Public and Private Risk Mitigation: An Field Experiment

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Research Objectives

- Understand the perception of risk, risk preferences, and preparedness priorities between citizens and public decision-makers over low probability, high risk events (e.g. Hurricanes, Flooding, etc.).
- Compare perceptions of risk and concomitant behavior across different segments of society (demographics, geographic locations, role) .
- Understand how the risk perceptions of individuals and government decision-makers affect their preparedness and behavior.
- Examine the impact of public mitigation, and citizen expectations about public mitigation, on private mitigation decisions (including insurance)
- Identify policy design flaws and implementation barriers that arise from differences between citizens and policy makers in terms of risk perception, risk pooling, and future orientation, as well as strategic interaction of mitigation choices at different levels.
- Propose improved policy designs that enhance preparedness based on a better understanding of how people perceive and react to risk.

Research Questions

- What are the risk preferences of individual decision-makers vs. governmental decision makers?
- Do individuals and government decision makers use risk information the same way?
- How are decisions about compliance linked to risk preferences?
- How much are individuals willing to pay to mitigate risk?
- How do expectations of government mitigation and assistance affect individual mitigation decisions.

Research Questions

- How much do individuals need to be compensated to accept risk?
  - How are low-probability events considered in risky decision making?
- Do policy makers adequately understand and consider the risk attitudes of the citizens affected by disasters and disaster-related policies?
  - Misperceptions, paternalism
- Do different social groups (wealthy/poor, families, ethnicities) have different mechanisms for mitigating risk (including risk pooling)?
- Is there a difference in time preferences (discounting or planning for the future) for residents in high risk areas versus low risk areas?
  - Due to selection or experience?

Aspects of Risk

- Risk Portfolio
  - How do different non-disaster (background) risks affect disaster preparedness and mitigation?
- Risk Perception
  - How do citizens perceive the risks of natural disasters?
- Risk Tolerance
  - How much risk do citizens enjoy/prefer?
- Risk Mitigation
  - What actions can be taken by citizens and governments?
  - What actions do citizens prefer for government to take?

Research Strategy

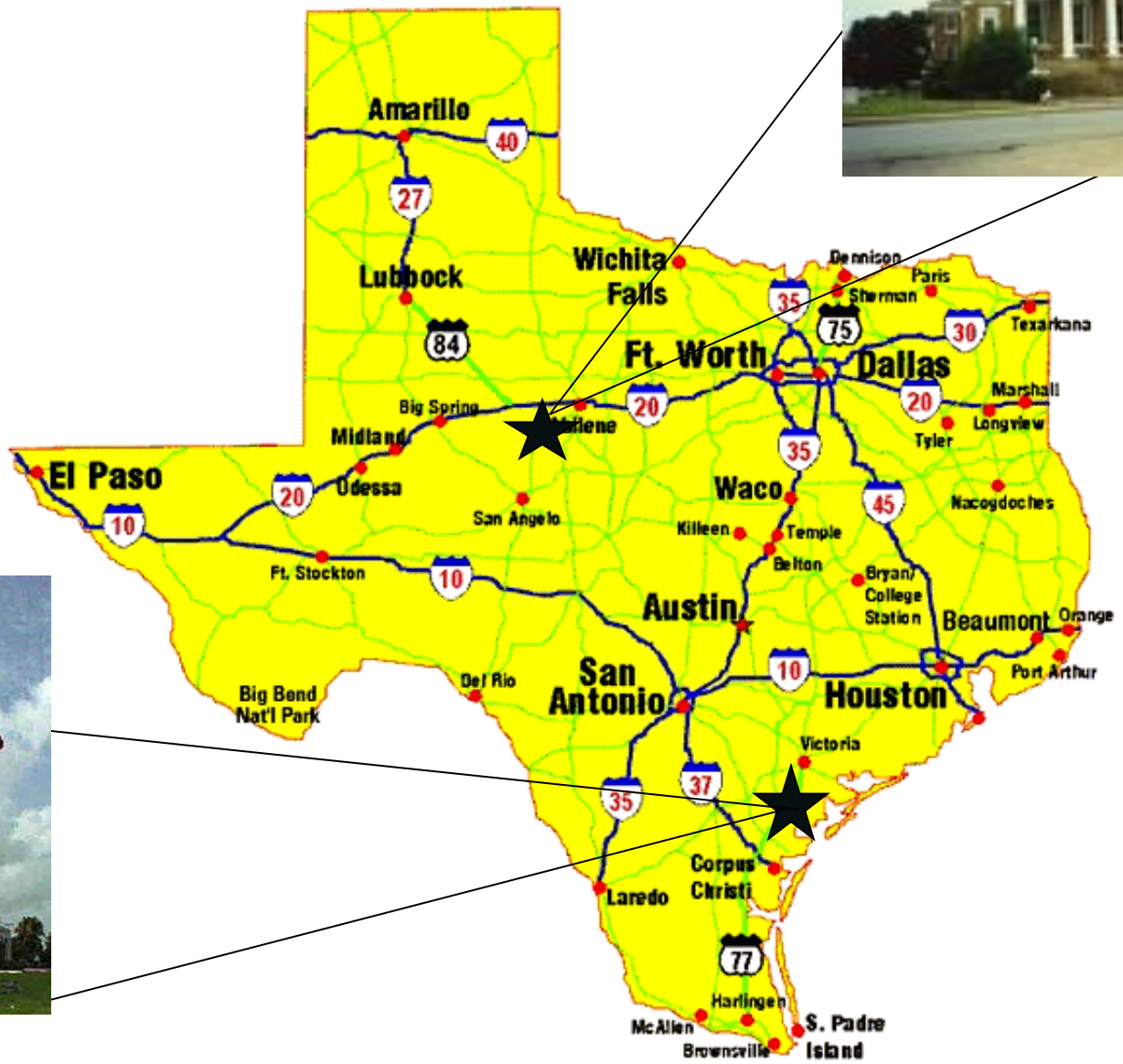
- Usual approach
  - Survey collection of attitudes, perceptions and self-reported behavior
  - Augmented by “willingness to pay” hypothetical questions
- Approach here:
  - Incentivized experiments assessing preferences
  - Two locations: hurricane risk v. tornado/flooding risk
- Citizen individual decision tasks (experiments)
    - Time discounting
    - Risk tolerance
    - Insurance purchase
    - Correlated v. uncorrelated risks (explained later)
  - Citizen questionnaire (self-administered)

