

# **Institutional Ambiguity and Economic Growth: An Experimental Approach**



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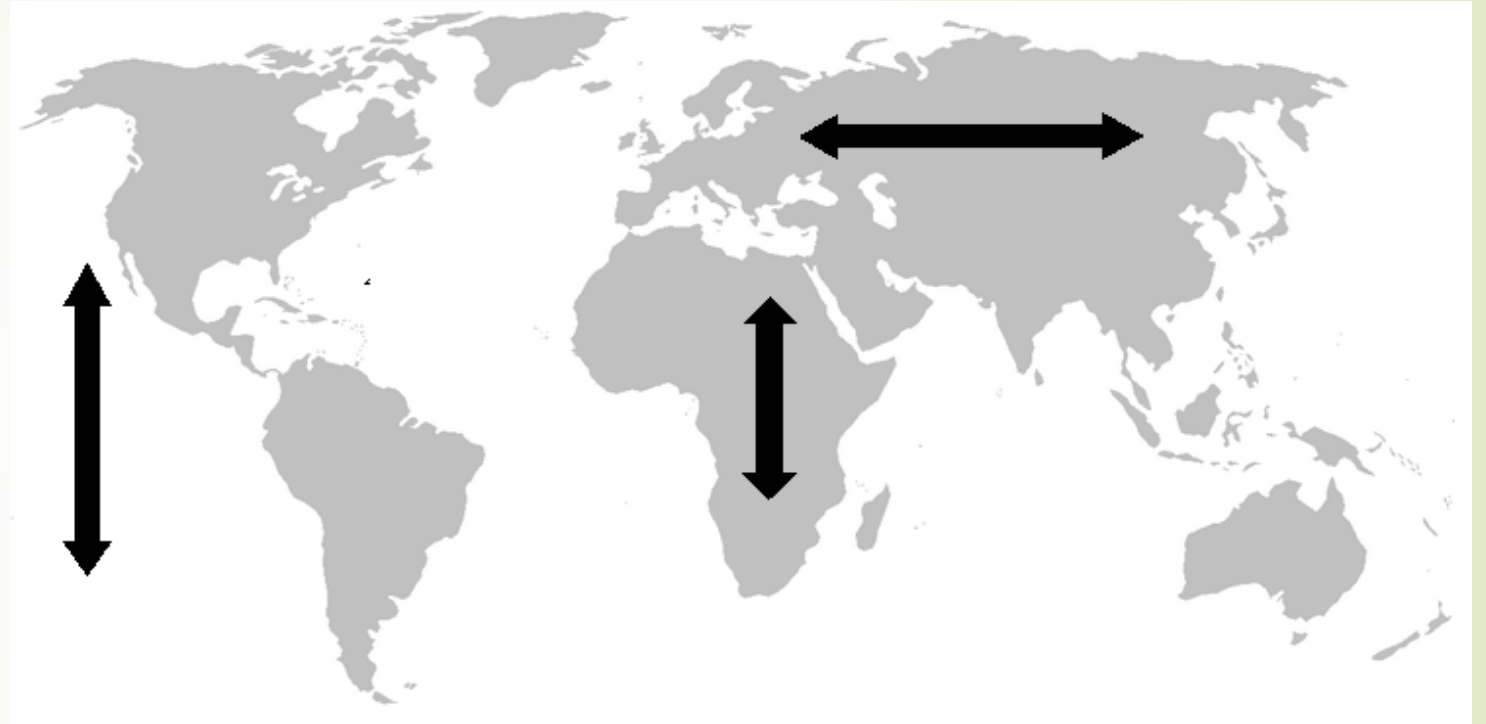
# Agenda

