Policy Insights from Laboratory Experiments

Presentation to HRSDC Workshop on Economic Laboratory and Field Experiments, March 2007

by Cathleen Johnson (University of Arizona) and Jean-Pierre Voyer (SRDC)

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Experiments are the Policy maker's "Wind Tunnel"

- As Charlie Plott and Vernon Smith taught us, one can test lots of things
  - Historically generated processes
  - Newly designed processes

How has this methodology been applied?

- FCC
- NASA
- Logistics
- Smog
- British Telecom
- Deregulation of Markets for Electricity
- HP
- Matching Markets (gastroenterologists and hospitals)
- Measuring preferences

The fields of experimental investigation

1. Market experiments

2. Predictions of Game Theory

3. Individual Decision Making

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Using experiments to measure preferences?

- **Information used to design policy is at best based on traditional empirical methodologies:**
  - Outcome-based measures (multivariate analysis method)
  - Survey questions
  - Focus groups

- **Experimental measures of preferences provide an additional source of information**

  ....and can be much more reliable than survey or focus groups information
  - Decisions involve real money; costly not to tell the truth
  - Anonymity further minimizes misinterpretation effects
  - Real, not hypothetical decisions
  - Control for situational variation by placing subjects in identical settings

Can economic experiments inform policy?

- **Can help predict people's response to policies aimed at changing behaviour:**
  - Fiscal incentives (tax credits, subsidies, loans)
  - Pricing and taxation

- **Can save governments millions of dollars**:
  - Better prediction of behaviour reduces size of windfall gains
  - Leads to more effective program implementation

- **Could improve impact of policy**:
  - Ensures better take-up rates by target population

- **Could improve existing simulation tools**:
  - Provides better estimates for model parameters

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SRDC Working Paper Series 03-09

Fostering Adult Education:

A Laboratory Experiment on the efficient use of

loans, grants and savings incentives

December 2003

by **Cathleen Johnson**
SRDC and CIRANO

Claude Montmarquette
University of Montreal and CIRANO

Catherine Eckel
University of Texas at Dallas

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Object of the experiment

- **Project designed to address a particular set of specific policy issues:**

  - How do various types of learning subsidies (grants and loans) affect the participation rates in adult education?
  - Would the availability of incentives for part-time studies discourage full-time studies?
  - What is the extent of windfall gain resulting from different levels and types of incentives?
  - What are the "barriers" to participation in adult education?
    - Lack of information
    - Lack of time
    - Loan aversion
    - Fear of Failure
    - Preference for the present
    - Lack of readiness to learn

Participants

	Urban Sample	Non-Urban Sample
Age 18–24	144	26
Age 25–44	352	88
Age 45–55	160	35
Male	293	57
Female	363	92
PSE student	96	5
Unemployed	125	38
Part-time employed	137	33
Full-time employed	219	42
Subtotal	**656**	**149**
High school student sample	80	N/A
Total	**736**	**149**

The Experiment

Focus of the full study is on four sets of measures:

1. Experimental preference measures
   a) consumption over time
   b) risky choice alternatives
2. Survey measures: demographics and attitudes
3. Numeracy Assessment
4. Willingness to invest in post-secondary education
   a) Grants
   b) Loans (regular and income-sensitive repayment – ISR)
   c) Matched-savings grants

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Protocol

- $20 Show-up fee

- Practice Choice Questions
  - Bingo balls used for random draw process
  - Dice were used for gambles

- As individuals finished they left the room and were paid privately for one decision

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Preference Measures:
Four measures of Risk aversion

- Measured using simple task (Decision 7)
- Subjects choose which among six 50/50 gambles that they wish to play (Decision 6)
- Subjects make 10 choices between two gambles (Holt Laury, AER 2002)
- Subjects make 15 choices with ambiguous payoffs

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Decision

Choice A
- ❑ $120.00 for sure

Choice B
- ❑ 80% chance for $175 and
  20% chance for $0

Preference Measures: Patience

- Subjects choose among amounts of money at an earlier time and larger amounts at a later time.