Research Strategy, cont'd

- Public Official decision tasks
    - Time discounting (for self)
    - Risk orientation (for self)
    - Insurance (self)
    - Correlated risk mitigation (for citizens)
  - Questionnaire
- Context rich data (GIS)
- Panel structure (5 year)

Cities Selected

Brownwood City, TX



Port Lavaca, TX

City Comparison

Coastal City

Port Lavaca, TX

Population*: 12,035

Hurricane Risk Area: 1

Main Industries*:

1. Manufacturing
2. Education, Health and Social Services

Median Income*: 33,626

Median Age*: 32.1

Website:http://www.portlavaca.org/index.html

Inland City

Brownwood City, TX

Population*: 18,813

Hurricane Risk Area: Outside 5

Main Industries*:

1. Agriculture, Forestry, Fishing and Hunting, and Mining
2. Construction

Median Income*: 27,325

Median Age*: 33.4

Website: http://www.ci.brownwood.tx.us/

* US Census Bureau 2000 - http://www.census.gov/

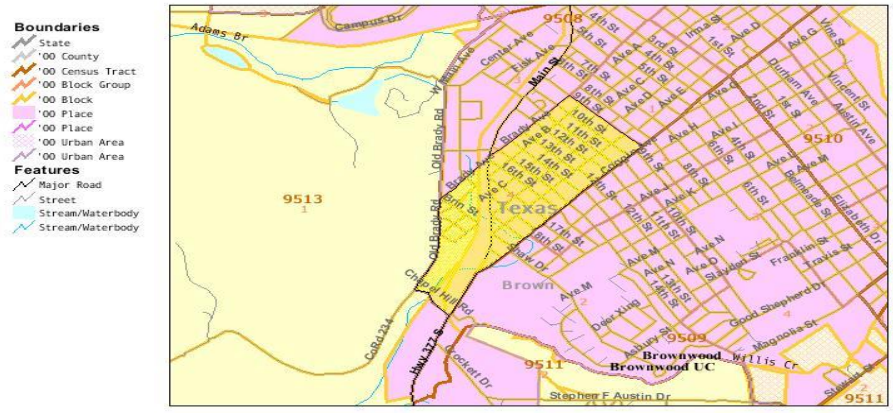
Sampling

- Matched Towns
- Matched neighborhoods within towns
  - SES
  - Vulnerability to natural disasters
  - Prior experience with disaster event
- Random sample of households (n=200 per community in 2 neighborhoods)
- Quota for sex of household member
- Convenience sample of Public Officials (n=25 per community)