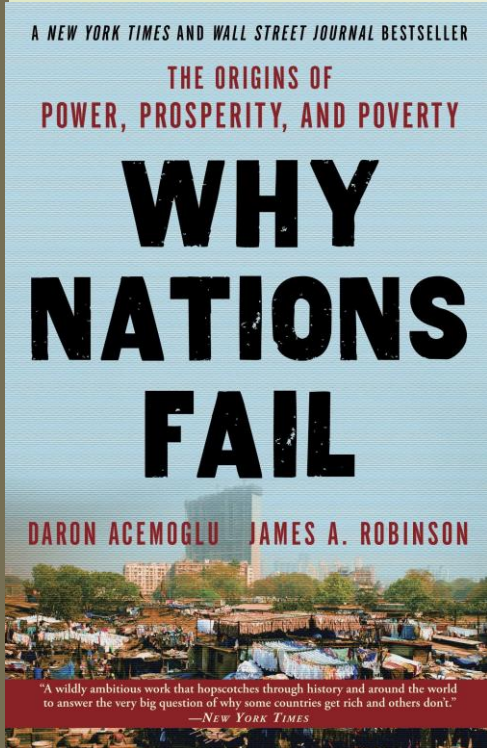


- Motivation for Proposal from Literature
- Proposal
- Experimental Design
- Primary Results
- Robustness Checks
- Implications
- Ideas for Future Work

# Economic Growth Theory: Neoclassical Model & Guns Germs and Steel

- Neoclassical Models do a good job of discussing the interplay of labor, capital, and technology in a theoretical framework
  - But they generally suggest we would see convergence, which we do not
- Jared Diamond, in *Guns, Germs, and Steel* proposes that the underlying geographies of the Eurasian and American continents are what have driven the large wealth divergences we see observe today





# More Compelling: Acemoglu, Robinson and Rodrick

- Acemoglu and Robinson (2012) argue that Diamond fails to explain the many different gaps in wealth between countries and across time
  - Europe and the Americas: Reversal of Fortune
  - The Korean Peninsula post-1960ish
  - Nogales, Mexico versus Nogales, USA
- These differences are attributable to some institutions being inclusive, while others are exclusive, they say.
- Dani Rodrick (2005, 2006) states that “Washington Consensus” policies are not a one-size fits all solution. Rather, policies developed around the local climate that ensure property rights, enforce contracts, and manage debt etc. are effective.

# Ambiguity Aversion

- Originally brought into the literature by Ellsberg (1961)
- Across multiple behavioral experiments: Tractable risk decisions are preferred versus “ambiguous” risk decisions
- Thought experiment with betting on coin flips:





# Proposal

- Economic institutions which negatively affect growth are those that create ambiguous risk environments, those that create tractable risk environments encourage and promote growth. This is driven by the ambiguity effect that microeconomic actors face.
- This proposal does not contradict Acemoglu and Robinson, nor Rodrik
  - Simply provides a higher-order explanation for why their proposals work





# Data Collection Process

- 50 trial surveys deployed to understand survey and Mechanical Turk mechanics etc. It was decided before running these trials that their data would not be used.
- 415 total respondents (all Mturk 'Masters') at the end of multiple "batches"
  - Batch 1: 50 people
  - Batch 2: 150 people
  - Batch 3: 250 people
- Some subjects were dropped due to failing an attention-capturing question (~10)
- Some subjects were dropped due to failure to have unique confirmation codes (~10)
- Some subjects were dropped due to having previously participated in the study (~15)



# Data Overview

- 415 observations
- Treatment Distribution:
  - Treatment 1: AUNA -- 102
  - Treatment 2: AWA -- 109
  - Treatment 3: PLNA -- 104
  - Treatment 4: PLA -- 100
- Bonus Winners (~13%):
  - No-Win: 360
  - Winner: 55



# Question of Interest: Review

Investment Treatment Matrix	Potential Loss (PL)	Always a Winner (AW)
Non-Ambiguous Payout (NA)	PL-NA	AW-NA
Ambiguous Payout (A)	PL-A	AW-A

- 4 treatment options
- All treatment options choosing between \$10.00 guaranteed and some investment with \$11.00 payout in expectation
- ~ 10% of participants have their investment decision carried out.

