

# Inflation Expectations and Behavior: Do Survey Respondents Act on their Beliefs?

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- **Brief overview of financial literacy related research at the NYFed**
  - Study what consumers know – content of individual information sets/knowledge
  - Study how individuals form and update expectations -- how information is used
  - Study how expectations, knowledge and education influence consumer decision making
- **Inflation expectations and behavior: Do survey respondents act on their beliefs?**  
(with Olivier Armantier, Wandi Bruine de Bruin, Giorgio Topa, Basit Zafar)



# Two key components of this research

- **Collection of new data** on consumer expectations and behavior
  - RAND's American Life Panel (ALP)
  - Survey of Consumer Expectations (SCE)
    - Started in June 2013. Fielded by the Demand Institute, a partnership between the Conference Board and Nielsen
    - Overall goal: collect timely, high quality information on *consumer expectations* and *decisions*
    - A nationally representative, monthly internet-based survey of a rotating panel of ~ 1,200 household heads.
- The use **of field experiments** to establish causal relationships



# Financial literacy related research at NYFed

Three main research themes:

## 1. Study what consumers know – content of individual information sets/knowledge

- Measure numeracy, financial literacy and heterogeneity therein
- Identify holes in knowledge/awareness of financially relevant information

**(i) Student loan literacy:** Widespread lack of understanding of the implications of student loan indebtedness

- *Only 37% considers forgiveness of student debt delinquency in bankruptcy as “extremely unlikely” (18% somewhat unlikely)*
- *Only 27% aware of three actions the government can take if not repaying federal student loan*



# Findings on: What Consumers Know (continued)

## (ii) Misconceptions of College Benefits and Costs

- We find biased beliefs, with the average respondent under-estimating the average wage premium, and over-estimating the average costs of a college education
- Higher accuracy among those with higher numeracy
- Misperceptions are larger for more disadvantaged groups, so information may help reduce gaps in college attendance
- This suggests a role for potential information campaigns to inform the public about population returns to a college education



## 2. Study how individuals form and update expectations – how information is used

- Document differences by levels of financial literacy & numeracy
  - New SCE provides monthly changes in a large range of expectations by low/high numeracy/financial literacy
- Analyze updating of expectations in response to new information while accounting for endogeneity of information acquisition (randomized price information experiment)

**(i) Inflation Expectations:** Differences by financial literacy/numeracy  
*During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now?”. “By about what percent do you expect prices to go [up/down] on the average?*



# Findings on: How Consumers Form/Update Expectations

Find that demographic differences in reported inflation expectations are mostly explained by differences in financial literacy:

- Respondents with lower financial literacy scores report higher and more extreme inflation expectations
- Evidence of differences in expectation formation: They
  - thought more about specific (salient) prices; covering expenses
  - reported higher uncertainty about future inflation, estimates more volatile over time: can lead to upward bias if perceived 0% floor
  - had lower confidence in their financial knowledge and shorter planning horizons



## 3. Study how expectations, knowledge and education influence consumer decision making

- Analyze whether and how individuals act on their expectations
- Investigate role of expectations as channel through which numeracy, financial literacy, knowledge affects consumer decisions and outcomes

**Randomized financially incentivized investment experiment:**

Do Survey Respondents Act on their Beliefs about Inflation?





# Inflation Expectations and Behavior: Do Survey Respondents Act on their Beliefs?

## Background

- Inflation expectations are at the center of modern Macro Theory
- Transmission effect : Beliefs about future inflation affect current behavior and therefore realized inflation
- Managing inflation expectations is first step in controlling inflation
- Recent research aims at better understanding and survey measures of inflation expectations



# What we do

- We ask the same subjects to respond to a survey and participate in a financially incentivized experiment
- In survey, we elicit inflation expectations
- In experiment, subjects chose between investments whose final payoffs depend on future inflation
- The objective is to compare the survey responses with the behavior in experiment
- The survey and the experiment is repeated with the same respondents



# Motivation 1 : Are Survey Responses Informative?

- Inflation surveys are widely used in practice and in academia
- Are these surveys informative?
- Possible reasons why surveys may not be informative about the true inflation beliefs of individual consumers:
  - Respondents may not provide truthful responses
  - Respondents may not provide thoughtful responses
  - Survey questions may not be clear.
- What we do:
  - We test how informative the subjects survey responses are about their decisions in the experiment.



## Motivation 2 : Do agents act on their inflation beliefs?

- There is a debate about expectation formation, but macro models assume agents act on their inflation beliefs.
- Is there empirical support for this assumption?
- Possible reasons why agents may not act on their inflation beliefs:
  - The impact of future inflation may not be sufficiently salient
  - Lab evidence of money illusion
- What we do:
  - We examine whether actions in financially incentivized experiment are consistent with self reported beliefs in survey

# The Survey

- Conducted by RAND as part of American Life Panel
- We contacted 771 respondents randomly from participants in the Reuters/UMichigan Survey of Consumers conducted in 2007
- Two waves: Wave 1, end of July 2010. Wave 2, January 2011.
- Consists of several parts, including inflation expectations elicitation, experiment, elicitation of risk attitude, numeracy and financial literacy



# Inflation Expectations Questions

Two survey treatments:

## 1. “Inflation”:

- *Over the next 12 months, I expect the rate of inflation to be \_\_\_\_% OR the rate of deflation (the opposite of inflation) to be \_\_\_\_%.*

## 2. “Prices”

- *Over the next 12 months, I expect prices of the things I usually spend money on to go up by \_\_\_\_ % OR to go down by \_\_\_\_ %*



# Elicitation of Probabilistic Beliefs

What do you think is the percent chance that, **over the next 12 months:**

*the rate of inflation will be 12% or more* \_\_\_\_\_

*the rate of inflation will be between 8% and 12%* \_\_\_\_\_

*the rate of inflation will be between 4% and 8%* \_\_\_\_\_

*the rate of inflation will be between 2% and 4%* \_\_\_\_\_

*the rate of inflation will be between 0% and 2%* \_\_\_\_\_

*the rate of deflation will be between 0% and 2%* \_\_\_\_\_

*the rate of deflation will be between 2% and 4%* \_\_\_\_\_

*the rate of deflation will be between 4% and 8%* \_\_\_\_\_

*the rate of deflation will be between 8% and 12%* \_\_\_\_\_

*the rate of deflation will be 12% or more* \_\_\_\_\_

**% Total** \_\_\_\_\_

To verify if your responses add up to 100% press “Add”

# The experiment

- Consists of 10 questions
- In each question, a subject chooses between investment A or B
- Each investment generates a payoff 12 months from now
- Once survey completed, we draw randomly 2 subjects and 1 question
- 12 months later, each of the selected subjects is paid according to his/her choice for the selected question





# The Experimental Questions

Earnings under investment A												
Rate of inflation	-1% or less (deflation)	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10% or more
Earnings	\$600	\$550	\$500	\$450	\$400	\$350	\$300	\$250	\$200	\$150	\$100	\$50

**Question 1:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$100**.

**Question 2:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$150**.

....

....

**Question 10:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$550**.



# The Experimental Questions

Earnings under investment A												
Rate of inflation	-1% or less (deflation)	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10% or more
Earnings	\$600	\$550	\$500	\$450	\$400	\$350	\$300	\$250	\$200	\$150	\$100	\$50

**Question 1:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$100**.

....

**Question 6:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$350**.

....

**Question 10:** Which one of these two investments do you choose?

- Investment **A**: your earnings are determined by the table above.
- Investment **B**: your earnings are exactly **\$550**.



# Switching Point

- If rational a subject should switch investment at most once from investment A to investment B
- Define “*Switching Point*” as the number of A choices before the subject switch to investment B
- Switching point is only defined for respondents with rationalizable choices



# The investments

- Investment A corresponds to the following scenario:

*“An agent borrows \$5,000 for 12 months at a rate equal to the inflation rate, and invests the \$5,000 for 12 months in an account that earns a fixed annual rate of 11%.”*

- Investment B corresponds to the following scenario:

*“An agent borrows \$5,000 for 12 months at a rate equal to the inflation rate, and invests the \$5,000 for 12 months in an inflation protected account that earns an annual rate equal to the inflation rate plus  $k$  %”*

- A is an affine transformation of B, and A is riskier than B



# Theoretical Predictions

- **Proposition 1:** *If a risk averse agent is indifferent between investment A and investment B, then, all else equal, a more risk averse agent prefers investment B to investment A.*
- **Proposition 2:** *If a risk averse agent is indifferent between investment A and investment B, then the agent prefers investment B to investment A for any increase in risk*



# Numeracy and Financial Literacy Questions

- We ask 6 questions to measure a respondent's numeracy and financial literacy
- *“Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number?”*
- *“If you have \$100 in a savings account, the interest rate is 10% per year and you never withdraw money or interest payments, how much will you have in the account after: one year? two years?”*
- Number of correct answers: 4.5 on average with a median at 5

# Self reported Risk Tolerance

- *“On a scale from 1 to 7, how would you rate your willingness to take risks regarding financial matters? (Note: 1 means “not willing at all” and 7 means “very willing”)”*
- This instrument has been shown to produce meaningful measures of risk attitudes
- Average is 3.3 with a median at 3
- 33% less or equal to 2. 25% greater or equal to 5
- Correlation of 0.822 between the two surveys



# Survey Responses

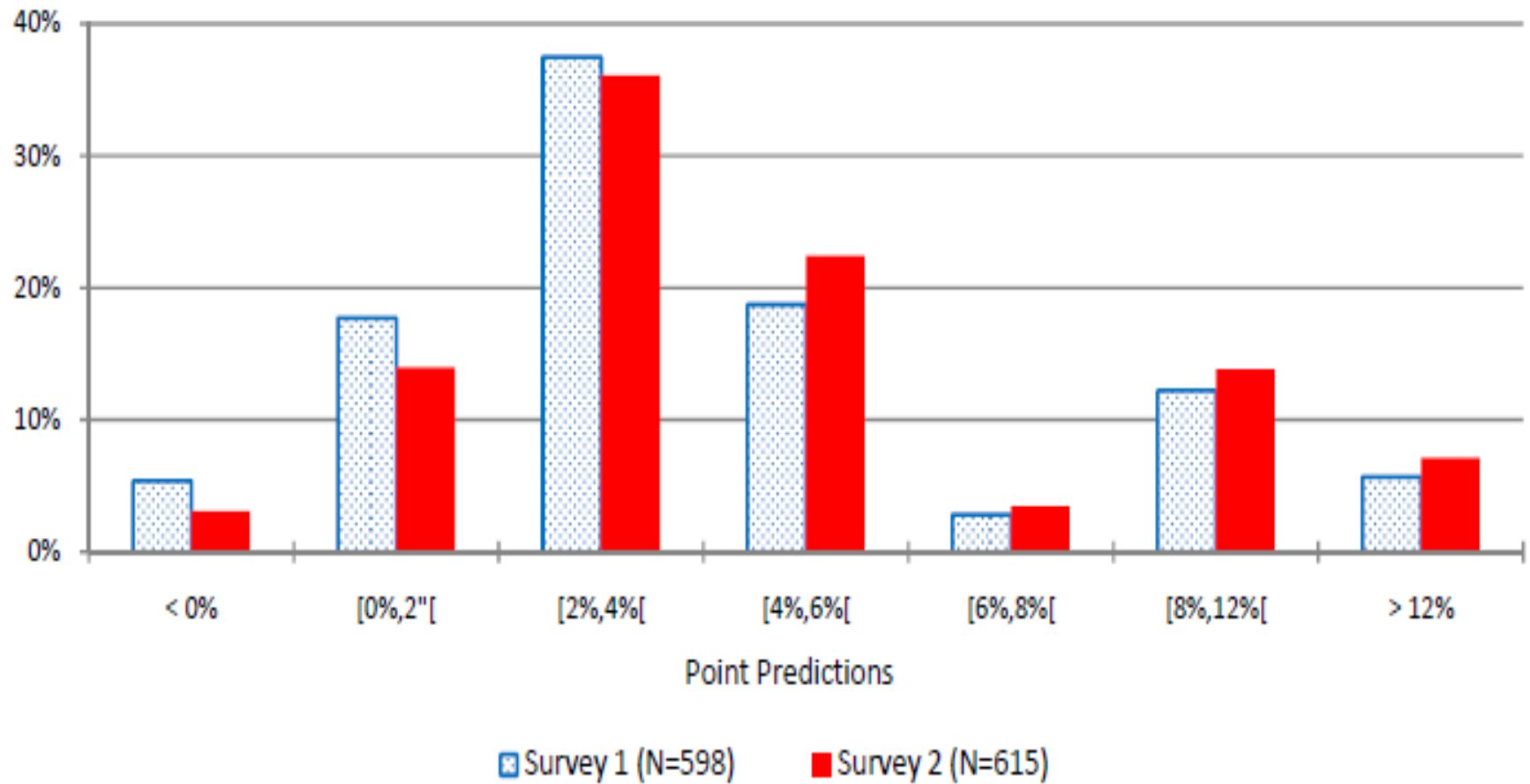
- Out of the 771 respondents we contacted, 745 completed survey 1 and 734 completed survey 2
- 115 respondents (57 in survey 1, 58 in survey 2) with missing data
- Out of the 1,364 remaining respondents, 88.9% (598 in Survey 1 and 615 in survey) made rationalizable experimental decisions
- 502 repeat respondents with rationalizable choices in both surveys



