epsilon_i$$

where

$$
\begin{aligned}
y_i &\in \quad \{\text{no. of correct ans, lg(time), lg(edu time)}\} \\
\mathbf{1}\{s_i = H\} &= \quad \text{indicator for high incentives} \\
\mathbf{1}\{d_i = D\} &= \quad \text{indicator for disclosure} \\
\mathbf{1}\{l_i = 1\} &= \quad \text{indicator for available education}
\end{aligned}
$$

Distribution Test: check if one distribution FOSD the other

A. Effects of Incentives

A1. Effect of Incentives on Effort? No effect

	Lg(Time)	EduUse	Lg(EduTime)
High Incentive	0.0270	0.0167	-0.0993
	(0.0504)	(0.0296)	(0.137)
Constant	5.067***	0.296***	3.765***
	(0.0491)	(0.0250)	(0.130)
Observations	2009	1003	326

Standard errors in parentheses. $^{*}\ p < 0.1,\ ^{**}p < 0.05,\ ^{***}p < 0.01.$

The regressions control for the disclosure and education treatments.

A1. Effect of Incentives on Effort? No effect

Is the null effect on effort because of wrong perception of stakes?

  a. Is perception of stakes wrong when stakes are undisclosed?

  b. Does wrong perception explain the null effect?

a. Is perception of stakes wrong when stakes are undisclosed? Yes

Q: If you always choose the best plan, what do you think you receive?

Answers	Low Incentive		High Incentive	
	Undisclosed	Disclosed	Undisclosed	Disclosed
$2.25	7.8%	15.7%	7.6%	11.0%
$3.5	11.2%	76.7%	11.8%	9.8%
$7	4.4%	5.4%	5.2%	75.1%
50%: $3.5, 50%: $7	76.7%	2.2%	75.5%	4.2%

Effects of Incentives

b. Does wrong perception explain the null effect? No

	Lg(Time)	EduUse	Lg(EduTime)
High Incentive	0.0114	0.0456	-0.248
	(0.0707)	(0.0412)	(0.202)
Disclosure	-0.0529	0.0709*	-0.165
	(0.0712)	(0.0416)	(0.207)
High Incentive x Discl	0.0312	-0.0576	0.279
	(0.101)	(0.0592)	(0.274)
Constant	5.075***	0.281***	3.845***
	(0.0550)	(0.0285)	(0.158)
Observations	2009	1003	326

Standard errors in parentheses. * $p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The regressions control for the education treatment.

Distribution: Lg(Time)

43

A1. Effect of Incentives on Effort? No effect

Is the null effect on effort because of wrong perception?

  a. Is perception wrong when stakes are undisclosed? Yes

  b. Does wrong perception explain the null effect? No

Subjects think that the extra time will not improve choices

Effects of Incentive

A2. Effect of Incentives on Choices? Yes and disclosure again has no effect

	Number of Correct Ans	
High Incentive	0.273***	0.280***
	(0.0506)	(0.0714)
Disclosure	0.0350	0.0427
	(0.0506)	(0.0646)
High Incentive x Discl		-0.0154
		(0.101)
Constant	1.368***	1.364***
	(0.0487)	(0.0530)
Observations	2009	2009

Standard errors in parentheses. * $p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The regressions control for the education treatment.

Distribution: Ans

Higher Incentives: no change in time but better choices

Possible Explanations

1. Effort intensity: subjects work harder in the same time

2. High-incentive problem is easier

$\rightarrow$ Follow-up Experiment

Effects of Incentives

Follow-up experiment: "Low-Hard" vs. "Low-Easy"

	Ans	Lg(Time)
Easy	0.313**	-0.0741
	(0.107)	(0.104)
Constant	1.398***	4.986***
	(0.0666)	(0.0719)
Observations	603	603

Standard errors in parentheses. * $p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The regressions control for the education treatment.

Another channel of incentives: high incentives simplify problems

- High incentives have no effect on time
  - Robust to disclosure

- High incentives improve choices
  - Robust to disclosure

- Follow-up experiment: same pattern for "Low-Easy" vs. "Low-Hard"

More

B. Effects of Available Education

B1. Effect of available education on effort?

