Determinants and Consequences of Risk Preferences

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Preferences

- Social preferences
  - Altruism
  - Trust/trustworthiness
  - Reciprocity
  - Fairness
  - Inequality aversion
  - Competitiveness
  - Likelihood to cheat
- **Risk preference**
  - **Neoclassical**
  - **Prospect Theory**
- Time preference
  - Discount rate
  - Hyperbolic discount rate

Why should we care about risk preferences?

- Risk preference is an important predictor for economic decision making (Dohmen and Falk, 2011; Liu, 2013)

- Many studies find that women are more risk averse than men (See Eckel and Grossman, 2008; Croson and Gneezy, 2009; Niederle,2014 for review)

- Studies suggest that gender gap in risk attitudes could explain some of the differences in career choices and wage gaps between men and women (Manning and Swaffield, 2008; Sapienza et al., 2009)

Bt versus Conventional Cotton

- ▶ Bt cotton increases the expected yields about 10%-20%.
- ▶ Bt cotton adopters reduce pesticide expenditures by 60-80%.
- ▶ Bt cotton seeds cost more than conventional cotton seeds by 100-250% in earlier years.
- ▶ Farmers who adopt Bt cotton reduce the cost of producing cotton by 28%.

Source: Huang et al., 2002;

► Why didn't cotton farmers adopt sooner?

Cumulative Distribution Function of Household Adoption of Bt Cotton
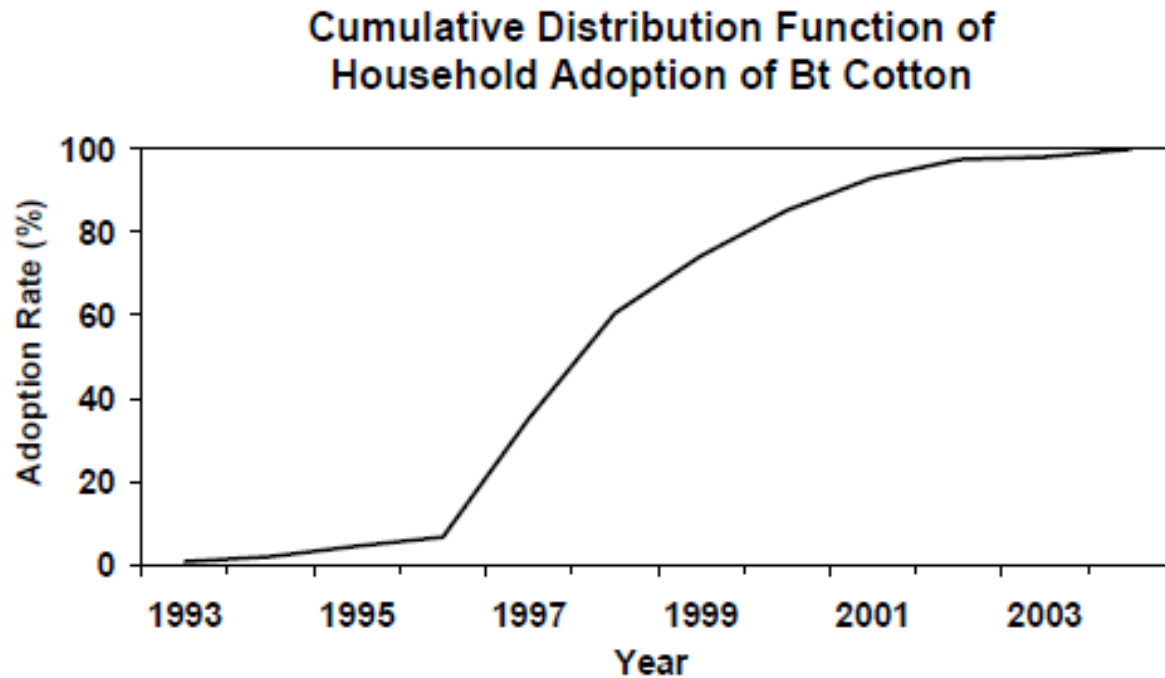
- Other papers: credit constraints, learning spillover

Maybe it's about risk preferences? How to Measure Risk Preferences

- Ask in the survey / subjective
  - Vignette (Falk, et al ; 2014)
- Lab experiment
  - Protocol for eliciting risk preference, e.g. Holt and Laury (2002)