Neighborhood Matching

		BW	PL	BW-PL
		BG 4, Census Tract 9508	BG 2, Census Tract 9902	
Population		771	1,298	
Race (%)	white	74.7	70.3	4.4
	black/ african ame	3.2	2.9	0.4
	other	22.0	26.8	(4.8)
Education (%)	low	38.8	32.7	6.0
	high school	32.9	38.2	(5.3)
	college+	28.4	29.1	(0.7)
Income (%)	~29K	62.9	53.8	9.0
	30K~49K	17.1	19.6	(2.5)
	50K~74K	13.6	14.4	(0.8)
	75K~	6.5	12.2	(5.7)
Employment (%)	Employ	92.7	95.1	(2.3)
	Unemploy	7.3	4.9	2.3

Block Group 4, Census Tract 9508, Brown County, Texas



Block Group 2, Census Tract 9902, Calhoun County, Texas

Public Official Sample

- Elected Officials (Mayor, County Judge, Council Members)
- City managers and engineers
- Disaster Directors (Fire Chief, Police Chief)
- Key volunteer coordinators
- Mid-level employees

Experiments – Time Discounting

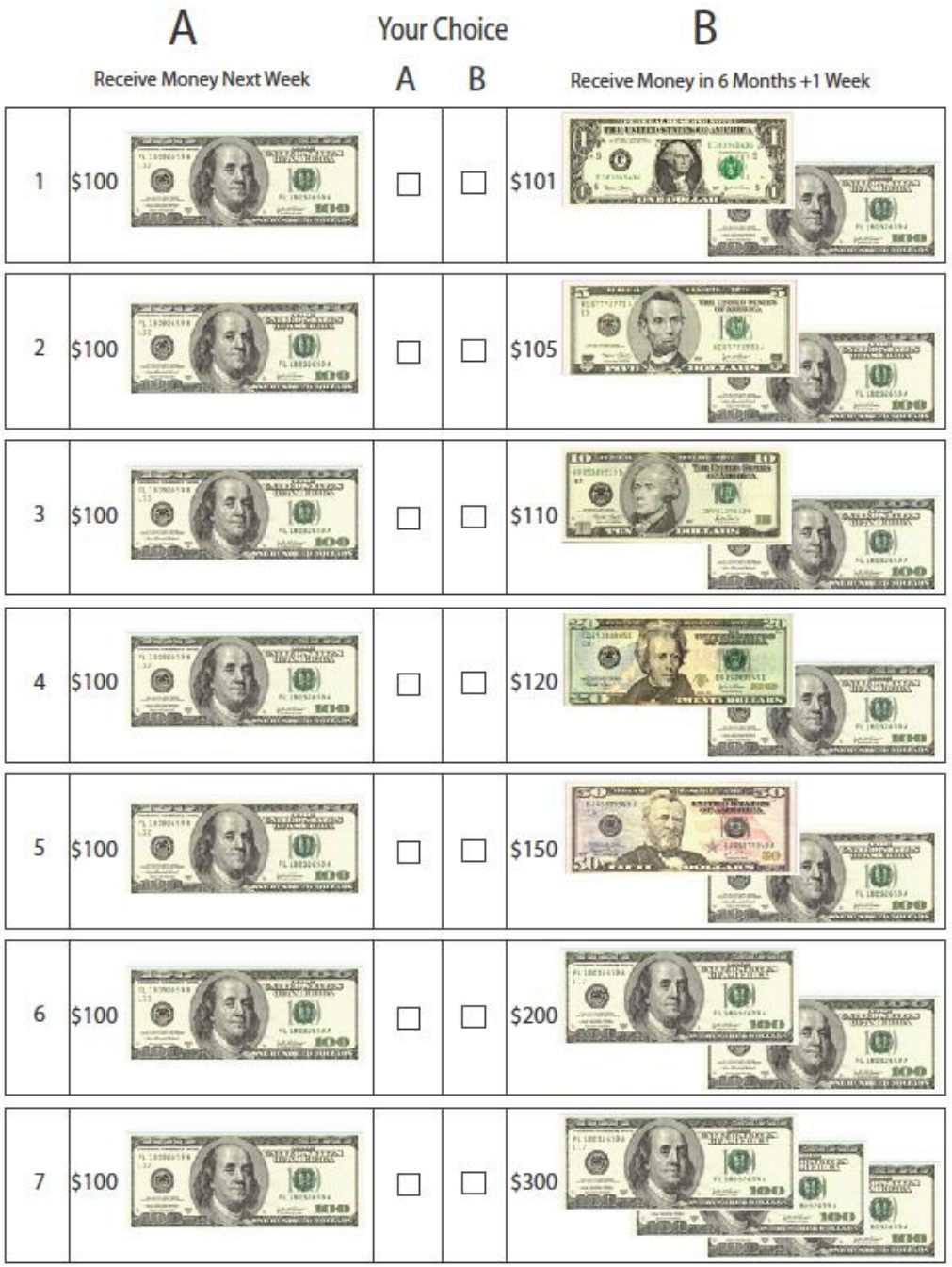
- In this task you are asked to make seven (7) decisions. For each decision you must choose between option A , $100 in one week, and option B, a larger amount of money in 6 months and 1 week.
- For example, consider decision 1 in the sample decision form at right.. For decision 1, you must choose between option A ($100 next week) and option B ($101 - 6 months later).
- After you have made all your decisions, one of the decisions will be chosen at random for payment.