# Question of Interest: Examples

Please select one of the two payout options below. At the end of the survey, there is a 10% chance that your choice will be carried out. If so, you will receive the payout for the option you have selected as a worker bonus.

Wage Choice - Guaranteed Receipt of \$10.00

Investment Choice - Receipt of \$9.00 with 50 percent probability, receipt of \$13.00 with 50 percent probability

Please select one of the two payout options below. At the end of the survey, there is a 10% chance that your choice will be carried out. If so, you will receive the payout for the option you have selected as a worker bonus.

Wage Choice - Guaranteed Receipt of \$10.00

Investment Choice - Receipt of \$10 with 50% probability, receipt of \$12 with 50% probability

Please select one of the two payout options below. At the end of the survey, there is a 10% chance that your choice will be carried out. If so, you will receive the payout for the option you have selected as a worker bonus.

Wage Choice - Guaranteed Receipt of \$10.00

Investment Choice - Choose to "invest". You should know that the last 20 investment decisions yielded payouts of:

\$9.45, \$10.47, \$8.69, \$10.95, \$10.95, \$11.79, \$11.74, \$11.81, \$10.58, \$11.54, \$12.26, \$12.29, \$8.93, \$12.21, \$11.33, \$11.25, \$11.22, \$8.99, \$11.84, \$8.92

Please select one of the two payout options below. At the end of the survey, there is a 10% chance that your choice will be carried out. If so, you will receive the payout for the option you have selected as a worker bonus.

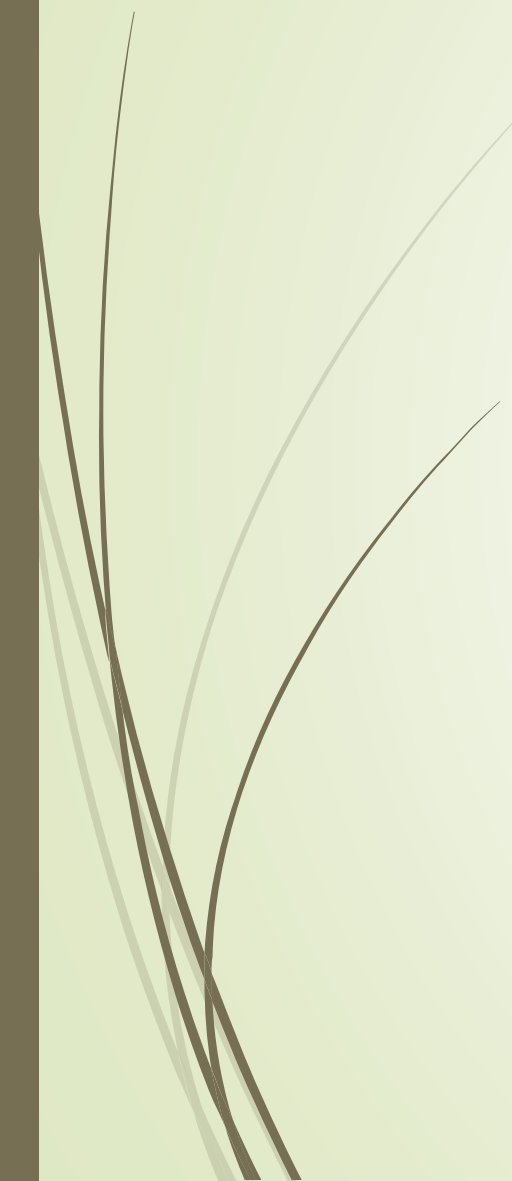
Wage Choice - Guaranteed Receipt of \$10.00

Investment Choice - Choose to "invest". You should know that the last 20 investment decisions yielded payouts of:

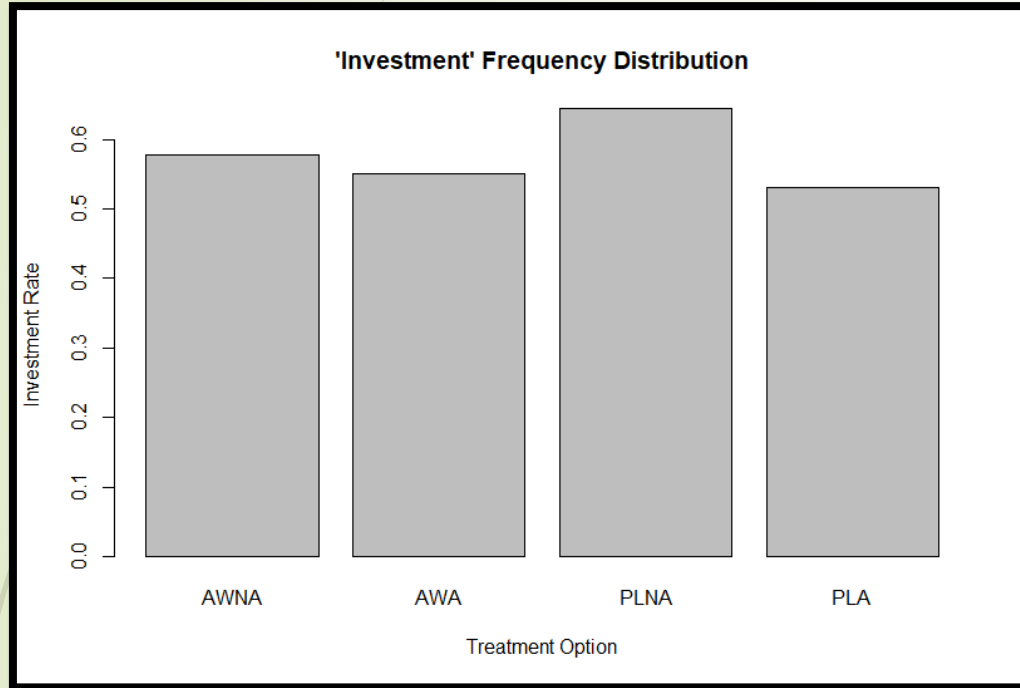
\$11.16, \$10.93, \$10.87, \$11.10, \$11.15, \$10.93, \$11.34, \$11.14, \$10.59, \$10.08, \$10.79, \$11.77, \$11.35, \$10.79, \$10.97, \$11.41, \$11.02, \$10.66, \$11.01, \$11.21



# Hypotheses:

1. Those faced with an ambiguous investment payout would choose to invest at a lower rate than those facing a non-ambiguous investment payout with a similar risk spread.
  2. Those presented with an “Always a Winner” payout for their investment, particularly those with non-ambiguous risk treatments, will choose to invest almost exclusively.
  3. The ‘ambiguity effect’ will be greater when moving within the “Potential Loss” treatments versus the “Always a Winner” treatments.
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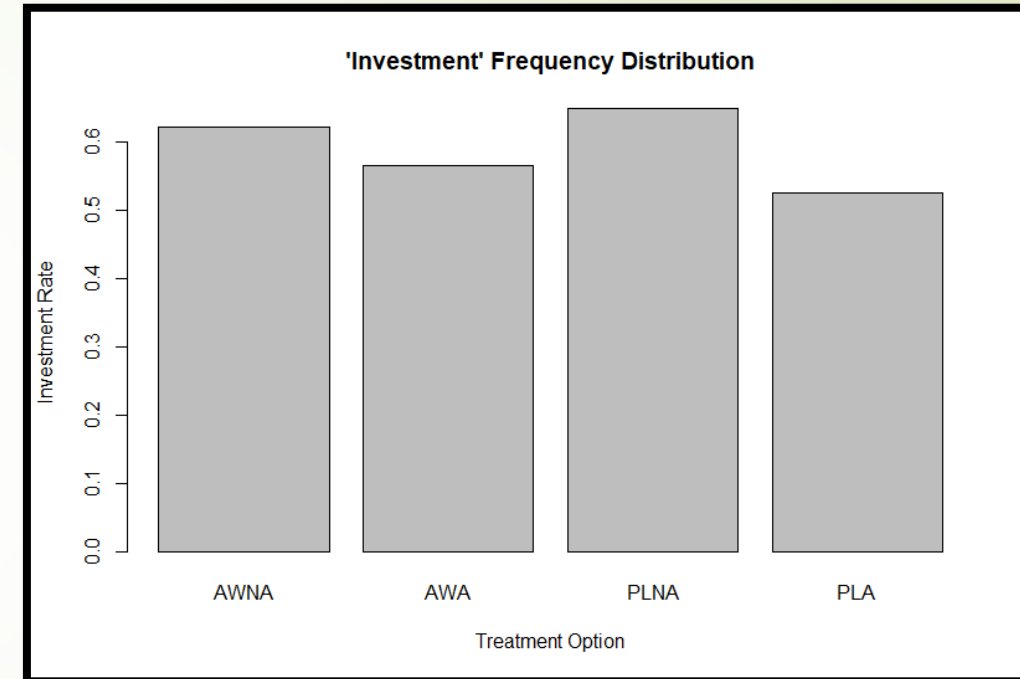
# Question of Interest (QOI): Results