- Choices vary in terms of
    - ✓ rates of return
    - ✓ wait times
    - ✓ Front-end-delay

# Time Preference Decision

Choice A
- ❑ $65 today

Choice B
- ❑ $130 one year from today

Summary of Time Preference Choices

Time of Sooner Payment ($65)	Annualized Rates of Return	Later Payment Amount	
		One Month Investment	One Year Investment
• Today	10	65.27	68.25
• Tomorrow	20	66.08	78.00
• One Month from today	50	67.71	97.50
	100	70.42	130.00
• One year from today	200	75.83	195.00

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Patient Choices:
One month delay, 1 year wait

Proportion of subjects who saved $65 one month from today for one additional year
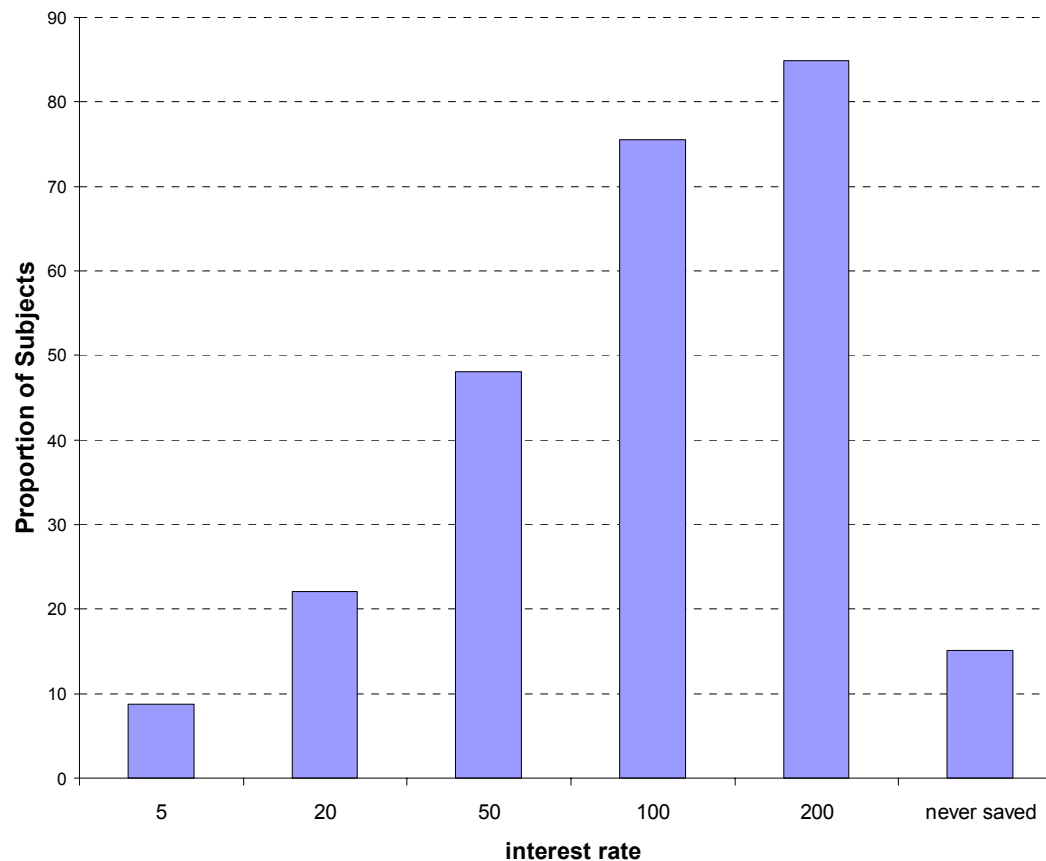
Determinants of the Proportion of Subjects Choosing Early Payoff

- Delaying alternative payoff reduces the incentive to pick the latest alternative

- Increasing the rate of return induces subjects to delay reward

- Absolute difference encourages subjects to delay reward

Survey measures

- Demographics
  - Age, gender, income
- Labour market and educational status
- Attitudinal measures
  - Planning, debt
- Barriers to education
  - Skills, dispositional, situational

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Cash vs. Investment Choice

- Cash alternative made the choice of investment costly to the subject

- Results used to calculate elasticities of demand for education with different types of subsidy

- Used to rank subjects according to their *relative preference for education* for each participant

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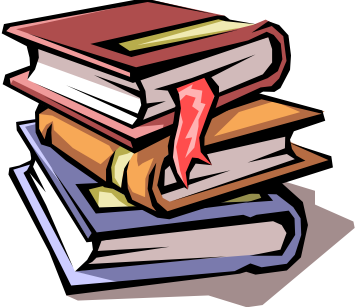# Figure 1: Example of Education-Preference Decisions

You must choose A or B:

CHOICE A

$100 one week from today

CHOICE B

FULL-TIME
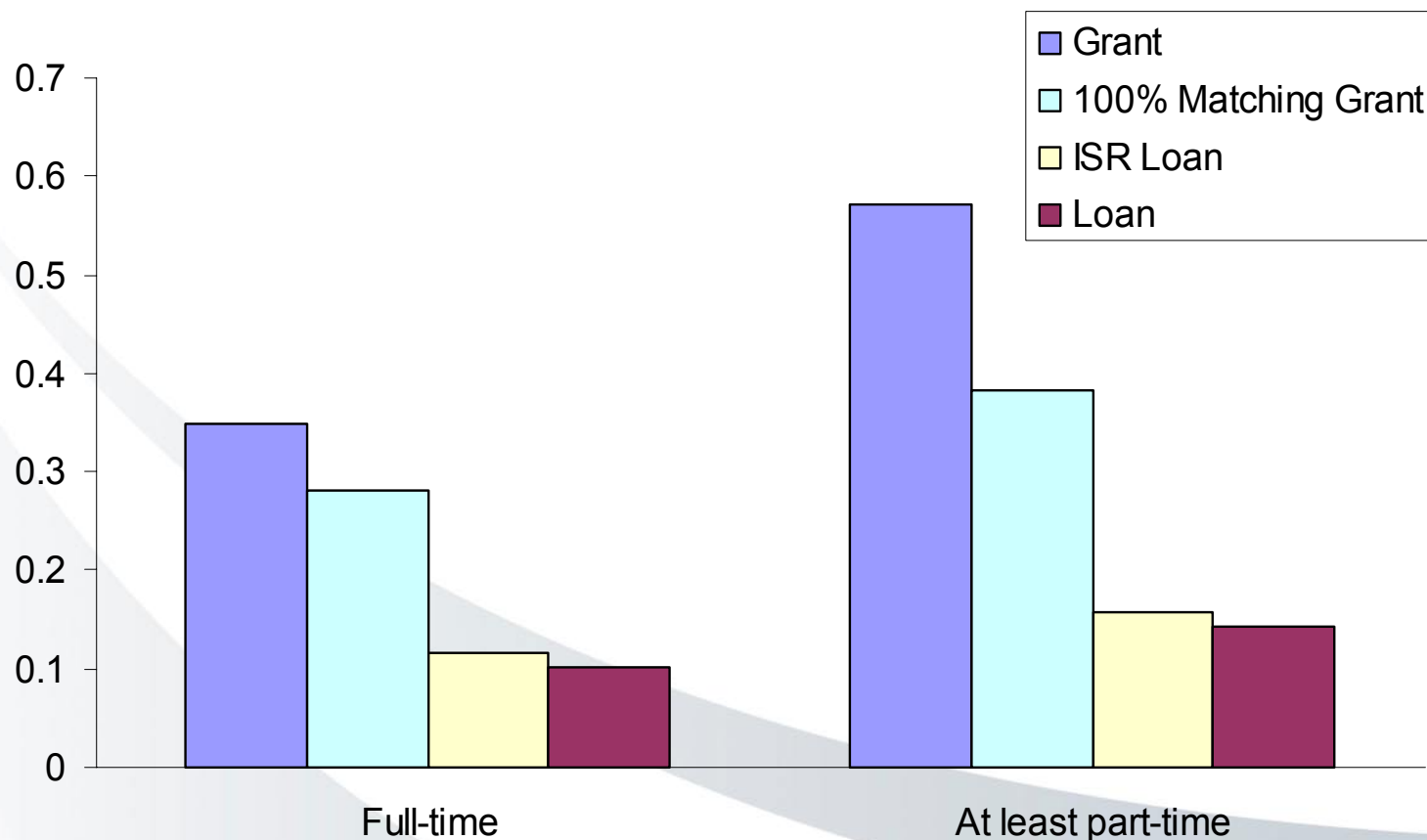Education or Training
(Expenses refunded)

Decision 73	❑$100	❑$300 GRANT
Decision 75	❑$100	❑$1,000 GRANT

Take up Rates for $1,000 in Educational Financing

Analysis - Education Preference

Overall intensity of preference for education

experimental estimates: None, some, moderate, strong, very strong preference for education (D75-D78)