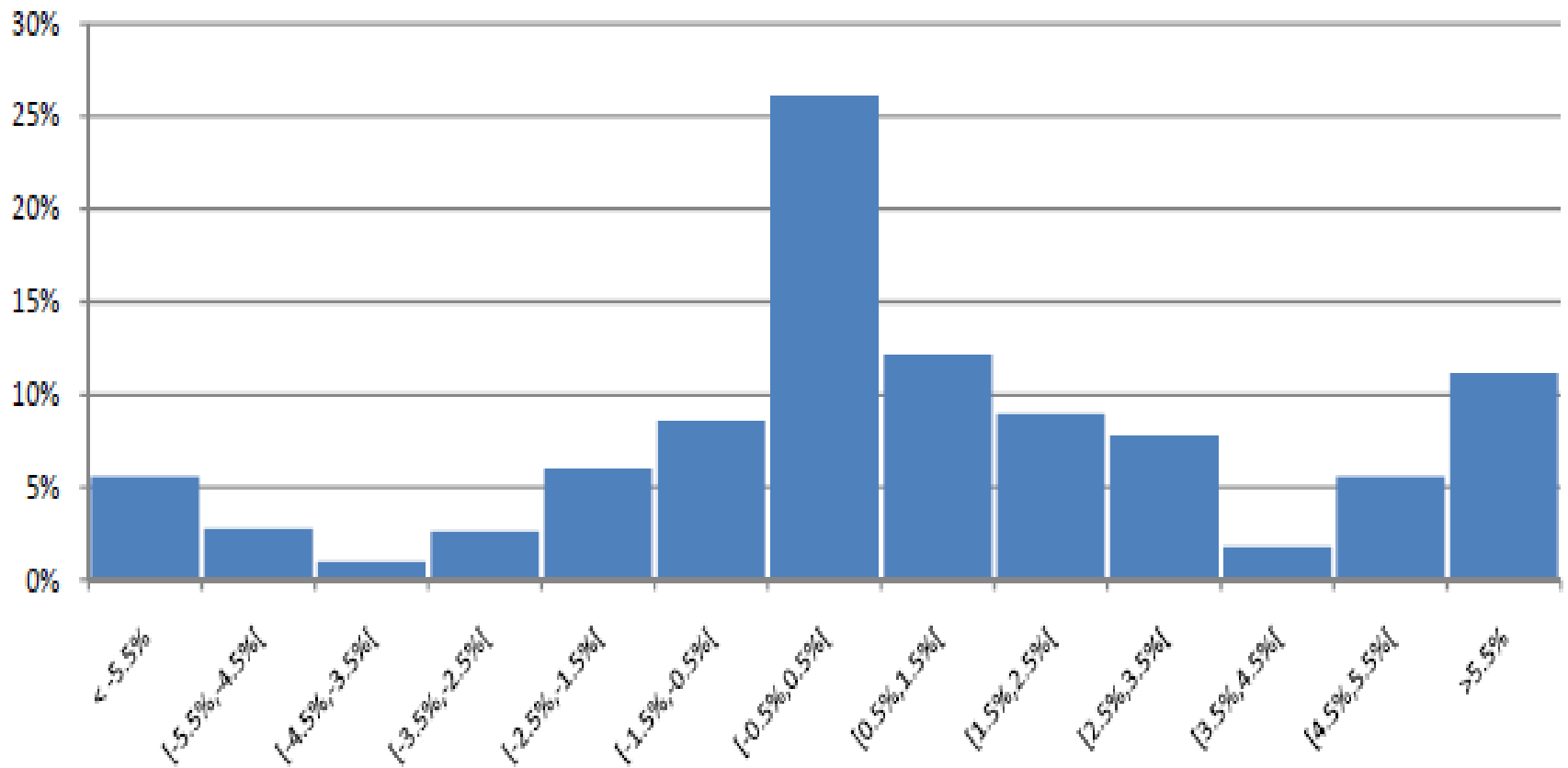
**Table1: Descriptive Statistics**

	All Data	Group 1 Missing Data for Point Prediction or Experiment	Group 2 Non-Rationalizable <sup>b</sup> Experimental Choices	Group 3 Rationalizable Experimental Choices	Group 4 Rationalizable Choices in Both Surveys	Probit <sup>a</sup> Probability to be in Group 4
Age	52.126 (14.049)	51.765 (16.794)	51.291 (13.657)	52.519 (13.736)	52.592 (13.422)	-0.001 (0.001)
Gender (female)	57.3%	73.0%	68.2%	54.4%	52.6%	-0.043 (0.032)
Education: No more than High School	15.1%	17.4%	18.6%	14.0%	12.8%	0.051 (0.048)
Education: More than Bachelor	20.9%	23.5%	13.25%	21.6%	22.5%	0.017 (0.038)
Income greater than \$75k	41.8%	23.5%	29.1%	44.9%	47.4%	0.032 (0.031)
Numeracy and Financial Literacy <sup>c</sup>	4.502 (1.481)	3.3487 (1.692)	3.629 (1.553)	4.746 (1.335)	4.986 (1.234)	0.058 <sup>***</sup> (0.010)
Reported Risk Tolerance <sup>c</sup>	3.335 (1.586)	3.601 (1.823)	3.308 (1.745)	3.368 (1.567)	3.403 (1.548)	0.011 (0.010)
Point prediction	5.382 (6.903)	9.394 <sup>e</sup> (12.842)	8.705 (6.387)	4.777 (3.190)	4.563 (3.167)	—
Number of Observations	1,479 (100%)	115 (7.8%)	151 (10.2%)	1,213 (82.0%)	1,004 (67.9%)	1,479

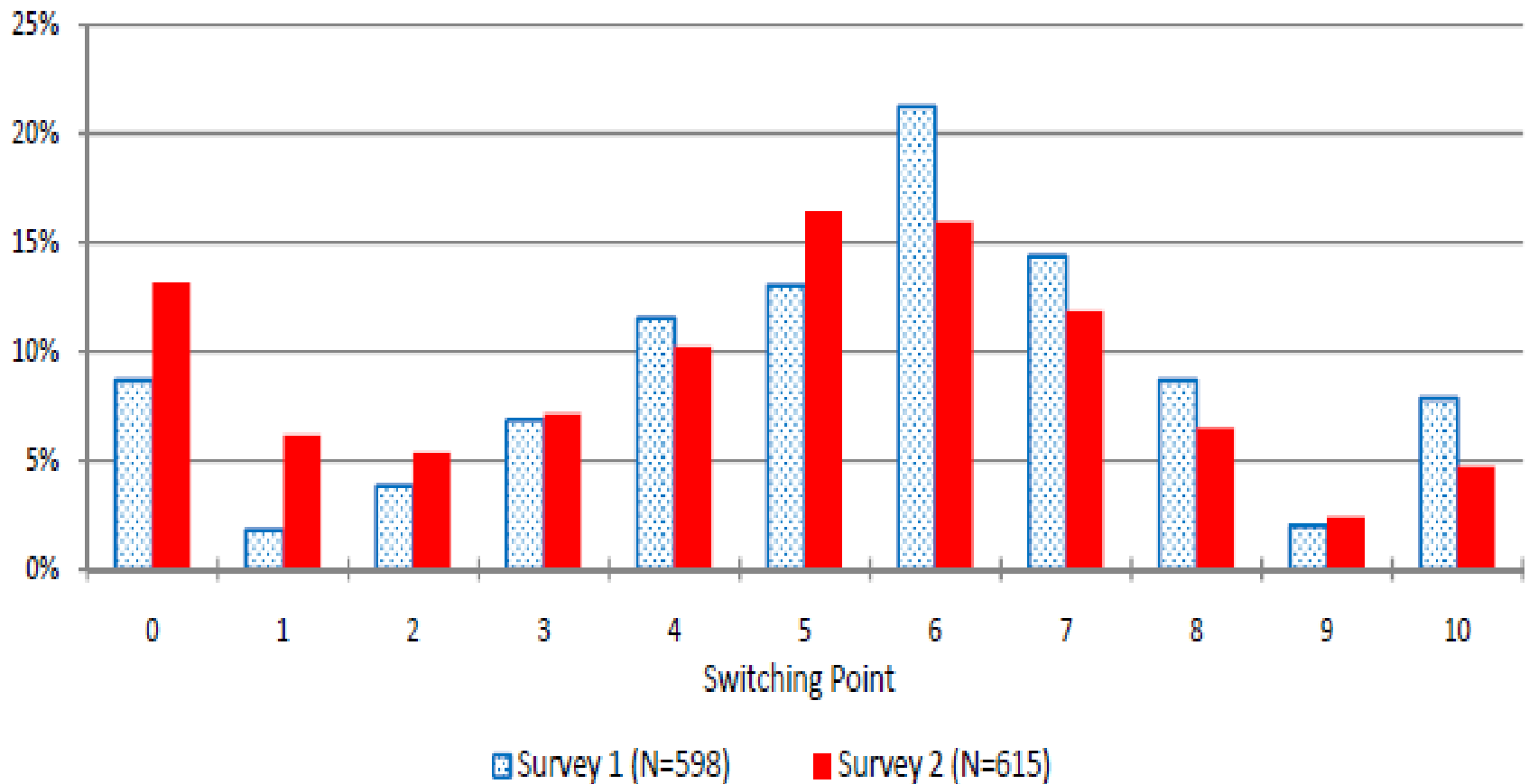
### Figure 1: Distribution of Point Predictions



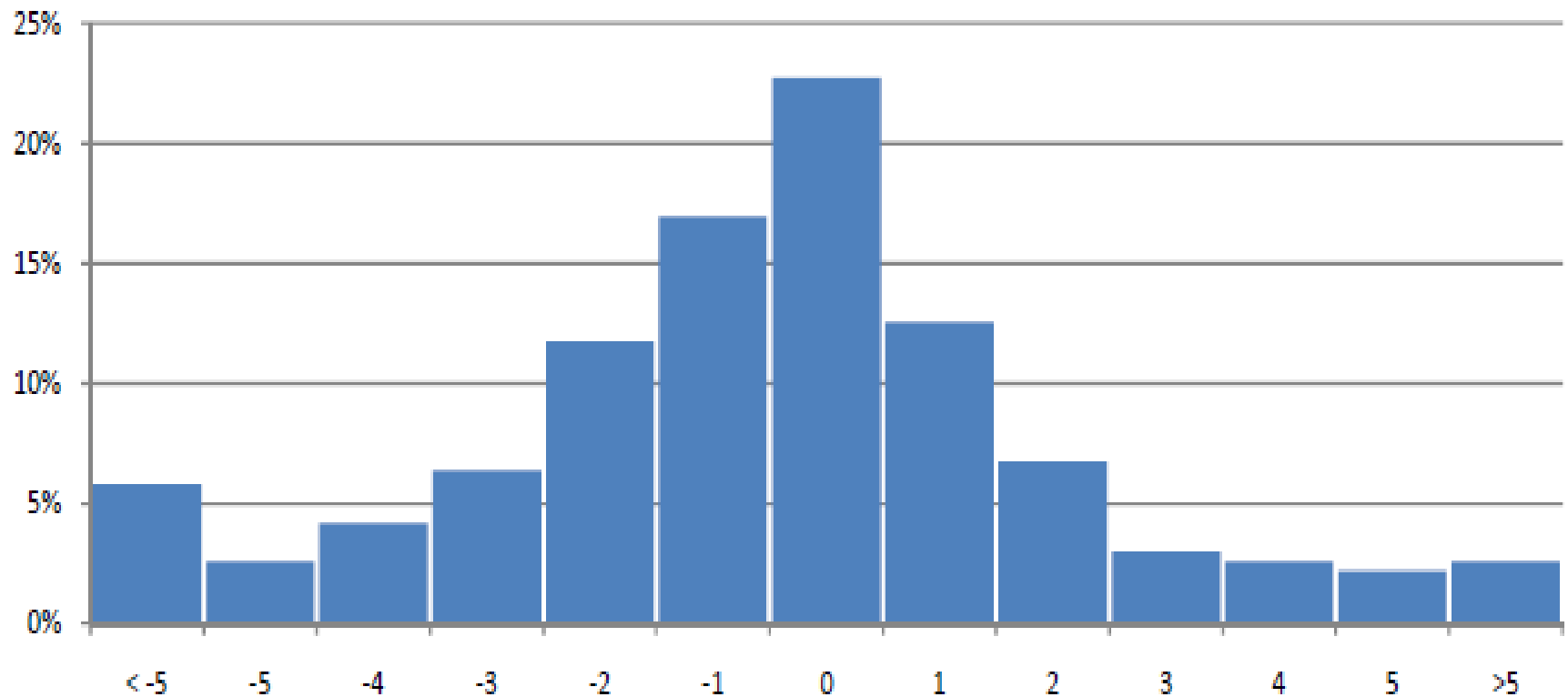
**Figure 2: Distribution of Individual Differences  
in Point Predictions (N=502)**