Yes for hard problems and high incentives

	Lg(Time)		
	Low-Hard	High-Easy	Low-Easy
Education	0.181**	0.251***	0.0755
	(0.0713)	(0.0714)	(0.112)
Constant	5.092***	5.069***	4.986***
	(0.0594)	(0.0602)	(0.0719)
Observations	1005	1004	603

Standard errors in parentheses. * $p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The regressions control for the disclosure treatment.

B2. Effect of available education on choices?
Yes for easy problems, but no for hard problems

	Number of Correct Ans		
	Low-Hard	High-Easy	Low-Easy
Education	0.0422	0.249**	-0.129
	(0.0645)	(0.0779)	(0.117)
Constant	1.415***	1.593***	1.398***
	(0.0570)	(0.0641)	(0.0666)
Observations	1005	1004	603

Standard errors in parentheses. * $p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The regressions control for the disclosure treatment.

Effects of Available Education

Effect of Available Education

Treatment	Overall Time	Choices
Low-Hard	$+$	0
High-Easy	$+$	$+$
Low-Easy	0	0

- Providing education is effective only when incentives are high and problems are easy

- Subjects are exactly wrong about the actual returns of education

- Overview of Subjects: 2,612 from a variety of background

- Treatment Effects in Insurance
  - Effects of Incentives: incentives simplify the problems
  - Effects of Education: education is effective only for "high-easy" treatment

- Other Result: Subjects' mistakes

▷▷

Choice Pattern

Choice data

- We know all available plans in each question
  - The premium of each plan
  - "Out-of-pocket" (OOP) cost of each plan

- We know subjects' choices in each question

- $1 increase in premiums = $1 increase in OOP?

Choice Pattern

Subject i, plan j, scenario k

$$\mathbf{1}\{\text{Choose Plan}\}_{ijk} = \gamma_0 + \gamma_1 \text{Premium}_{jk} + \gamma_2 \text{OOP}_{jk} + \sum_k \gamma_{3k} \mathbf{1}_k + \epsilon_{ijk}$$

	$\mathbf{1}$Choose Plan		
Premium	-0.00219***	-0.00262***	-0.00161***
	(0.000182)	(0.000381)	(0.000235)
OOP	-0.000319***	-0.000359***	-0.000272***
	(0.0000148)	(0.0000309)	(0.0000194)
Premium x High		0.000492	
		(0.000428)	
OOP x High		0.0000514	
		(0.0000345)	
Premium x Edu			-0.00116**
			(0.000356)
OOP x Edu			-0.0000932**
			(0.0000288)
Observations	40180	40180	40180

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Choice Pattern

- The weight on premium is higher

- High incentive does not have an effect on the weights

- Education increases the weights for both
  - The increase on premium is higher
  - Education is more effective for straightforward concept

Plan

People make mistakes in health insurance
even when stakes are high and education is available

- The problems are hard
  - In the "best" treatment, 1.9 correct answers out of 5
  - Almost 70% of subjects do not acquire education

- High incentives motivate educational effort and simplify the problems

- Effective education requires both high incentives and easy problems

- Direction for future exploration: making choices easier
  - "Easiness" improves choices by 20%
  - Return of education is positive only in easy problems

Literature

- Experiments on health insurance
  - Johnson et al (2013), Bhargava et al (2015)
  - <u>This Project:</u> effects of incentives on effort
    and interaction between incentives and education

- Experiments on disclosure
  - Bertrand and Morse (2011), Goda et al (2017)
  - <u>This Project:</u> disclose the difference between the best choice and a
    random choice

- Experiments on financial education
  - Fernandes et al (2014)
  - <u>This Project:</u> interaction between incentives and education

Thank You

MTurk Interface

Participate in a decision-making experiment

| Requester: MikeT | | Reward: $2.00 per task | Tasks available: 0 | Duration: 2 Hours |

Qualifications Required: HIT Approval Rate (%) for all Requesters' HITs greater than 95 , Number of HITs Approved greater than 1000 , Location is US , done-ins has not been granted

Survey Link Instructions (Click to expand)

This HIT is part of an academic study on decision-making. It will take about 30 minutes to complete. Your answers to the questions in this study may earn you a bonus payment. Past participants earn an average of $4 in bonus payment, on top of the $2 for completing the study. Complete instructions will be given at the beginning of the task.