Table 1. The Ten Paired Lottery-Choice Decisions with Low Payoffs

Option A	Option B	
1/10 of $2.00, 9/10 of $1.60	1/10 of $3.85, 9/10 of $0.10	
2/10 of $2.00, 8/10 of $1.60	2/10 of $3.85, 8/10 of $0.10	
3/10 of $2.00, 7/10 of $1.60	3/10 of $3.85, 7/10 of $0.10	
4/10 of $2.00, 6/10 of $1.60	4/10 of $3.85, 6/10 of $0.10	
5/10 of $2.00, 5/10 of $1.60	5/10 of $3.85, 5/10 of $0.10	
6/10 of $2.00, 4/10 of $1.60	6/10 of $3.85, 4/10 of $0.10	
7/10 of $2.00, 3/10 of $1.60	7/10 of $3.85, 3/10 of $0.10	
8/10 of $2.00, 2/10 of $1.60	8/10 of $3.85, 2/10 of $0.10	
9/10 of $2.00, 1/10 of $1.60	9/10 of $3.85, 1/10 of $0.10	
10/10 of $2.00, 0/10 of $1.60	10/10 of $3.85, 0/10 of $0.10	

- I use the experiment designed by Tanaka, Camerer and Nguyen (TCN, 2006), which incorporate prospect theory
- Expected utility theory: risk preferences are solely characterized by the concavity of utility function for money.
- Prospect Theory (Kahnemen and Tversky, 1979): nonlinear probability weighting and aversion to loss compared to gain also influence individual attitudes toward risk.

- Bt Cotton Survey (2006) was designed and conducted by the Center for Chinese Agricultural Policy (CCAP). A total of 320 households in the survey

Cotton Producing Provinces in China

☐ Provinces included in the survey

Xinjiang

Hebei
Shandong
Henan
Jiangsu
Anhui
Sichuan
Hubei
Hunan
Jiangxi

High stake monetary game. Everyone receives 10 Yuan (1/3 daily wage) by participating in the game.

At some point, participants switch from safe to risky option in a series.

Series 1

	A	B
1	20 Yuan if ①②③ 5 Yuan if ④⑤⑥⑦⑧⑨⑩	34 Yuan if ① 2.5 Yuan if ②③④⑤⑥⑦⑧⑨⑩
2	20 Yuan if ①②③ 5 Yuan if ④⑤⑥⑦⑧⑨⑩	37.5 Yuan if ① 2.5 Yuan if ②③④⑤⑥⑦⑧⑨⑩
3	20 Yuan if ①②③ 5 Yuan if ④⑤⑥⑦⑧⑨⑩	41.5 Yuan if ① 2.5 Yuan if ②③④⑤⑥⑦⑧⑨⑩
4	20 Yuan if ①②③ 5 Yuan if ④⑤⑥⑦⑧⑨⑩	46.5 Yuan if ① 2.5 Yuan if ②③④⑤⑥⑦⑧⑨⑩

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	A	B
14	20 Yuan if ①②③ 5 Yuan if ④⑤⑥⑦⑧⑨⑩	850 Yuan if ① 2.5 Yuan if ②③④⑤⑥⑦⑧⑨⑩

I choose lottery A for Line 1 to _____ .

I choose lottery B for Line _____ to 14.

Payoffs may be positive or negative, which allows us to estimate the parameter of loss aversion.

Series 3

	A	B
1	Receive 12.5 Yuan if ①②③④⑤ Lose 2 Yuan if ⑥⑦⑧⑨⑩	Receive 15 Yuan if ①②③④⑤ Lose 10 Yuan if ⑥⑦⑧⑨⑩
2	Receive 2 Yuan if ①②③④⑤ Lose 2 Yuan if ⑥⑦⑧⑨⑩	Receive 15 Yuan if ①②③④⑤ Lose 10 Yuan if ⑥⑦⑧⑨⑩
3	Receive 0.5 Yuan if ①②③④⑤ Lose 2 Yuan if ⑥⑦⑧⑨⑩	Receive 15 Yuan if ①②③④⑤ Lose 10 Yuan if ⑥⑦⑧⑨⑩

One of the 35 lines would be randomly chosen ex post and the lottery they had selected would be played for actual stakes.

$$U(x, p; y, q) = \begin{cases} v(y) + \pi(p)(v(x) - v(y)) & x > y > 0 \text{ or } x < y < 0 \\ \pi(p)v(x) + \pi(q)v(y) & x < 0 < y \end{cases}$$

$$\text{where } v(x) = \begin{cases} x^{1-\sigma} & \text{for } x > 0 \\ -\lambda(-x)^{1-\sigma} & \text{for } x < 0 \end{cases} \quad \text{and } \pi(p) = \exp\left[-(-\ln p)^{\alpha}\right]$$

► Advantage of this design:

if $\begin{cases} \alpha = 1 \\ \lambda = 1 \end{cases}$, the above model would reduce to expected utility theory

- Farmers who are more risk averse adopt the new technology later.
- Farmers who are more loss averse adopt the new technology later.
- Farmers who overweight small probabilities adopt Bt cotton earlier.
- Follow up paper with Jikun Huang (JDE, 2013)
- We find that farmers who are more risk averse use greater quantities of pesticides.