	A	Your Choice		B
	Receive Money Next Week	A	B	Receive Money in 6 Months +1 Week
1	$100 	☐	☐	$101 
2	$100 	☐	☐	$105 
3	$100 	☐	☐	$110 
4	$100 	☐	☐	$120 
5	$100 	☐	☐	$150 
6	$100 	☐	☐	$200 
7	$100 	☐	☐	$300 

Experiments – Time Discounting

- Note that most people will start at the top choosing A and will switch to B at some point
- The switch point (# A choices) indicates a range for their discount rate.

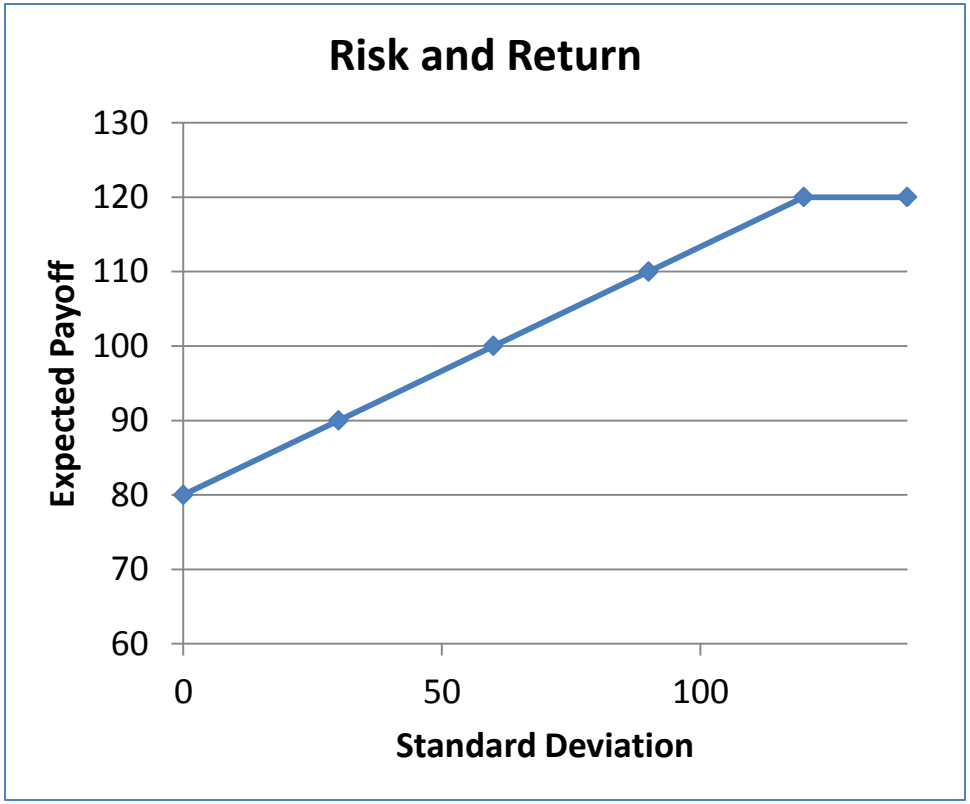
# A choices	Discount rate (6 mo)
0	r<1%
1	1%≤r<5%
2	5%≤r<10%
3	10%≤r<20%
4	20%≤r<50%
5	50%≤r<100%
6	100%≤r<200%
7	200%≤r<300%