To complete the experiment, please accept the HIT, and then follow the link below to the experimental website. When you have completed the experiment, you will be given a completion code to paste in the box below. **Make sure to leave this window open as you complete the survey.** Once your data has been processed you will receive your payment.

You may only participate in this study once. If you have previously participated in this study, you will not be eligible to complete it again.

| **Survey link:** | Click here |

Please paste your completion code here:

e.g. 123456

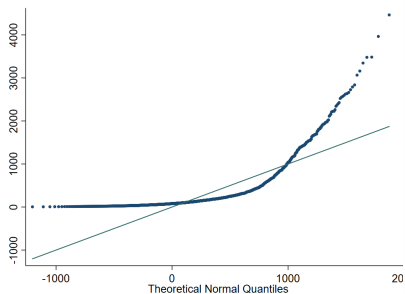**If you do not receive a code, please input your displayed bonus, gender, age, race and type of health insurance plan.**
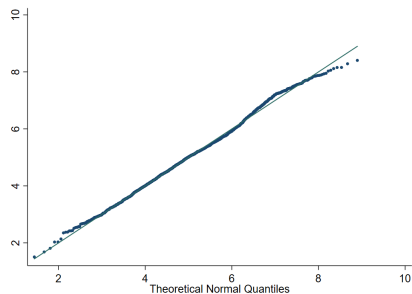
Submit

Demographics

	Subjects	US Census
Male	55%	49%
College or More	57%	31%
Race		
White	72%	60%
Black	12%	13%
Hispanic	7%	18%
Asian	7%	6%
Age (18 and more)		
18-29	29%	19%
30-39	40%	18%
40-49	17%	17%
No Insurance	17%	9%

QQ-plots of the time distribution against normal distribution
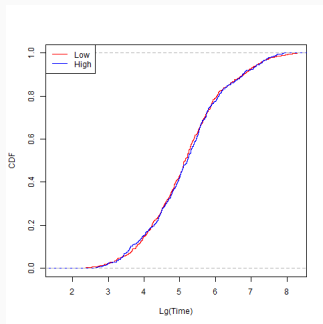
(a) Time in Insurance Task   **(b)** Lg(Time) in Insurance Task

No effect of Incentives on Time

(a) Undisclosed

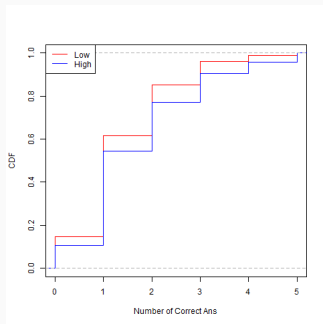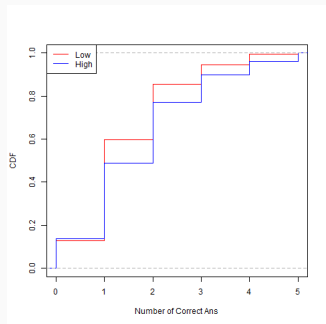**(b)** Disclosed
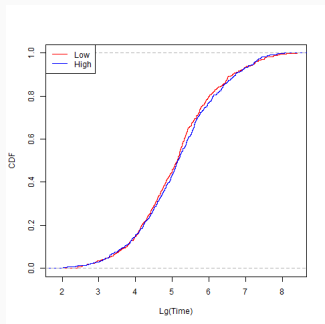
Effect of Incentives on Choices

(a) Undisclosed

(b) Disclosed

Could reference dependence play a role?

- Disclosed incentives: subjects are not aware of the other incentives

Ans: Unlikely

1. Where is the reference point?
   - By randomization, subjects should have the same reference point
   - Fixing the reference point, incentives work as usual

2. Possible that reference points are different by randomization?
   - 4 calculation questions: 2 high incentives, 2 low incentives
   - The order or incentives are randomized
   - In the first 2 questions, subjects are not aware of the other incentive

Difference in Lg(Time): 0.204***