Is a function of

Individual Characteristics

Individual characteristics and their sources

Time preference	Individual decisions (experimental)
Risk preference	Individual decisions (experimental)
Attitudes and perceptions	Survey questions and scales
Socio-demographics	Survey questions
Numerate ability	AILS: Numeracy Assessment

Determinants of Choosing $1000 Part-time Grant Over Cash (1/2)

(Ordered Probit, 801 observations)

+ Labour Force attachment
+ Immigrants, disabled
+ Willingness to save (decision)
+ Positive attitude with respect to Education and LM
+ Mathematical Competency
+ PSE experience

Determinants of Choosing $1000 Part-time Grant Over Cash (2/2)

(Ordered Probit, 801 observations)

- Age

- Employee with education supplement

- Married

- Children (older)

- HS equivalency

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Probabilities of Investing in Education

Time Preference

	Never Invest	Always
Least Patient	0.58	0.11
Most Patient	0.19	0.47

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Probabilities of Investing in Education

Positive Attitude

	Never Invest	Always
Lowest	0.45	0.21
Mid	0.38	0.26
Highest	0.36	0.28

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Determinants of Choosing $1000 Part-time Grant Over Cash for High School Students

(Ordered Probit, 80 observations)

+ Willingness to save ($$ Decision)

+ Plan for future (Temporal orientation scale)

+ Positive attitude with respect to Education and Labour Market

- Burdened by debt

Probabilities of Investing in Education – High School Students

Part-time	Never Invest	Always
Least Patient	0.50	0.15
Most Patient	0.01	0.74

	Never Invest	Always
Low Planning	0.24	0.26
High Planning	0.04	0.73

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Probabilities of Investing in Education – High School Students

Positive Attitude

	Never Invest	Always
Lowest	0.28	0.27
Mid	0.14	0.42
Highest	0.06	0.60

Proportion of urban participants that chose education financing over $100 cash

Labour force attachment
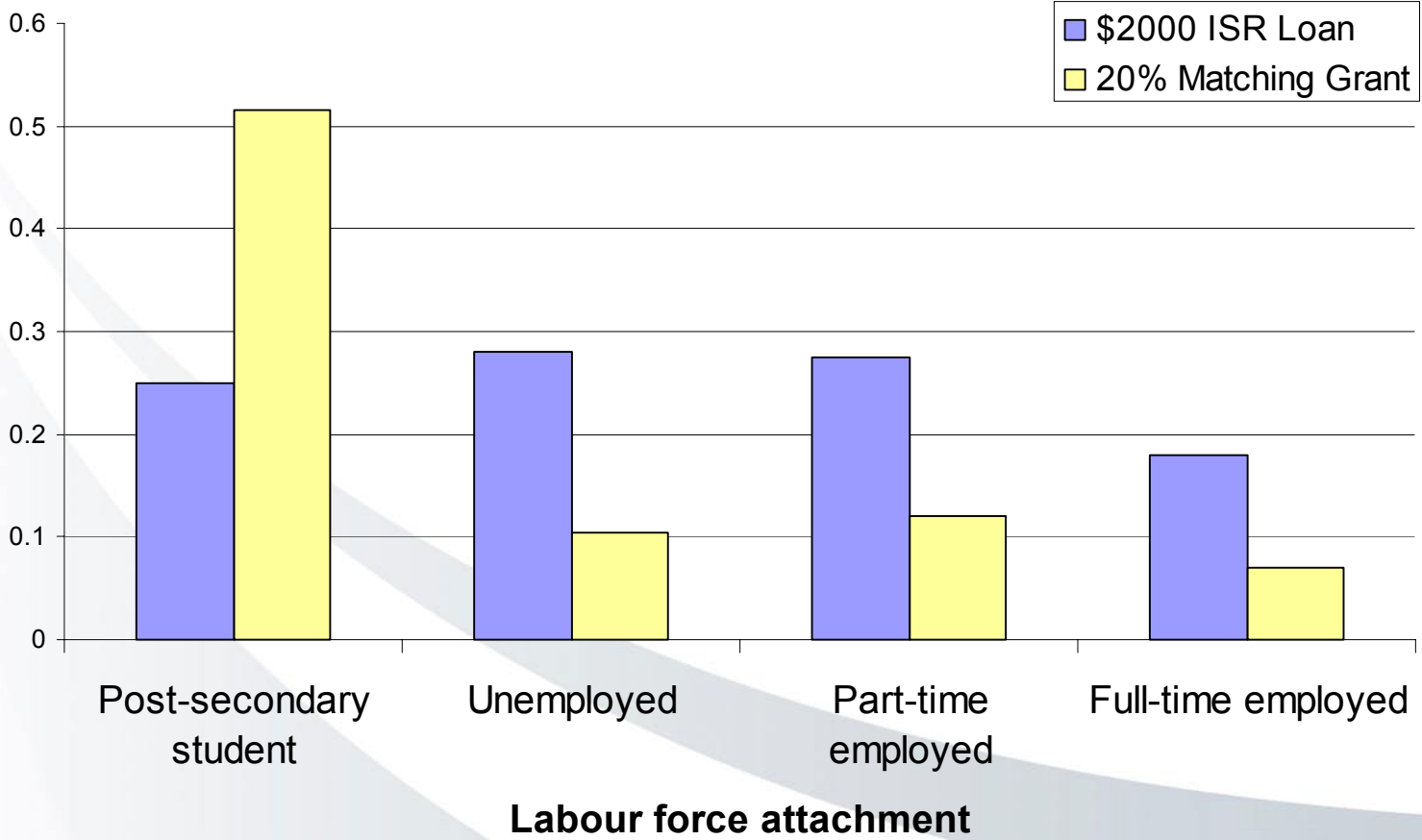
Comparison to Earlier Study – Risk in the Human Capital Decision: A Laboratory Experiment With the Working Poor