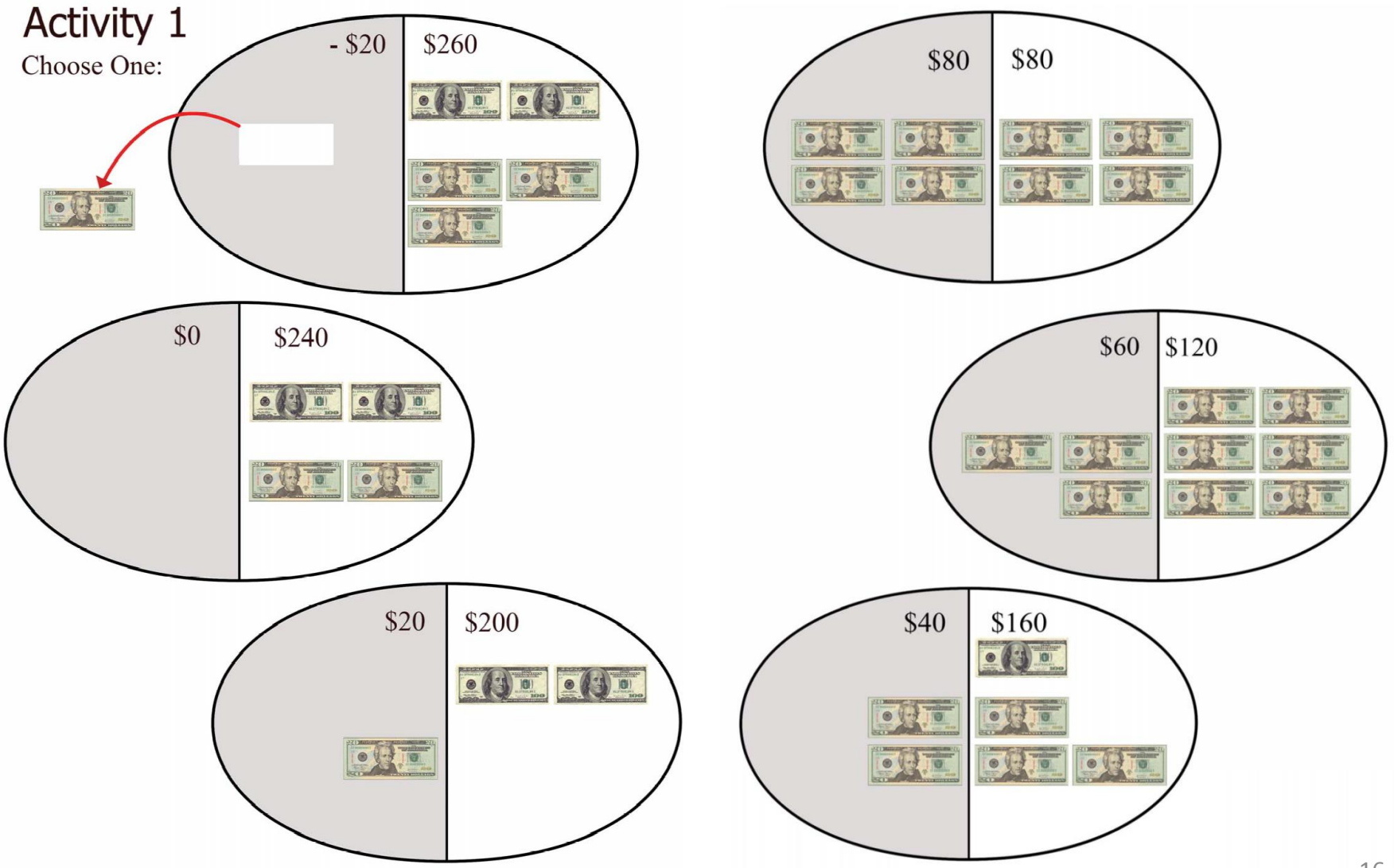
Risk Protocol

Subjects choose most preferred among 6 gambles with 50/50 odds.