### Figure 4: Distribution of Switching Points



**Figure 5: Distribution of Individual Differences  
in Switching Points (N=502)**

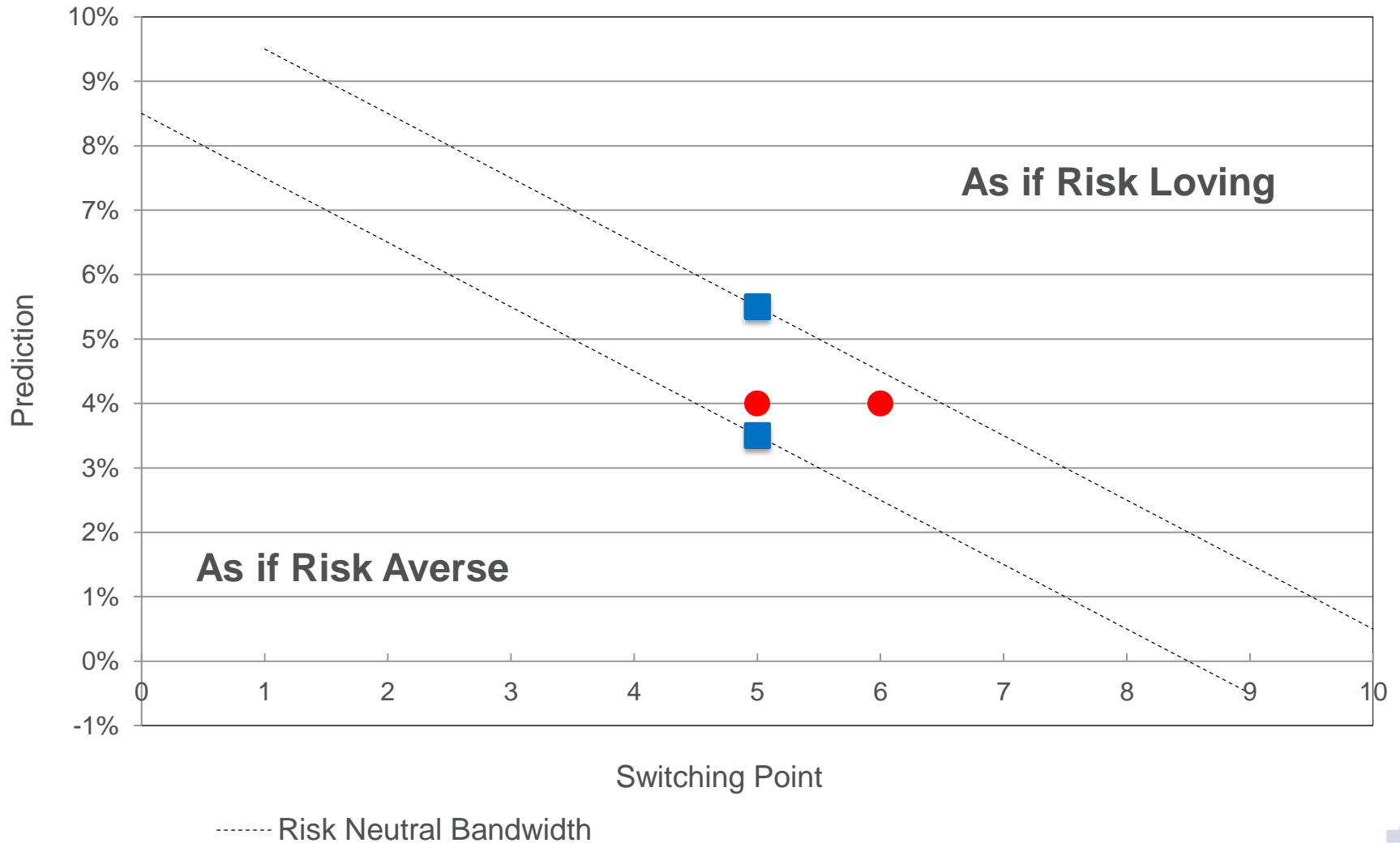


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## Question 1:

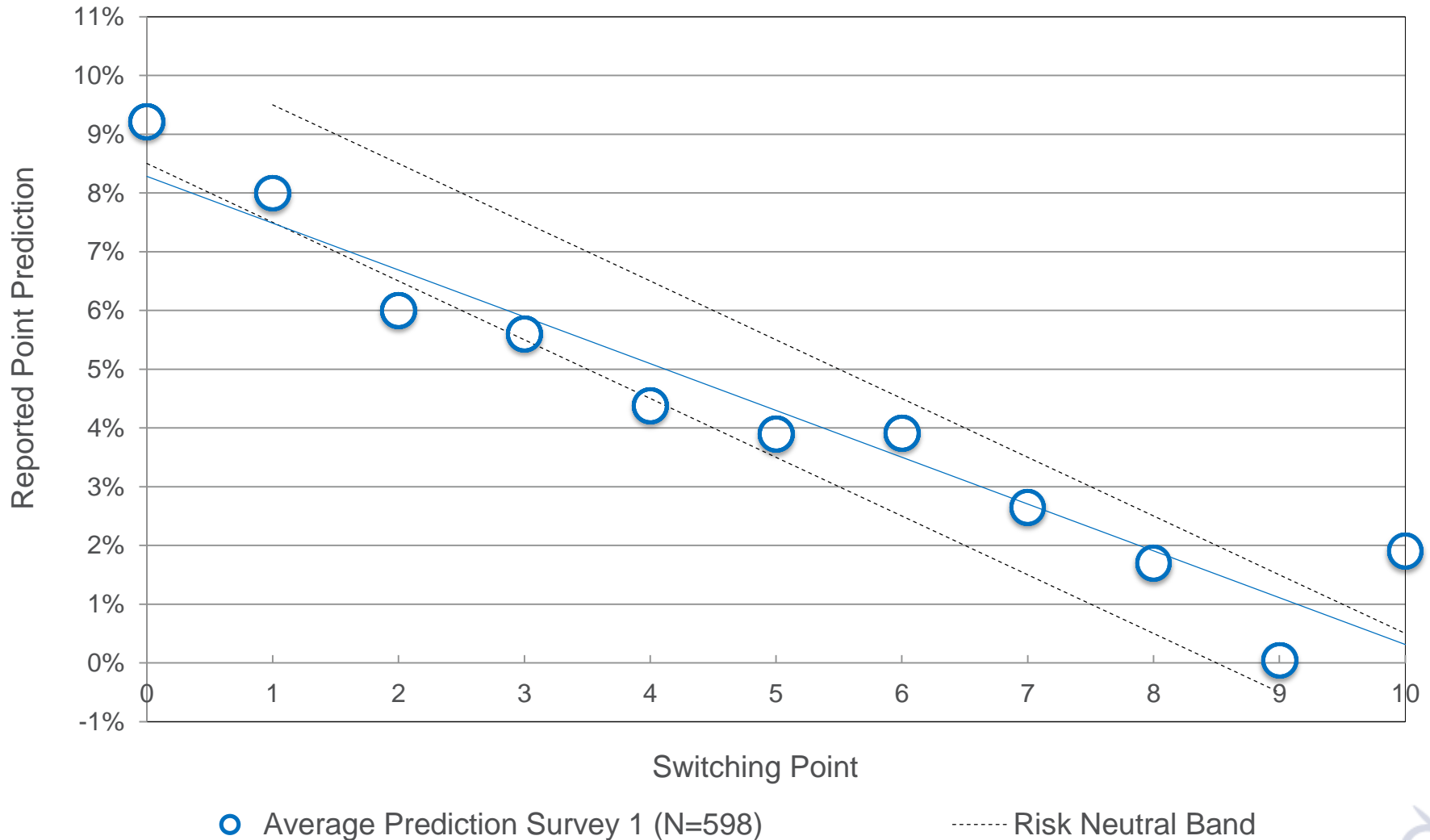
**Are survey responses informative about experimental choices?**