- Experimental measures of risk and time preference
- Survey measures of attitudes and behaviors
- Real Investment decisions
  - Own education
  - Family member's education
  - Own retirement

Determinants of Choosing Educational Expenses over Cash

- Younger participants more likely to engage in education
- Those with some post-secondary education were also more likely to engage in education
- Those participants not willing to save exhibit a higher probability to choose cash over education
- More risk averse participants show a lower probability of investing in human capital

Probabilities of Investing in Education

	Never Invest	Always
Most willing to save	0.25	0.40
Least willing to save	0.61	0.12

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Probabilities of Investing in Education

	Never Invest	Always
Most willing to save	0.25	0.40
Least willing to save	0.61	0.12

	Never Invest	Always
Most Risk Seeking	0.35	0.31
Least Risk Seeking	0.50	0.19

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Determinants of Choosing Cash over Family Member's Education

- Children increase probability of investment
- Those participants not willing to save exhibit a higher probability to choose cash over education
- Risk aversion measure plays no role

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Determinants of Choosing Cash over Retirement Savings

- Those participants not willing to save exhibit a higher probability to choose cash over education
- More risk averse participants show a lower probability of investing

What Have We Learned So Far?

- In general, the working poor in our sample are risk averse and many were not willing to save

- Many can be induced to invest in their own education

- 44 percent accepted analogous *learn*$ave offer

- Some couldn't be induced to invest in any asset even when return approached 500%

What Have We Learned So Far?

- When stakes are high and returns modest, this group of individuals was risk averse
  - These participants viewed foregoing certain cash in exchange for educational expenses as a RISKY alternative
  - Those who had already invested in some post secondary education were more likely to invest in education

# Determinants of choosing $1000 Grant Over Cash (Order probit: 801 observations)

+ **Labour Force attachment**
+ **Immigrants, disabled**
+ **Willingness to save (decision)**
+ **Positive attitude with respect to Education and Labour Market**
+ **Mathematical Competency**
+ **PSE experience**

− Age
− Employee with education supplement
− married
− Children (older)
− HS equivalency

Factors related to positive attitude towards Labour Market

+ Employer subsidy, Age, Men
+ Good math competency (not the best!)
+ Family history of saving for education
+ Attitude: Locus of control, temporal orientation
+ High market understanding
+ High school equivalency
- Student debt