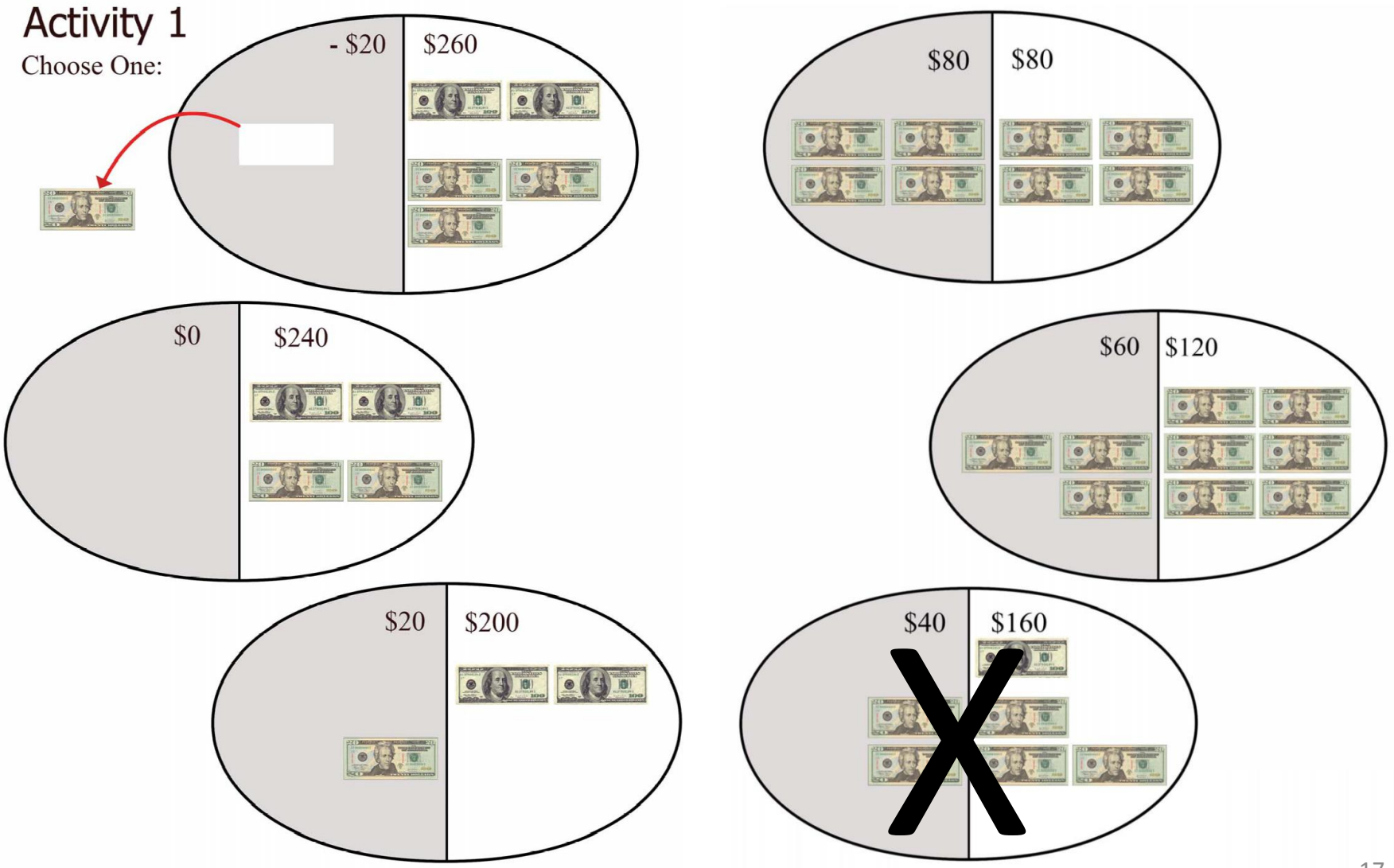
Gamble	Low	High
1	80	80
2	60	120
3	40	160
4	20	200
5	0	240
6	-20	260