# Choices and Predictions



# Survey 1

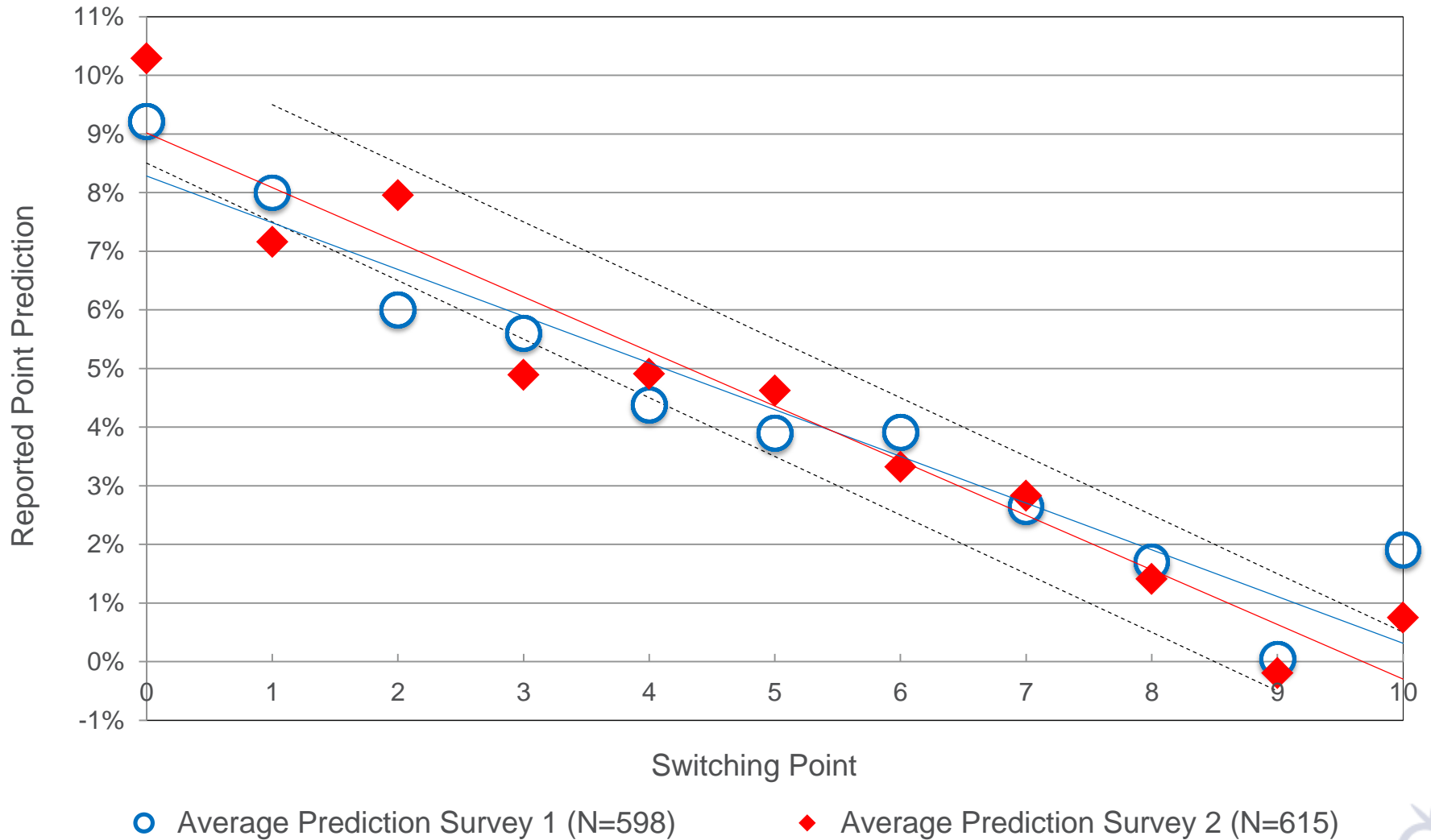
## Choices and Predictions





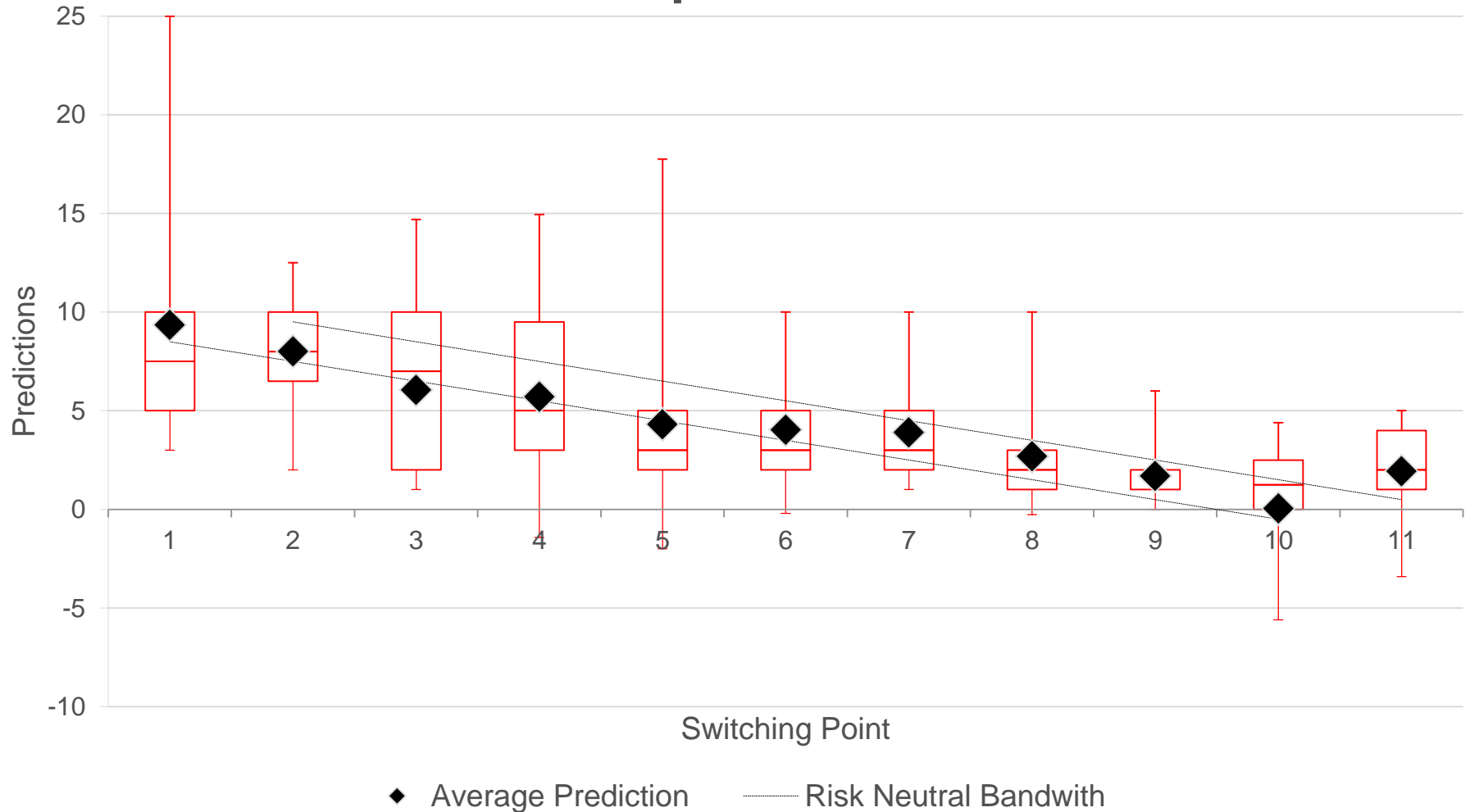
# Survey 2

## Choices and Predictions



# Observed Behavior in Investment Experiment

## Choices and Dispersion of Predictions



# Summary of Result

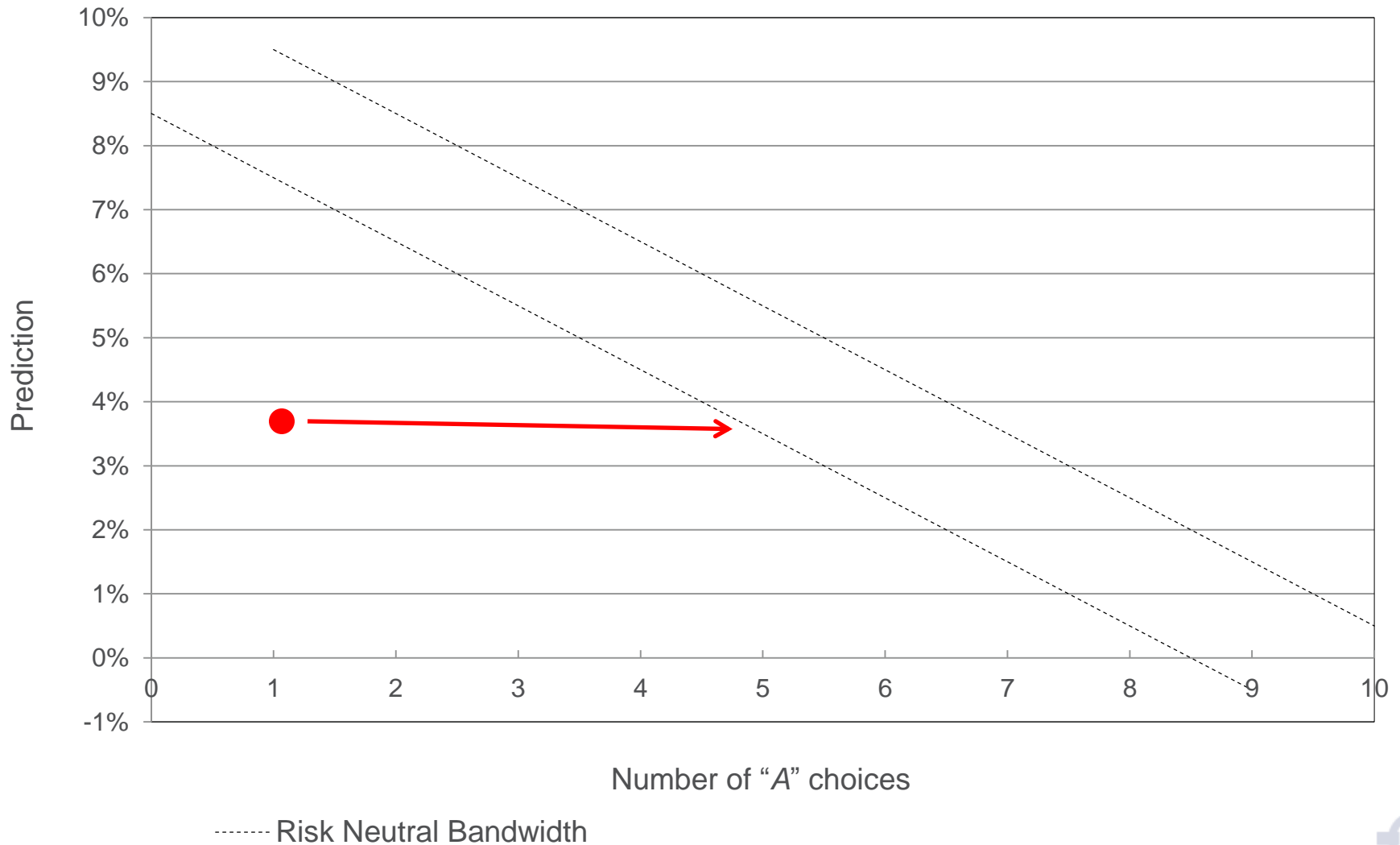
- Inflation expectations is correlated with behavior in experiment.
- Average behavior is consistent with expected payoff maximization
- Substantial heterogeneity in choices

## Distribution of Subjects According to Observed Behavior

As if Risk Averse	As if Risk Neutral	As if Risk Loving
39%	41%	20%

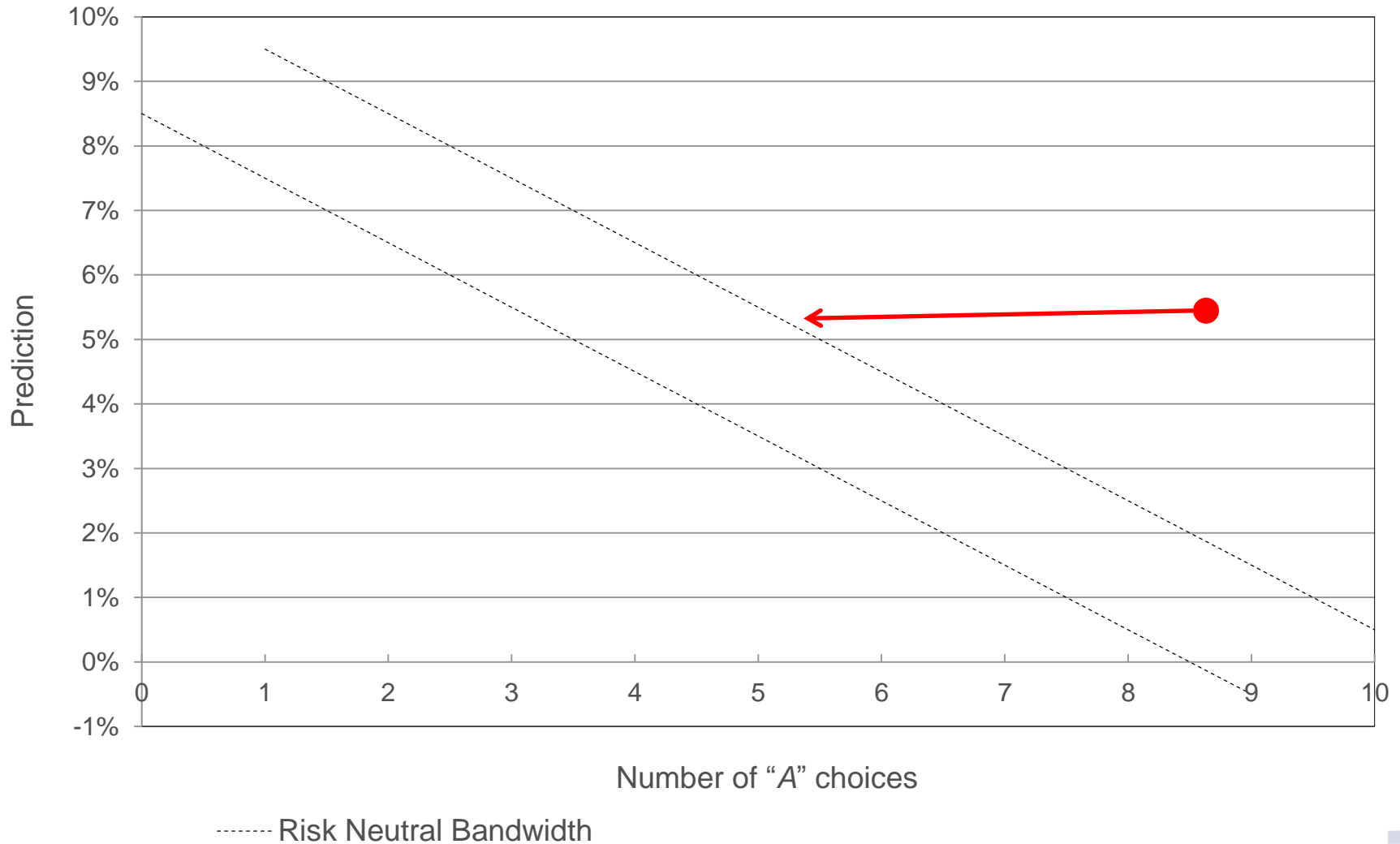
# Deviations from Risk neutrality

## Choices and Predictions



# Deviations from Risk neutrality

## Choices and Predictions



# Deviations from Risk neutrality

- We calculate the deviation from Risk Neutrality for each respondent
- Under expected utility theory deviations from risk neutrality should be explained only by:
  - Risk attitude
  - Investment subjective risk

**Table 4: Deviations from Risk Neutrality Explained by Reported Risk Attitudes?**

Ordered Probit estimations based on the difference between a respondent switching point and her/his “risk neutral switching point.”<sup>a</sup>

	Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>	
	Dependent = Absolute Deviation		Dependent = Deviation when Deviation < 0		Dependent = Deviation when Deviation > 0	
	Survey 1	Survey 2	Survey 1	Survey 2	Survey 1	Survey 2
Reported Risk Attitude <sup>e</sup>	-0.550*** (0.128)	-0.543*** (0.124)	0.258*** (0.056)	0.220*** (0.053)	0.356*** (0.059)	0.217*** (0.059)
Square of Reported Risk Attitude	0.077*** (0.017)	0.071*** (0.017)	—	—	—	—
Estimated Variance of Prediction <sup>g</sup>	0.004** (0.002)	0.004*** (0.001)	-0.011*** (0.0042)	-0.003** (0.002)	0.010*** (0.003)	0.008*** (0.003)
Numeracy and Financial Literacy Score <sup>f</sup>	-0.146*** (0.036)	-0.118*** (0.033)	0.234*** (0.059)	0.191*** (0.054)	-0.175*** (0.068)	-0.239*** (0.067)
Log of Time Taken to Complete the Survey	0.075*** (0.024)	-0.070*** (0.020)	-0.097** (0.036)	-0.064** (0.031)	0.087* (0.048)	0.091** (0.041)
Gender (female)	0.043 (0.091)	0.007 (0.093)	0.206 (0.148)	-0.071 (0.152)	-0.014 (0.184)	0.236 (0.206)
Age	-0.001 (0.003)	0.004 (0.003)	0.001 (0.006)	0.006 (0.006)	0.005 (0.007)	0.011 (0.007)
Income greater than \$75k	-0.125 (0.092)	-0.048 (0.092)	0.185 (0.149)	0.306** (0.152)	-0.131 (0.184)	-0.106 (0.205)
Education: No More than High School	0.535*** (0.128)	0.591*** (0.129)	-0.467** (0.218)	-0.666*** (0.203)	0.820** (0.042)	0.950*** (0.244)
Education: More than Bachelor	-0.273** (0.112)	-0.350*** (0.116)	0.463** (0.187)	0.487** (0.198)	-0.575** (0.257)	-0.831*** (0.287)