Determinants of Risk Preferences

- Nature vs nurture Genetics/epigenetics/environment
- Dohmen et al. (2006) use survey evidence on attitudinal questions and find modest intergenerational correlations in self-reported trust and risk attitudes
- Cesarini et al (2009) QJE : using DZ vs MZ to study risk preferences
  - Hypothesis: If a trait is heritable, then it must be the case that the correlation in MZ twins is higher than the correlation in DZ twins.
- Dohmen et al (2007) risk aversion is linked to cognitive ability
- Other work (Cameron and Shah) linked to important life events

Research Questions Related to Risk Preferences

- How does Culture/Religion Affect Risk Preferences?

  – In my own work with Joseph and Juanjuan Meng, we find that Confucianism cause Chinese students to behave less risk averse.

Work with Xuejing Zuo, PNAS (2019)

- We want to understand the origin of gender gap in risk preferences
- Studying the risk taking behaviors among children from matrilineal Mosuo and traditionally patriarchal Han in Yunnan, China
- Children of these ethnic groups go to the same set of schools
- We conducted surveys and eld experiments to elicit risk attitudes in elementary schools and middle schools

Kingdom of Women

- The Mosuo is the only matrilineal society in China. Population of 40,000.

- Yongning township at Ninglang County has the largest Mosuo population.

- In Ninglang county, there are Yi, Han, Mosuo and 23 other ethnic groups. Yi and Han are both patriarchal in nature (Hill and Diehl, 2001)

- The local annual average income per capita was $481 USD in 2011

Matrilineal vs Patriarchal Societies

- Work by Gneezy, Leonard and List (2009) and Gong and Yang (2012) find that female adults from matrilineal society behave more similar to men in patriarchal society

Distinct Gender Norms

	Han	Mosuo
Household head	Male (Father or Grandfather)	Female (Grandmother)
Family Lineage	Male	Female
Father	Family member	Not a family member
Marriage	Monogamy	Walking Marriage
		(nonexclusive, noncontractual, and nonobligatory)
Kids set up own family	Yes	No
Women Status	Subordinate to men	Enjoy equal (higher) rights
Son Preference	Yes	No

Source: (1) Shih, C.K 1993 The Yongning Mosuo: Sexual Union, Household Organization, Gender and Ethnicity in a Matrilineal Duolocal Society in Southwest China PH.D thesis, Stanford University, Stanford,California. (2) Yongning Township Government Report,2012.

Footnote: There are variations in customs among Mosuo. Customs we describe here are for the Mosuo in Yongning Township.

Elementary School

- Conducted in 4 elementary schools and 1 middle school in the early spring of 2015 and 2016 in Yongning Township
- Elementary schools: all Han and Mosuo students from 1st to 5th grade.
- 10 to 30 students per grade, and one class per grade
- Share of Mosuo students varied between 13% to 77% at school-grade-year level.
- 185 elementary school students from 2015 and 167 from 2016
- No endogeneous sorting due to household registration system.

Middle School

- Middle School ranges from 7-9th grades. Enrollment rate is about 98%.

- Share of Mosuo students: 25%. (Han: 35%, Yi 25% based on 2014 roster)

- More than 85% of students board at the school.