Risk Task presentation



Subject marks chosen gamble, which is then played out by choosing a “high” or “low” chip from a bag



Independent v. Correlated Risks

- Low-probability Independent risks
  - House fire, accident, illness
  - People tend to insure against these
  - Not a public policy issue
- Low-probability correlated risks
  - Hurricane or other natural disaster (or banking failure)
  - People often fail to insure
  - Public policy issue: people assume government will bail them out

Independent v. Correlated: Experiment

- Contrast independent and correlated risk
- From the point of view of an individual subject, prospects are identical
- Difference is in what happens to the other subjects:
  - Independent: each subject's outcome is determined separately
  - Correlated: common outcome for all subjects

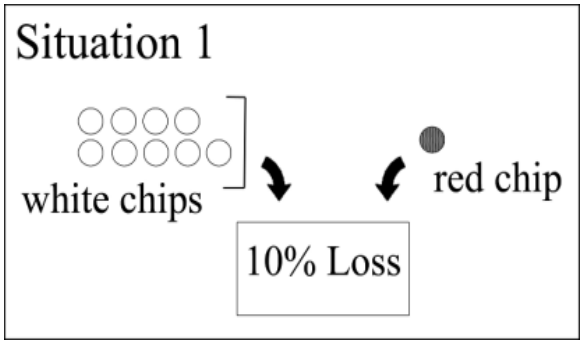
10% Chance of Losing $70.00

Please indicate whether you will buy insurance at the indicated price. Check one box on each line.

	Insurance Price	I Will Buy Yes	I Will Buy No
1.	$0.00	☐	☐
2.	$5.00	☐	☐
3.	$10.00	☐	☐
4.	$15.00	☐	☐
5.	$20.00	☐	☐
6.	$25.00	☐	☐
7.	$30.00	☐	☐
8.	$35.00	☐	☐
9.	$40.00	☐	☐
10.	$45.00	☐	☐
11.	$50.00	☐	☐
12.	$55.00	☐	☐
13.	$60.00	☐	☐
14.	$65.00	☐	☐

Experiments – Independent risks

1. Determine whether to buy insurance (1%, 10%, 50% loss).
2. Roll a die to determine which situation you will be in.
3. Roll a 14-sided die to determine insurance cost.
4. Pull a chip from a hat to determine your payoff.



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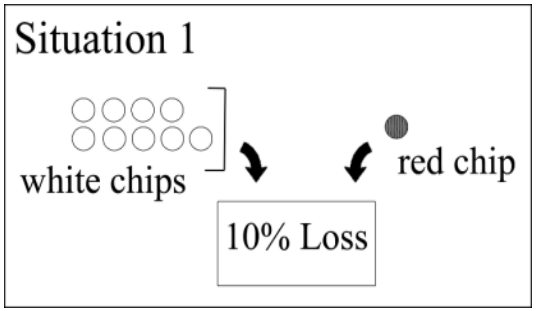
5.	$20.00	☐	☐
6.	$25.00	☐	☐
7.	$30.00	☐	☐
8.	$35.00	☐	☐
9.	$40.00	☐	☐
10.	$45.00	☐	☐
11.	$50.00	☐	☐
12.	$55.00	☐	☐
13.	$60.00	☐	☐
14.	$65.00	☐	☐

Experiments – Correlated Risks

1. Determine whether to buy insurance (10% loss).
2. Public Official will be randomly matched with the group and can provide additional coverage
3. One roll a 14-sided die to determine insurance cost for the group.
4. Pull a chip from a hat that determines the fate of **<u>everyone</u>** in the group.



Experiments – Correlated Risk, Public Official

1. Already participated in insurance task.
2. Given budget that can be spent on own Department/Office or can cover potential citizen losses.
3. Make a choice.
4. Randomly matched with citizen group.

	Your Budget	Citizen Insurance	Coverage
☐	$500	$0	0%
☐	$450	$50	10%
☐	$400	$100	20%
☐	$350	$150	30%
☐	$300	$200	40%
☐	$250	$250	50%
☐	$200	$300	60%
☐	$150	$350	70%
☐	$100	$400	80%
☐	$50	$450	90%
☐	$0	$500	100%

Questionnaire

- Disaster module (hurricane/flooding)
- Evacuation module
- Risk mitigation module
- Willingness to pay module
- Trust in Government module
- Demographics/Household module