**Table 4: Deviations from Risk Neutrality Explained by Reported Risk Attitudes?**

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Log of Time Taken to Complete the Survey	0.075 <sup>***</sup> (0.024)	-0.070 <sup>***</sup> (0.020)	-0.097 <sup>**</sup> (0.036)	-0.064 <sup>**</sup> (0.031)	0.087 <sup>*</sup> (0.048)	0.091 <sup>**</sup> (0.041)
Gender (female)	0.043 (0.091)	0.007 (0.093)	0.206 (0.148)	-0.071 (0.152)	-0.014 (0.184)	0.236 (0.206)
Age	-0.001 (0.003)	0.004 (0.003)	0.001 (0.006)	0.006 (0.006)	0.005 (0.007)	0.011 (0.007)
Income greater than \$75k	-0.125 (0.092)	-0.048 (0.092)	0.185 (0.149)	0.306 <sup>**</sup> (0.152)	-0.131 (0.184)	-0.106 (0.205)
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# Summary of Result

- Consistent with EU, deviations from Risk Neutrality seem to be explained in large part by risk aversion and inflation uncertainty
- Other variables have explanatory power:
  - Financial literacy and numeracy
  - Education
  - Time taken to complete survey



# Exploiting the panel

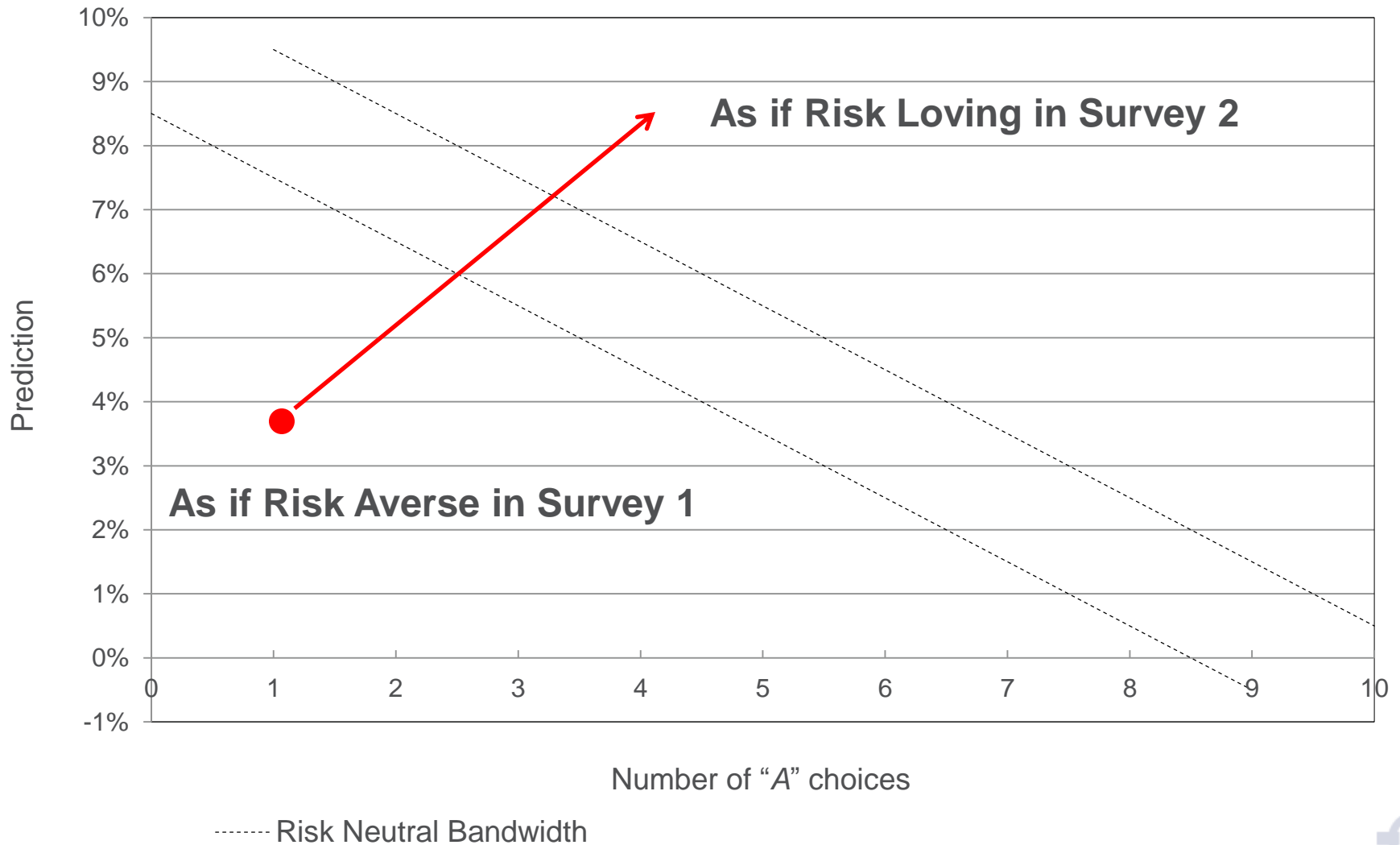
## Question 2:

Is the direction of the changes in predictions and choices between survey 1 and 2 consistent with theory?



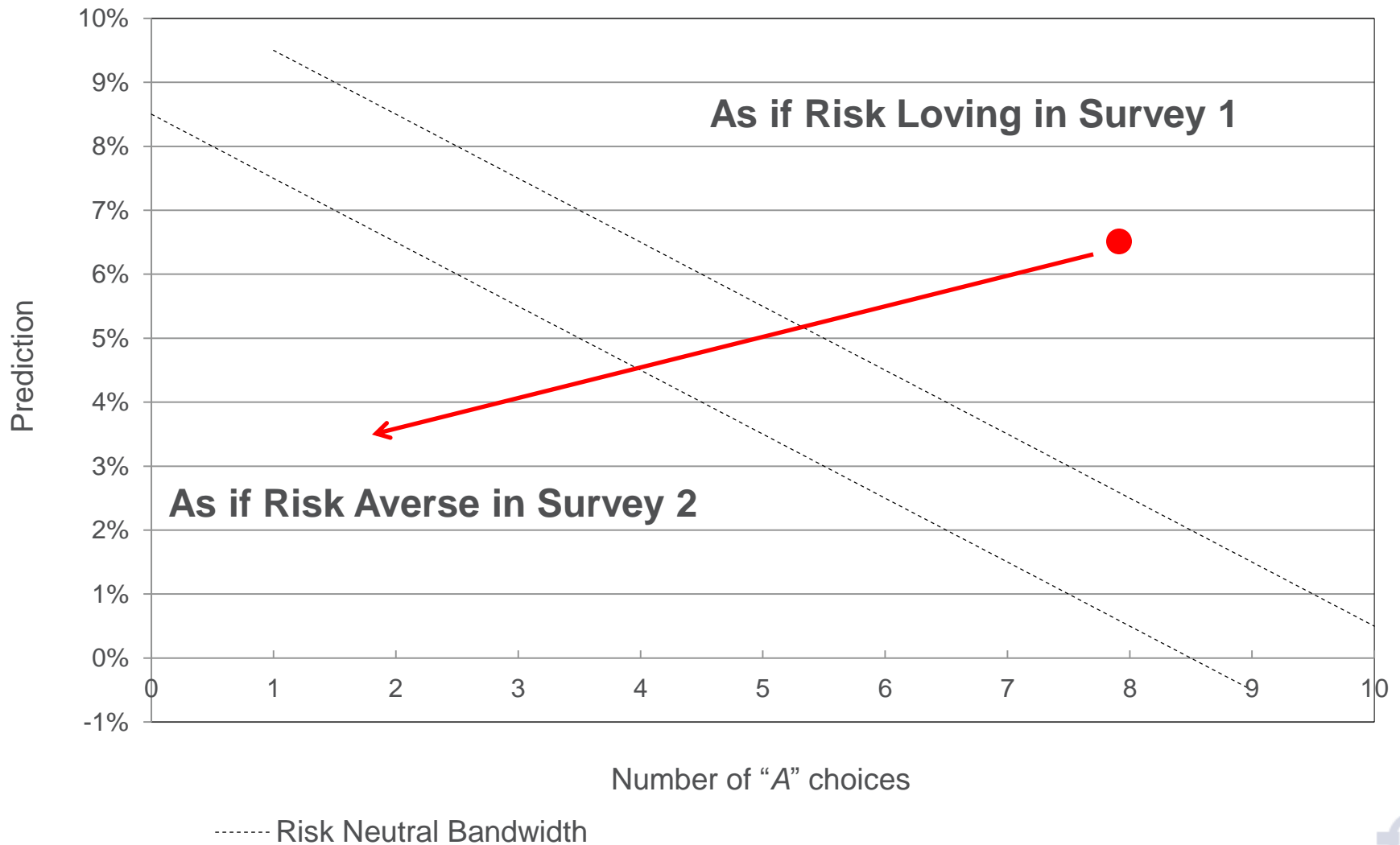
# Changes in Revealed Risk Attitude

## Choices and Predictions

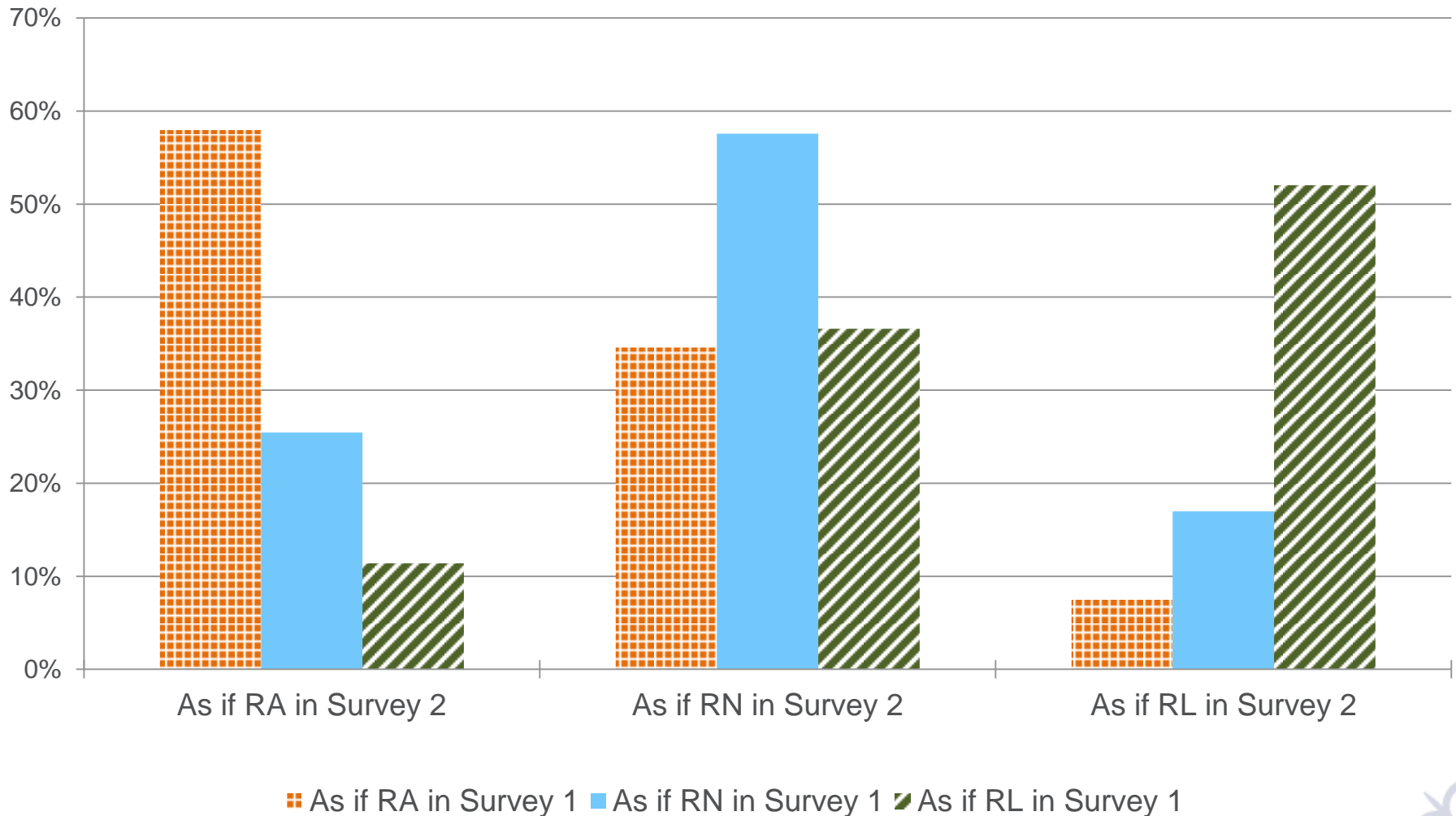


# Changes in Revealed Risk Attitude

## Choices and Predictions



## Distribution of Revealed Risk Attitude in each Survey (N=502)



**Table 5: Are Changes in Predictions and Changes in Switching Point across Survey Consistent with Theory? <sup>a</sup>**