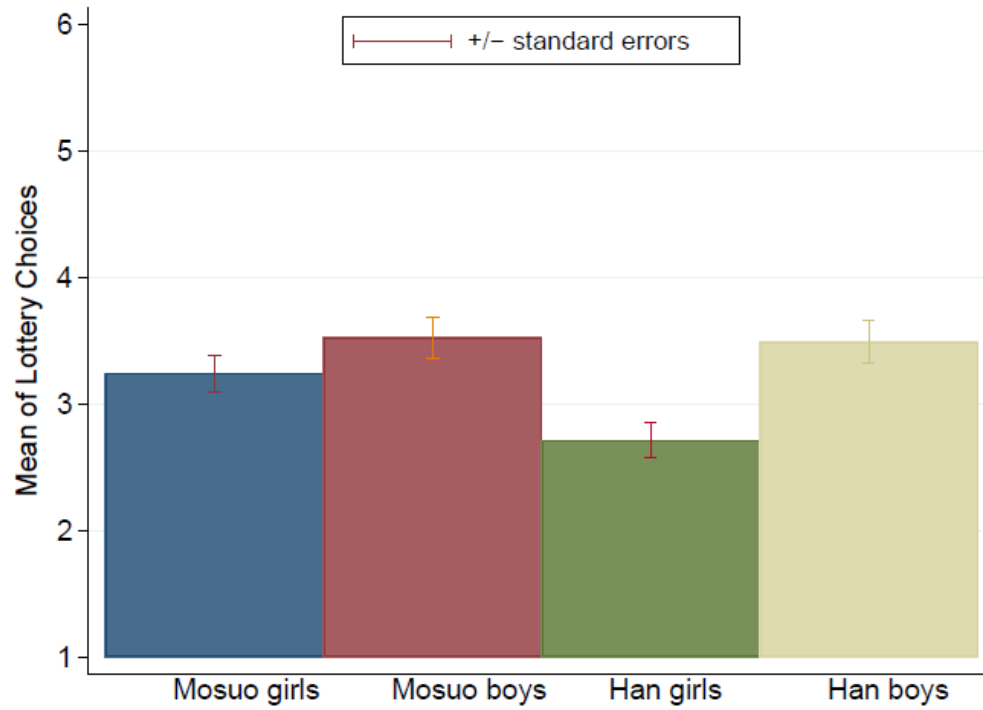- Out of 240 seventh-grade students, we randomly draw about 75 Han and Mosuo students each year.

Schools

Incentivized Lottery Game
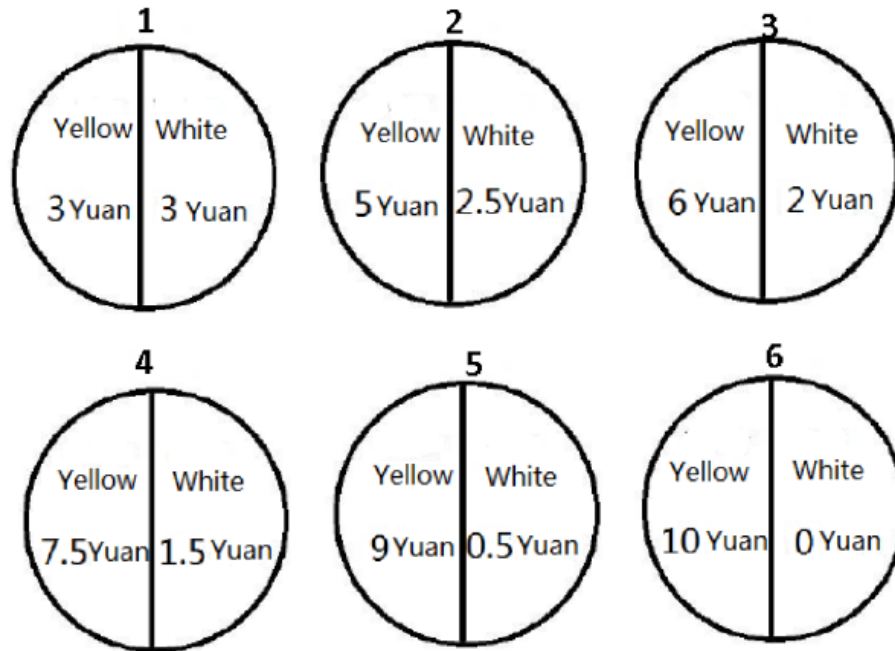
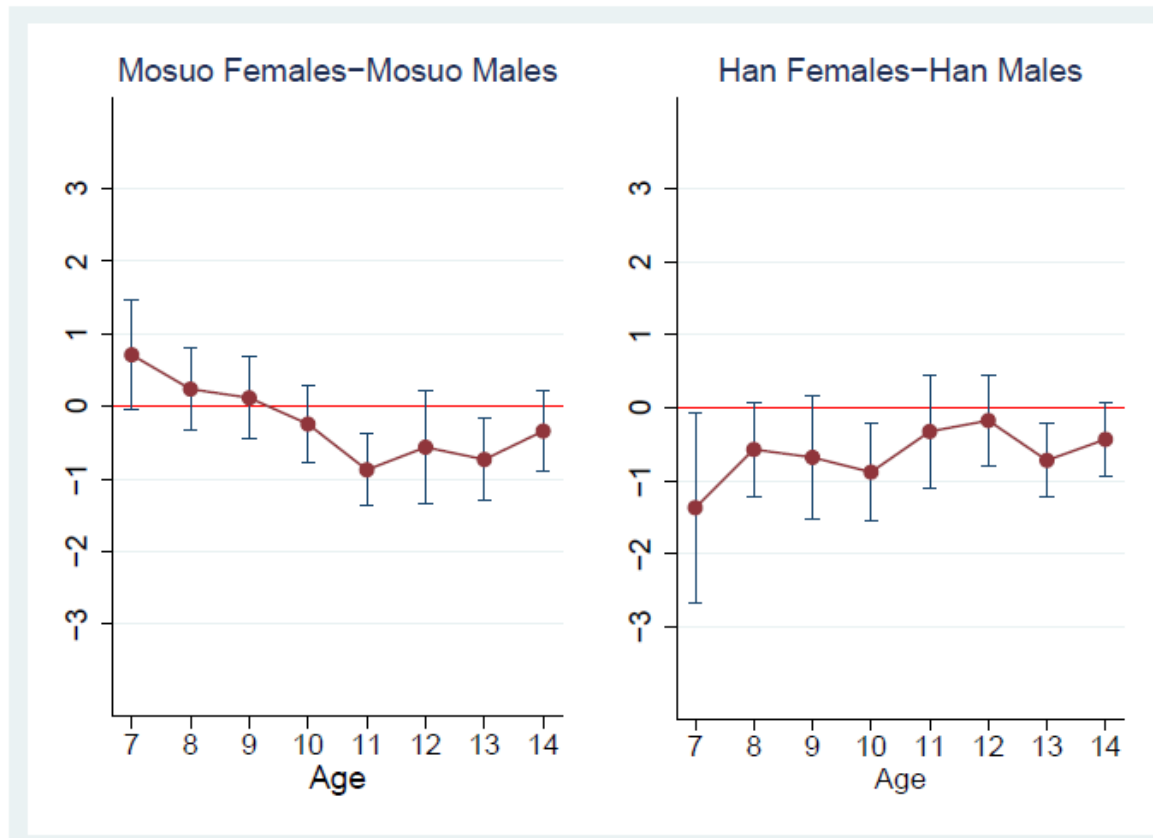- The cost of a lunch in elementary school is about 5 yuan(85cents).