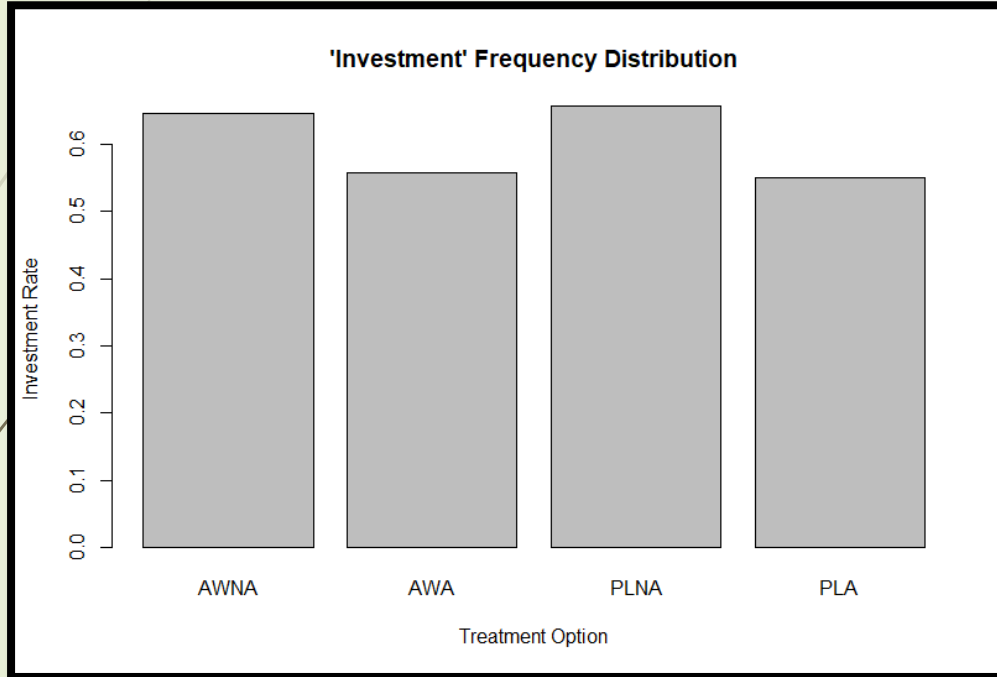
- Using repeated bootstrap samples of choices within treatments PL-NA and PL-A, 10,000 trials result in PL-NA investing at a significantly higher rate (P-Value: 0.0511).
- Significant difference between AW-NA and AW-A and AW-NA and PLA at the 10% level

# Robustness Check I

- Some subjects answered the question of interest extremely quickly. After eliminating all users who answered the QOI in less than 10 seconds (37 observations dropped), we yield:
  - Using repeated bootstrap samples of choices within treatments PL-NA and PL-A, 10,000 trials result in PL-NA investing at a significantly higher rate (P-Value: 0.0455).
  - Significant difference between AW-NA and AW-A, and AW-NA and PL-A, at the 10% and 5% level, respectively.