	Model 1 <sup>a</sup> Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Model 2 <sup>b</sup> Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Model 3 <sup>d</sup> Ordered Probit Dependent = Absolute value of Adjustment Precision
Absolute Difference in Reported Risk Attitude across Surveys <sup>e</sup>	-0.009 (0.0014)	0.032 (0.022)	-0.027 (0.060)
Absolute Difference in Estimated Variance of Prediction across Surveys <sup>g</sup>	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Numeracy and Financial Literacy Score <sup>f</sup>	-0.048*** (0.014)	-0.054*** (0.014)	-0.153*** (0.042)
Log of Total Time Taken to Complete the both Surveys	0.013*** (0.005)	0.027*** (0.007)	0.054*** (0.021)
Gender (female)	0.026 (0.024)	-0.062 (0.073)	0.089 (0.100)
Age	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.004)
Income greater than \$75k	-0.009 (0.025)	-0.054 (0.036)	-0.203** (0.101)
Education: No More than High School	0.153*** (0.060)	0.150*** (0.064)	0.722*** (0.148)
Education: More than Bachelor	-0.052 (0.027)	-0.096** (0.038)	-0.353*** (0.125)
“Prices” * “Increasing”	-0.026 (0.021)	-0.054 (0.047)	-0.146 (0.144)
“Prices” * “Decreasing”	0.025 (0.032)	-0.035 (0.049)	-0.098 (0.141)
“Inflation” * “Decreasing”	-0.028 (0.035)	-0.020 (0.048)	-0.105 (0.137)
N	495	495	134
Log Likelihood	-88.5	-222.1	-213.9

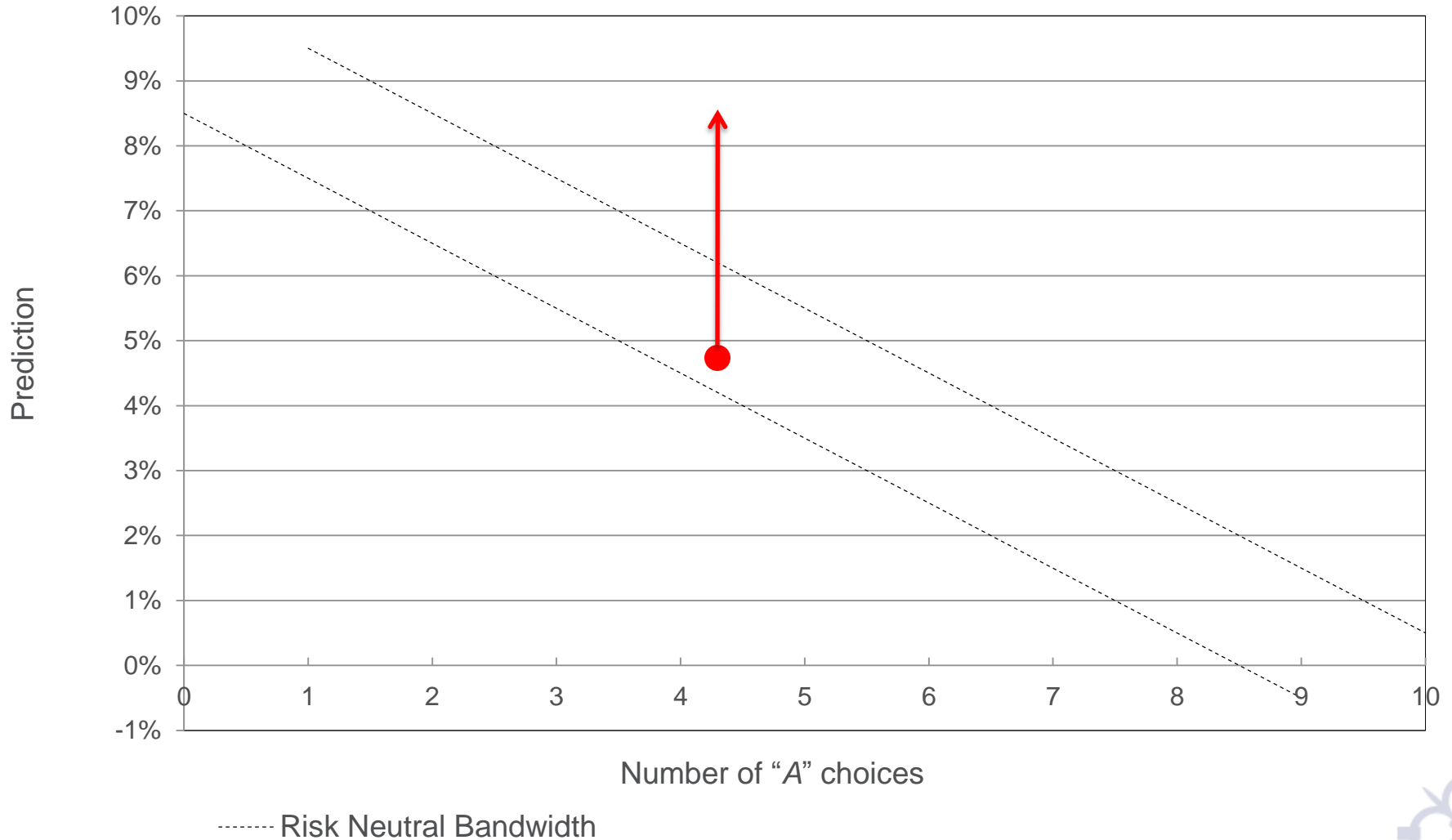
# Changes in Revealed Risk Attitude

- Out of 502 respondents 6.0% have inconsistent revealed risk attitudes.
- Predominantly low education, low numerical and financial literacy.



# Changes in predictions and Switching points

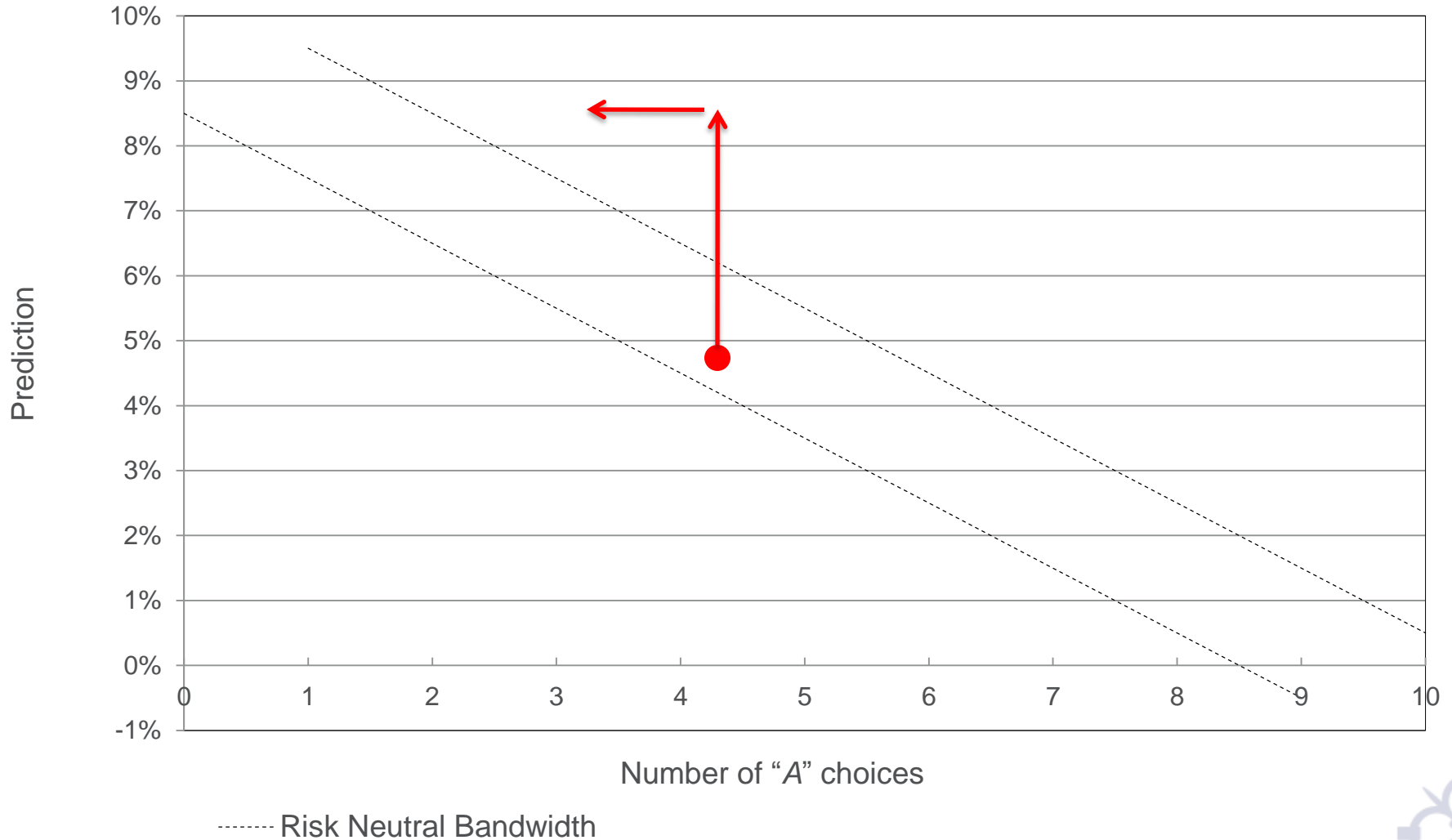
## First order effect





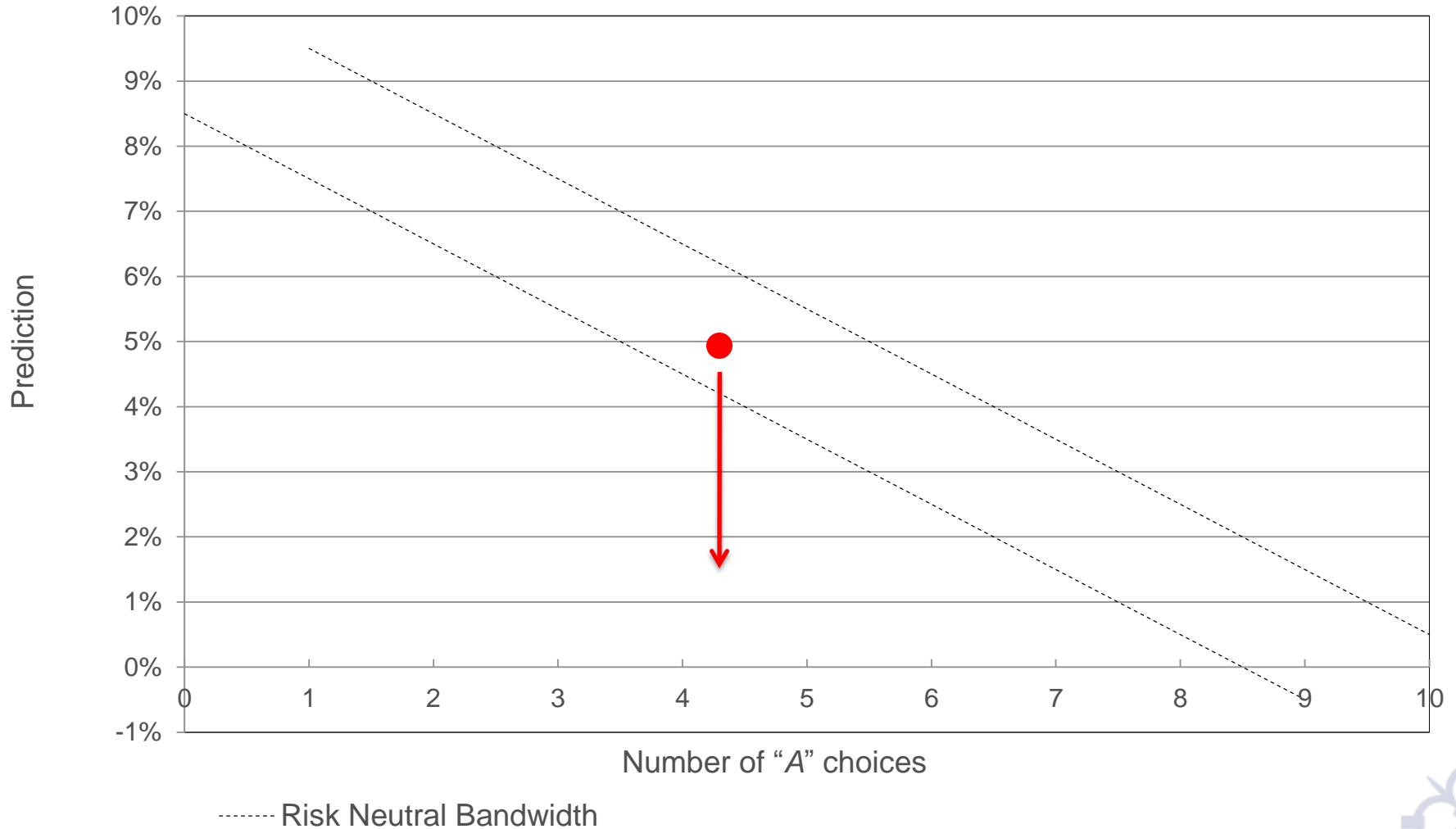
# Changes in predictions and Switching points