Descriptive Evidence

Evolution of Gender Gap in Risk Preferences

For individual i at grade g in year t

$$Y_{igt} = \alpha + \sum_{g=1}^{5} \beta_g Female_i * g + \tau_g + \gamma_t + \varepsilon_{igt}$$

Peer Effects in Elementary Schools

For individual i in a give school-grade-cohort c

$$Y_{ic} = \gamma_0 + \gamma_1 Age_i + \gamma_2 Mosuo_{ic} + \gamma_3 MosuoMinority_c +$$
$$\gamma_4 Age_i \times Mosuo_{ic} +$$
$$\gamma_5 Age_i \times MosuoMinority_c +$$
$$\gamma_6 MosuoMinority_c \times Mosuo_{ic} +$$
$$\gamma_7 Age \times MosuoMinority_c \times Mosuo_{ic} + \varepsilon_{ic}$$

Finding 2

	(1) Girls	(2) Boys
Mosuo in a Mosuo Majority Cohort, $\gamma_1 + \gamma_4$	-0.183*	-0.287*
	[52]	[41]
Mosuo in a Mosuo Minority Cohort, $\gamma_1 + \gamma_4 + \gamma_5 + \gamma_7$	-0.345***	0.302***
	[66]	[57]
Han in a Mosuo Majority Cohort, γ_1	0.452*	1.427**
	[15]	[10]
Han in a Mosuo Minority Cohort, $\gamma_1 + \gamma_5$	0.127	-0.006
	[60]	[52]
P-values for equality tests:		
Mosuo in a Mosuo Majority=Mosuo in a Mosuo Minority	.237	.001
Han in a Mosuo Majority=Han in a Mosuo Minority	.225	.002

"Lugu lake was beautiful. But the road condition wasn't great because of the snow..it was scary . Several time the roads were too icy...many cars were stalled. Also it was-10c in lugu.... and the room we stayed for the first two nights in did not have heater!!!!(local booked it for us because of connection. I finally had enough and moved.... caught a bad cold.. many stories to tell my kids for the sake of r research."