# Robustness Check II



- Some subjects answered the question of interest extremely quickly. After eliminating all users who answered the QOI in less than 15 seconds (103 observations dropped), we yield:
  - Using repeated bootstrap samples of choices within treatments PL-NA and PL-A, 10,000 trials result in PL-NA investing at a higher rate (P-Value: 0.0986).
  - No significant difference between AW-NA and AW-A, and AW-NA and PL-A.





# Robustness Check III

- Non-ambiguous versus ambiguous affect only, 15 seconds of attention or more
  - Again using the bootstrap, (P-Value: 0.0641).
  - Comparing these 2 groups with the entire data set, results are more statistically significant (P-Value: 0.0189) over 98.11% when the entire data set is used.

# Regression Analysis: Effect of Sex?

## Model:

Complete OLS Linear Regression Model Specification:

$$\gamma = \tau * \text{Treatment} + \beta X + \epsilon$$

$\gamma$  = Probability of Investment

$\tau$  = Treatment Effect Coefficients

$\beta$  = Control Variable Coefficients

$X$  = Control Variables

$\epsilon$  = Error Term

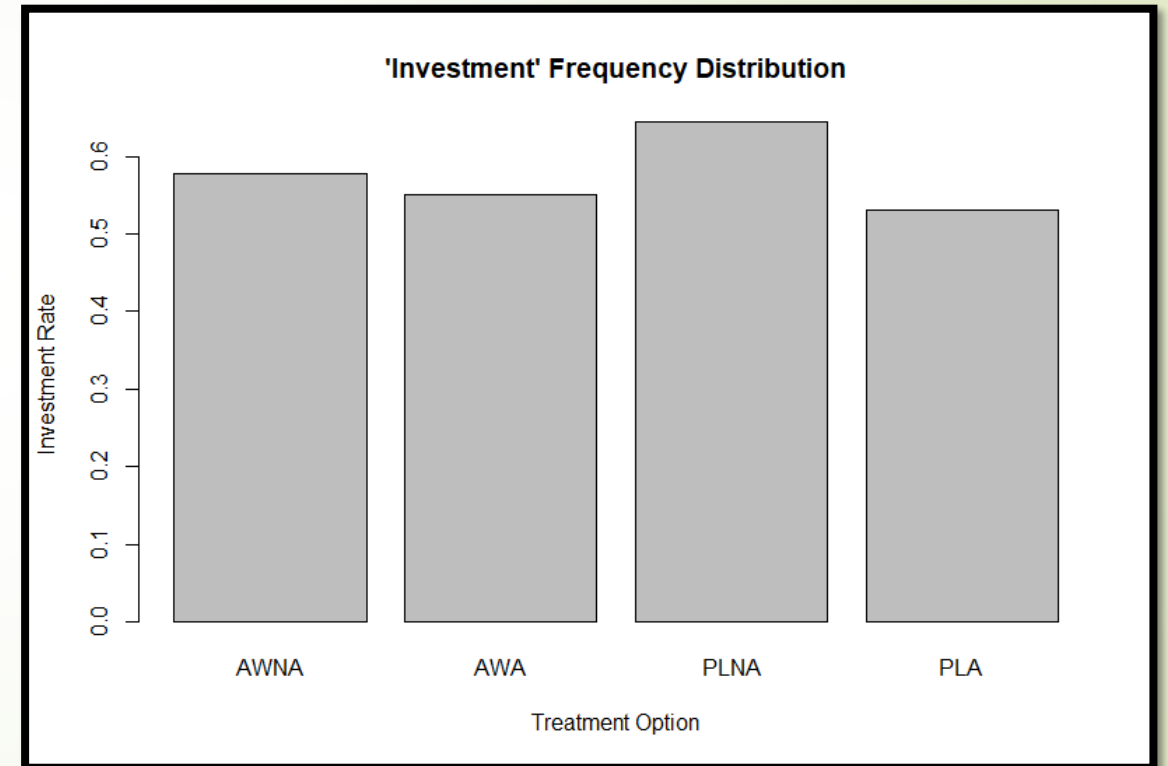
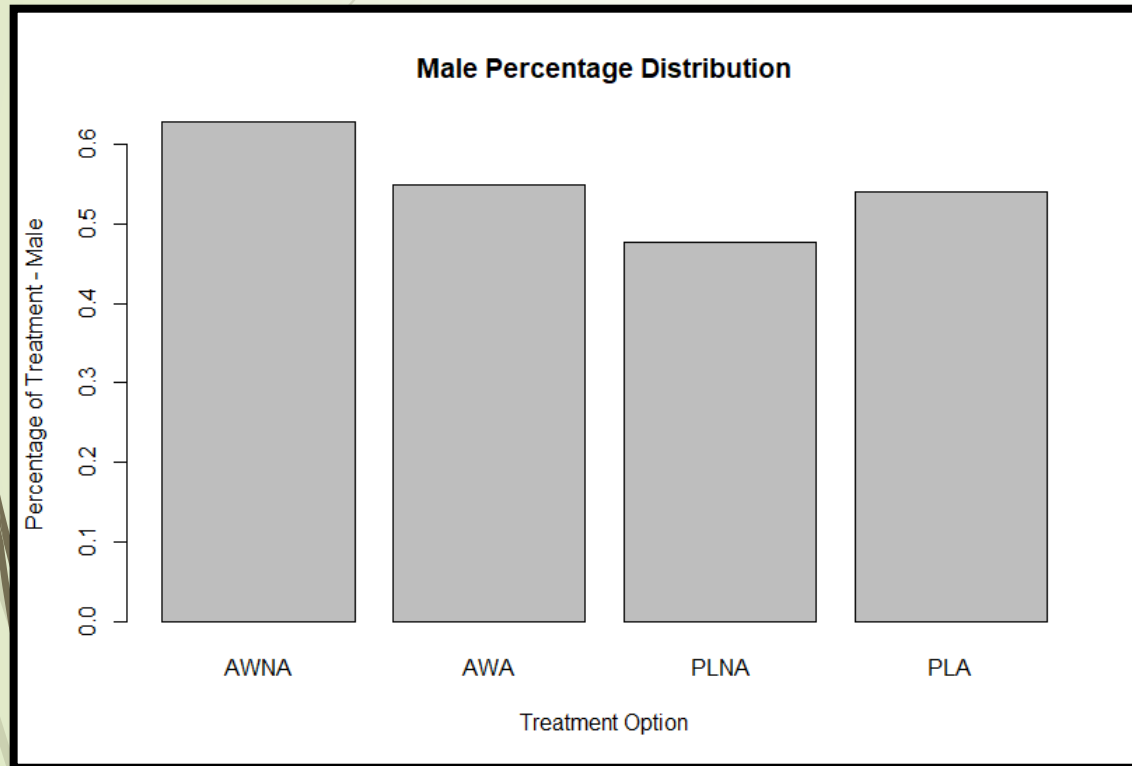
Table 1:

	Investment Rate		
	(1)	(2)	(3)
AW-NA	0.028 (0.068)	0.009 (0.068)	0.001 (0.069)
PL-A	-0.020 (0.069)	-0.029 (0.068)	-0.044 (0.069)
PL-NA	0.094 (0.068)	0.085 (0.067)	0.077 (0.068)
Male		0.128*** (0.049)	0.151*** (0.050)
Constant	0.550*** (0.047)	0.489*** (0.052)	0.353*** (0.105)
Controls	No	No	Yes
Observations	415	415	415
R <sup>2</sup>	0.008	0.024	0.100
Residual Std. Error	0.495 (df = 411)	0.491 (df = 410)	0.484 (df = 389)
F Statistic	1.045 (df = 3; 411)	2.522** (df = 4; 410)	1.731** (df = 25; 389)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