## First order effect



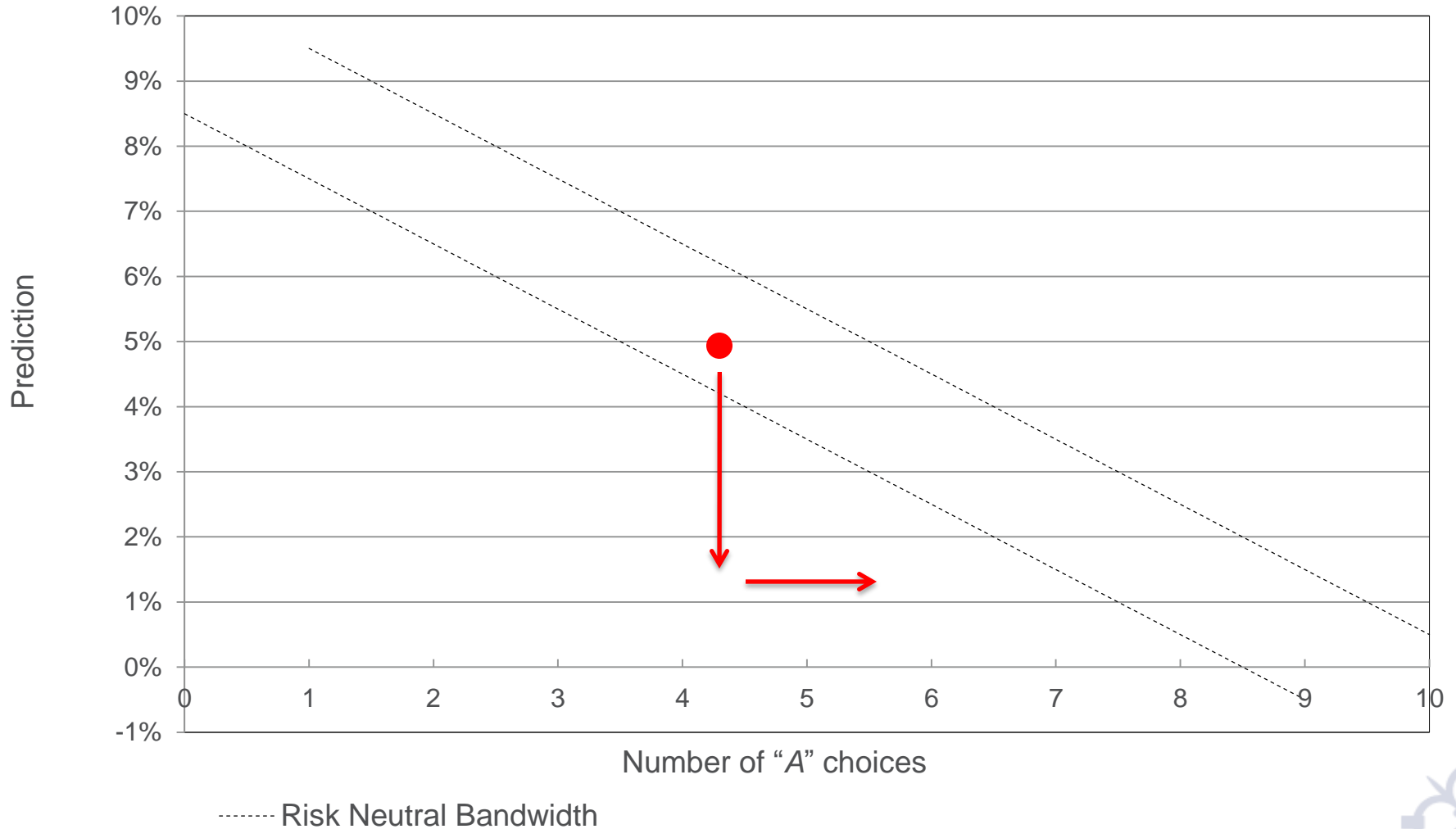
# Changes in predictions and Switching points

## First order effect



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# Changes in predictions and Switching points

## First order effect

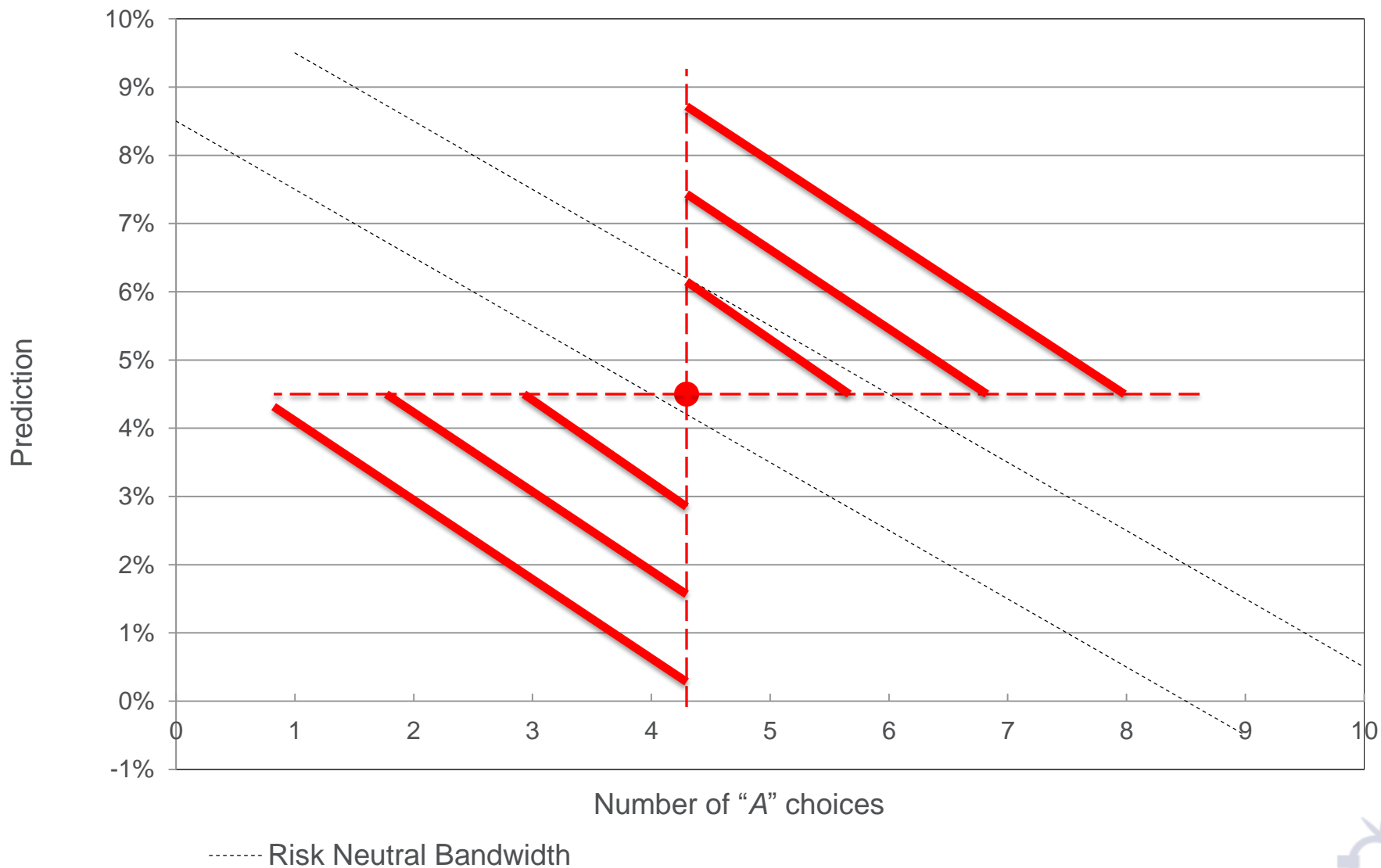
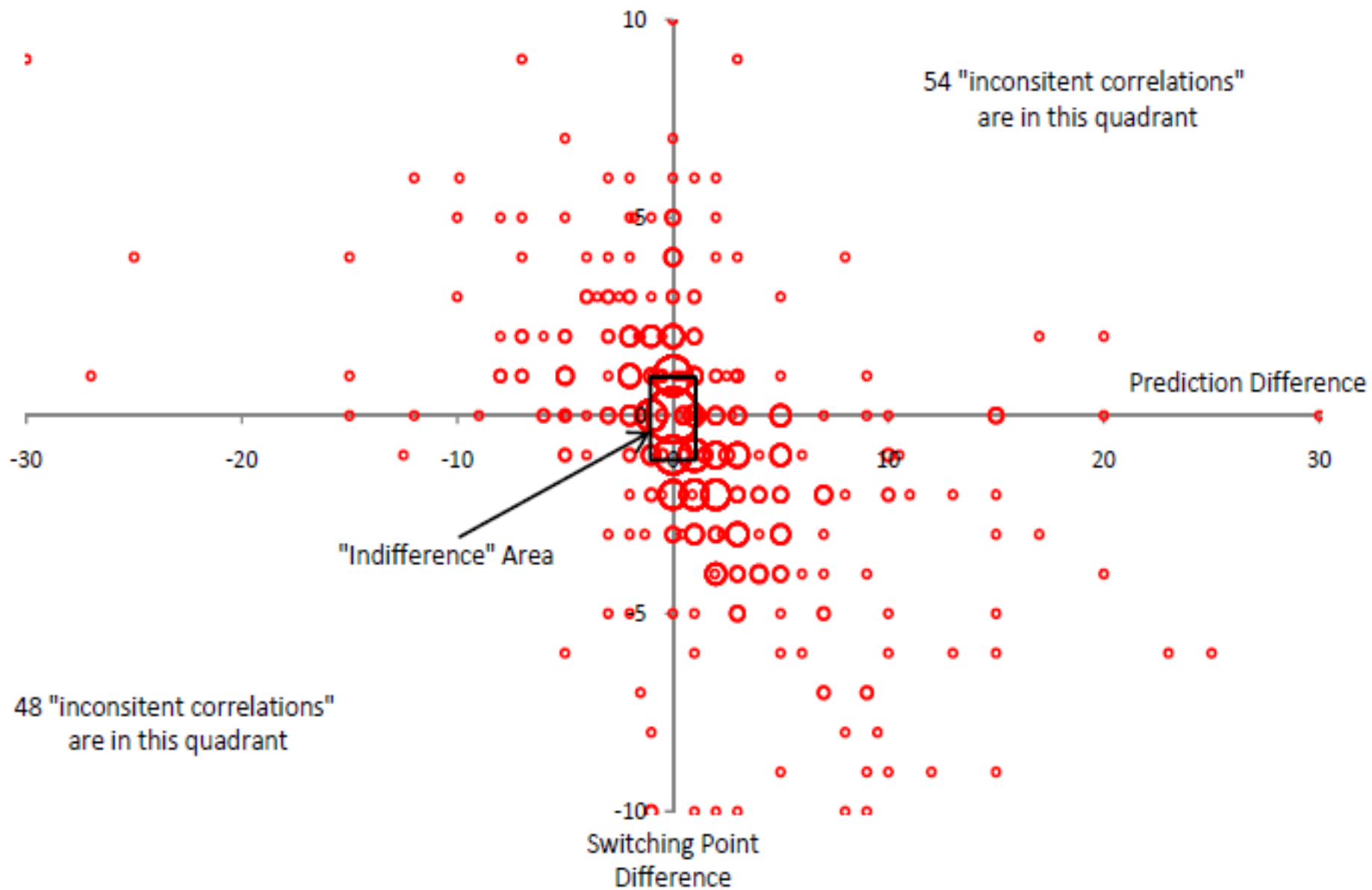


Figure 10: Prediction and Behavior Adjustment (N=502)



**Table 5: Are Changes in Predictions and Changes in Switching Point across Survey Consistent with Theory? <sup>a</sup>**

	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>d</sup>
	Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Ordered Probit Dependent = Absolute value of Adjustment Precision
Absolute Difference in Reported Risk Attitude across Surveys <sup>e</sup>	-0.009 (0.0014)	0.032 (0.022)	-0.027 (0.060)
Absolute Difference in Estimated Variance of Prediction across Surveys <sup>g</sup>	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Numeracy and Financial Literacy Score <sup>f</sup>	-0.048 <sup>***</sup> (0.014)	-0.054 <sup>***</sup> (0.014)	-0.153 <sup>***</sup> (0.042)
Log of Total Time Taken to Complete the both Surveys	0.013 <sup>***</sup> (0.005)	0.027 <sup>***</sup> (0.007)	0.054 <sup>**</sup> (0.021)
Gender (female)	0.026 (0.024)	-0.062 (0.073)	0.089 (0.100)
Age	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.004)
Income greater than \$75k	-0.009 (0.025)	-0.054 (0.036)	-0.203 <sup>**</sup> (0.101)
Education: No More than High School	0.153 <sup>***</sup> (0.060)	0.150 <sup>***</sup> (0.064)	0.722 <sup>***</sup> (0.148)
Education: More than Bachelor	-0.052 (0.027)	-0.096 <sup>**</sup> (0.038)	-0.353 <sup>***</sup> (0.125)
“Prices” * “Increasing”	-0.026 (0.021)	-0.054 (0.047)	-0.146 (0.144)
“Prices” * “Decreasing”	0.025 (0.032)	-0.035 (0.049)	-0.098 (0.141)
“Inflation” * “Decreasing”	-0.028 (0.035)	-0.020 (0.048)	-0.105 (0.137)
N	495	495	134
Log Likelihood	-88.5	-222.1	-213.9

# Inconsistent correlations

- Out of 502 respondents 21.5% have an inconsistent correlation between their change in predictions and their change in switching points
- Predominantly low education, low numerical and financial literacy.