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Labour Market Information Treatment
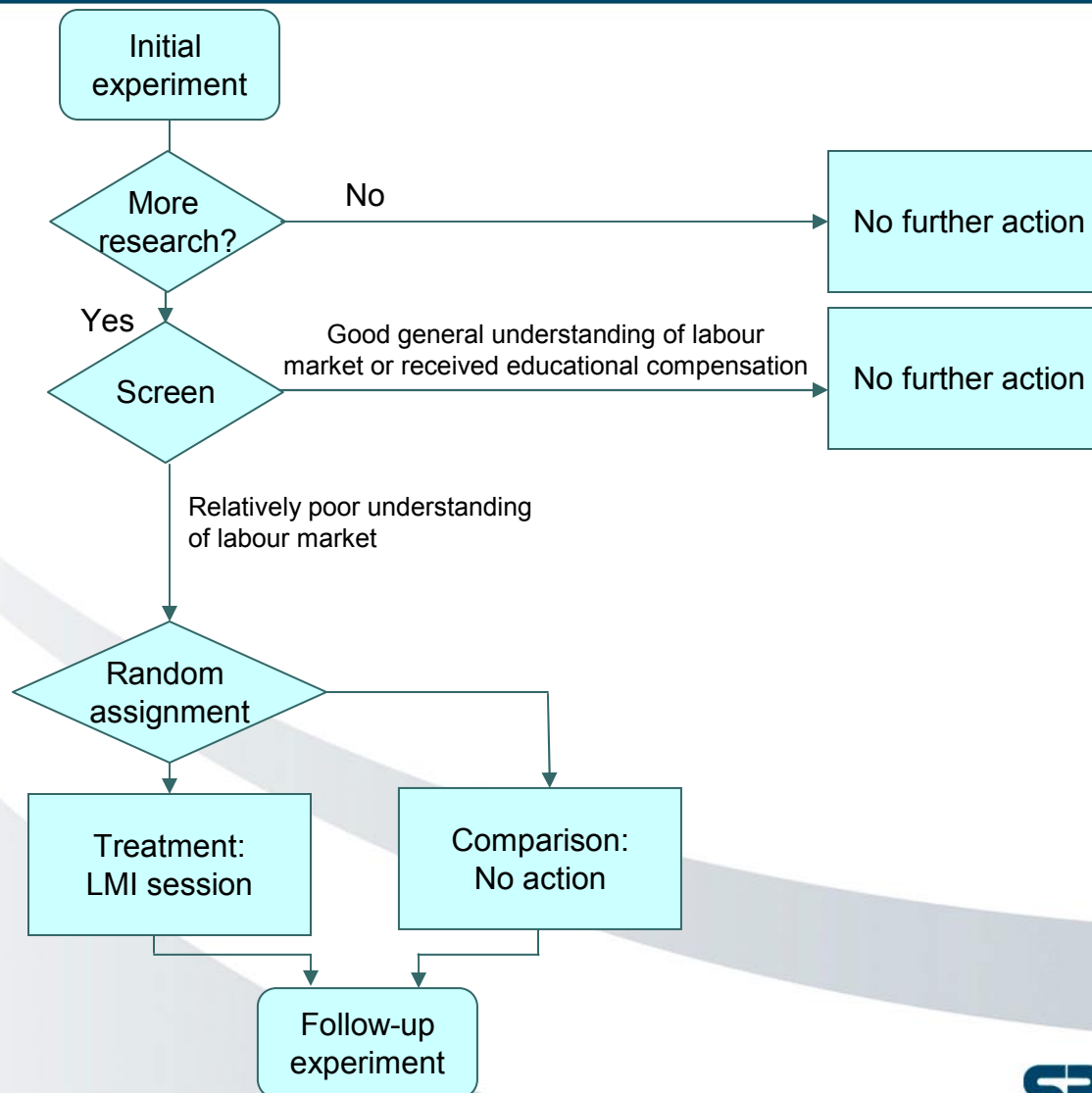
Determinants of choosing more education after the LMI session

Variable	Coefficient	t-statistic
Treatment x 18-25 yr	**.7069625 ***	1.92
Treatment x 25-45 yr	.0142603	0.05
Main Activity pos	.0876376	0.19
Main Activity neg	.3259259	1.00

```
Number of obs =
            156
```

Determinants of choosing more education after the LMI session

Probability of taking choosing more education for the young participants goes up by 15 percentage points, from 42% to 57%

What have we learned so far?

- Experimentally measured individual characteristics, such as time preference and risk preferences, can explain variability in the decision making process as much as demographic and social characteristics.

- Overall, participants were sensitive to different levels of incentives and different forms of financing

- LMI interventions can make a difference

- Study directly impacted Provincial Loan Programs

The Next Steps

- How does information influence knowledge and attitudes?

- What influence did ability play in the change of attitude?

- There is the problem of potential selection bias in the choice of the sub sample of individuals to participate in the LMI intervention. By focusing on those with poor initial information of the labour market, did we undermine the effect of the LMI intervention?

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