# Gender Discrepancies—A Closer Look





# What is the Story

- When faced with an investment decision, un-tractable uncertainty leads to an aversion to investment at the population level.
  - These results are robust to multiple different specifications
- The subjects in the study made similar identical decisions when they faced the same investment payoffs in expectation whether there was a potential loss or not.
  - The effect is primarily driven by ambiguity aversion alone
- Very interestingly, the subject did not always choose to invest in the “Always a Winner” non-ambiguous case. Adds and augments the results of Gneezy et al 2006.



# What is The Story II

- It is unclear whether subjects behave more or less rationally when making serious investment decisions.
- If there is irrationality outside of the experiment, I suspect effects are less under the current experimental setup than in the real world.
- The ambiguity effect is certainly something for policy makers to consider, all else being equal
  - Another argument for multi-party compromise



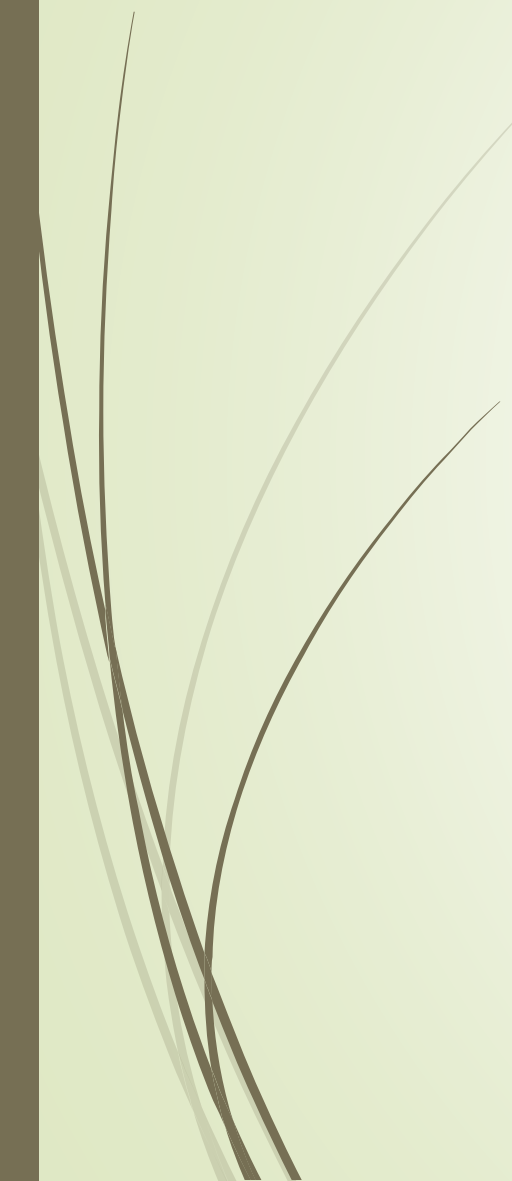
# Suggested Future Work: Study Alterations

- Lab environment replication
- Psychologically higher stakes decision
  - Build stories around the investment/work decision
- Monetarily higher stakes decision
  - Higher payout
  - Larger difference in expectation between investment and payout





# Suggested Future Work: Macro Idea I

- Relatively close congressional elections in the US create more ambiguous economic environments in their run-up
  - It can be unclear which parties win which seats, and by what margin
  - Forecasting policy agendas for the incoming congress can be very difficult
  - Perhaps analyzing stock market performance, comparing S&P 500 gains from 3 months pre to 3 months post election would discern an ambiguity effect on stock markets
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## Suggested Future Work: Macro Idea II

- Trying to forecast the economic repercussions of Brexit on the UK business environment has been quite difficult
- Analyze in 5-10 years if a portion of the UK's relative economic weakness is not explained by exiting the EU trade union, and rather due to ambiguity in the run up to actually executing Brexit