## Question 3:

Is the magnitude of the changes in predictions and choices between survey 1 and 2 consistent with theory?

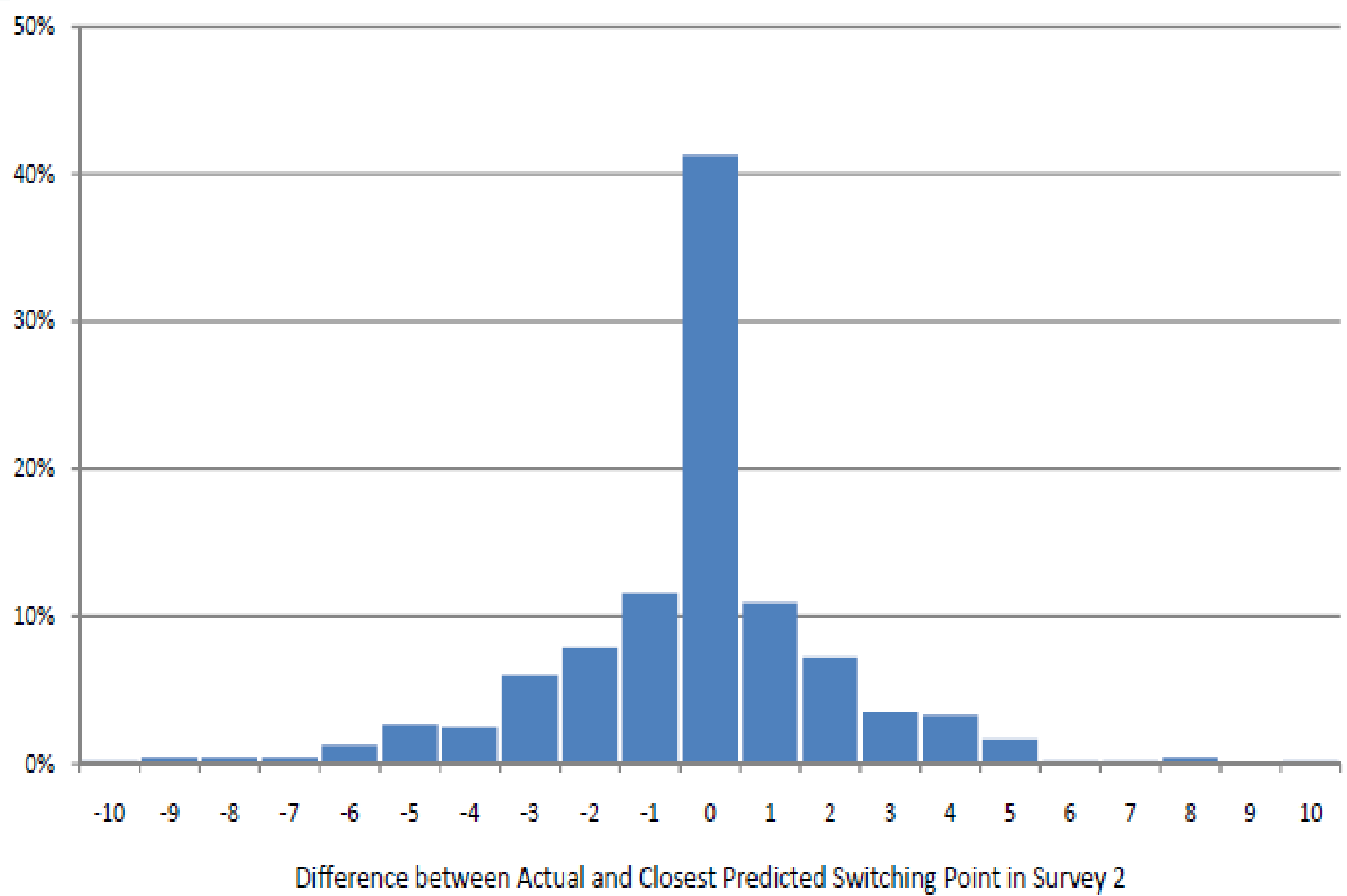




# Methodology

- Assume each respondent has a simple power utility function  $x^\theta$
- Based on respondent's i) elicited probabilistic belief and ii) experimental choice in survey 1, we calculate bounds for  $\theta$  for the respondent
- Based on “estimated”  $\theta$  and respondent's probabilistic belief in survey 2, we calculate the theoretical choice in survey 2
- Compare actual and theoretical choice in survey 2

### Figure 11: Adjustment Precision in Survey 2



**Table 5: Are Changes in Predictions and Changes in Switching Point across Survey Consistent with Theory? <sup>a</sup>**

	Model 1 <sup>a</sup> Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Model 2 <sup>b</sup> Probit (Marginal Effects) Dependent = Inconsistent Revealed Risk Attitude	Model 3 <sup>d</sup> Ordered Probit Dependent = Absolute value of Adjustment Precision
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Log of Total Time Taken to Complete the both Surveys	0.013 <sup>***</sup> (0.005)	0.027 <sup>***</sup> (0.007)	0.054 <sup>**</sup> (0.021)
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Age	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.004)
Income greater than \$75k	-0.009 (0.025)	-0.054 (0.036)	-0.203 <sup>**</sup> (0.101)
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# Findings

- For 41% of respondents the magnitude of the changes between predictions and experimental choices in the 2 surveys is exactly consistent with theory.
- Large differences between theoretical and actual choices are predominantly due to respondents with low education, low numerical and financial literacy.



# Conclusion

- On average, subjects do seem to act on their self reported belief about future inflation
- We find evidence that behavior in the experiment is often consistent (both in direction and magnitude) with expected utility
- Subjects who violate expected utility tend to have lower education and lower numeracy and financial literacy
- By identifying a breakdown of the connection between beliefs and actions, our results suggest a specific channel through which financial literacy affects economic behavior



# Conclusion

- Our results therefore :
  - Confirm that inflation expectations surveys are informative
  - Support micro foundation of modern macro-economic models



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Thank You



# How Consumers Form/Update Expectations (cont)

**The Price is Right: Updating of Inflation Expectations in a randomized price information experiment (with Olivier Armantier, Giorgio Topa, Basit Zafar).** Implemented on RAND's ALP

- Stage 1: Elicit inflation expectations
- Stage 2: the respondent receives one of two information treatments. First ask one of two questions:
  - The “Food treatment”: Over the last twelve months, by how much do you think the average prices of food and beverages in the US have changed?
  - The “SPF Forecast Treatment”: A group of professional economists report their expectations of future inflation on a regular basis. What do you think these professional economists predicted inflation to be over the next twelve months?
- We then randomly provide each group with (i) no information, (ii) latest Food/SPF information
- Stage 3: We re-elicite inflation expectations



# Randomized Information Experiment

Methodology has advantage of being able to infer causal effect of different types of inflation-relevant information on expectation updating, without having to make assumptions about elements of the respondent's information set or updating rules

## Findings:

- Respondents are not fully informed about the objective inflation measures in our information treatments – generally report higher numbers
- Respondents, on average, update sensibly in response to information we provided, indicating relevance of the information
- Updating reflects both the sign and size of the perception gaps
- Findings suggests that high survey inflation forecasts may be due in part to incorrect perceptions about objective measures of inflation. => possible scope for public information campaigns as part of prudent monetary policy

# SCE Findings: Randomized Investment Experiment

## Findings:

- Reported inflation expectations are informative in the sense that the beliefs reported by the respondents are correlated with their choices in the experiment
- Furthermore, most respondents appear to act on their inflation expectations in ways consistent (both in direction and magnitude) with expected utility theory
- Respondents whose behavior cannot be rationalized or whose choices are inconsistent with expected utility theory tend to be less educated and score lower on a numeracy and financial literacy scale
- By identifying a breakdown of the connection between beliefs and actions, our results suggest a specific channel through which financial literacy affects economic behavior

# SCE Findings on: What Consumers Know

**Student Loan Literacy:** To what extent does the American public understand the implications of student loan indebtedness?

We asked 1,029 survey respondents in the SCE:

*What is the likelihood that someone's student debt would be forgiven if they were to file for bankruptcy, on a scale from 1 to 5 (where 1 is "extremely unlikely" and 5 is "extremely likely")?*

Only 37% chose "extremely unlikely"

18% somewhat unlikely



# SCE Findings: Student Loan Literacy

*If a borrower is unable to repay her federal student loan, what steps can the government take to collect the debt?*

- A. Report that the student debt is past due to the credit bureaus.*
- B. Garnish wages until the debt, plus any interest and fees, is repaid.*
- C. Retain tax refunds and Social Security payments until the debt, plus any interest and fees, is repaid.*

41% checked A, 41% checked B, 51% checked C

35% checked none, 38% checked only 1 or 2

- Only 27% correctly chose all three
- Higher for those with student loans, children with student loans, or delinquent student loans – but rate still under 50%

# SCE Findings on: What Consumers Know

## Misconceptions of College Benefits and Costs

We asked SCE respondents about average earnings (at age 40) of current workers with and without college degrees in the population, as well as about the average annual cost of a 4yr Bachelor's degree at a public university. We also asked about future returns for themselves or their children

We find biased beliefs about the population, with the average respondent under-estimating the average benefits, and over-estimating the costs of a college education

- 74% of respondents under-estimate the population relative returns to a college education (which is 1.83).
- 78% among those without a college degree (average RCE of 1.63), 66% with college degree (average RCE of 1.83).
- Higher accuracy among those with higher numeracy



# SCE Findings: Misconceptions on College Returns

- 77% (86%) over-estimate average sticker (net) public university costs
- Among parents with children 6-17, we find strong relationship between beliefs about population RCE and beliefs about SCE for own child
- ... and beliefs about child's RCE is a significant predictor of intended college attendance

This suggests a role for potential information campaigns to inform the public about population RCE

- Misperceptions are larger for more disadvantaged groups, so information may help reduce gaps in college attendance
- Open question on how to best get information in a credible and cost-effective and feasible way to consumers



# SCE Findings on: What Consumers Know

**Inflation Expectations:** Differences by financial literacy/numeracy

*During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now?”. “By about what percent do you expect prices to go [up/down] on the average?”*

Find considerable demographic differences in reported inflation expectations - mostly explained by differences in financial literacy:

- Respondents with lower financial literacy scores report higher and more extreme inflation expectations
- Evidence of differences in expectation formation: They
  - thought more about specific (salient) prices; covering expenses
  - reported higher uncertainty about future inflation, estimates more volatile over time: can lead to upward bias if perceived 0% floor
  - had lower confidence in their financial knowledge and shorter planning horizons



# SCE Findings on: Do Consumers Act on Their Expectations/Knowledge

## Randomized financially incentivized investment experiment:

- In experiment (conducted on ALP), subjects chose between investments whose final payoffs depend on future inflation
- Objective: compare inflation expectations with behavior in experiment

## Experiment

- Consists of 10 questions: In each question, a subject chooses between investment A or B generating a payoff 12 months from now
- 12 months later, two randomly selected individuals are paid according to his/her choice for the selected question
- A rational individual should switch investment at most once from investment A to investment B
  - Define “*Switching Point*” as the number of A choices before the subject switch to investment B
  - Switching point only defined for respondents with rationalizable choices



**Figure 3: Histogram of Point Predictions for each Survey Treatment**

