Tax Audits as Scarecrows

Evidence from a Field Experiment

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UDESA, July 2021

Introduction

- Research question: How do tax audits affect tax evasion?
- Allingham–Sandmo (1972): firms respond to audits rationally.
  - Hereon: A&S.
  - Intuition: cost-benefit analysis (Becker, 1968).
  - Workhorse model in PF.

The Calibration Critique (I)

- Define:
  - p: probability this tax return will be audited eventually.
  - θ: penalty rate applied over amount evaded.
- SMEs in Uruguay:
  - $p = 0.11$, $\theta = 0.30$, $\tau = 0.22$, $CRRA = 4$.

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    A&S Pred. Evasion=100%

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    A&S Pred. Evasion=100% vs Actual Evasion $\approx$ 26%

The Calibration Critique (II)

- However, A&S can be modified to fit evasion levels:
  - Third party reporting (Kleven et al., 2011).
  - Tax morale (Luttmer and Singhal, 2014).
  - Misperceptions.
- Our approach: test a more "direct" prediction from A&S.
  - Elasticity of evasion w.r.t. p and θ.

Research Design (I)

- Letters to ≈20,000 SMEs from Uruguay.
  - Collectively pay over $200 millon in taxes per year.
- Random-assignment of information contained in the letter.
  - Randomize "signals" about p and θ.
  - Additional treatment arms (endogeneity, tax morale, audit-threat)
- Measure effects of information on:
  - Behavior (e.g., VAT payments), using administrative data.
  - Perceptions ($\hat{p}$ and $\hat{\theta}$), using survey data.

Research Design (II)

- First half: do firms react to information about audits?
  - Add information about audits to a baseline letter.
- Second half: is reaction consistent with A&S?
  - Test 1: Exploit data on perceptions about $\{p, \theta\}$.
  - Test 2: Exploit exogenous variation in signals about $\{p, \theta\}$.

Preview of Findings

1. Firms do react to information about audits.
   - Audit-messages increase tax payments by 7%.
   - Equivalent to a 27% reduction in evasion rate.
2. However, reactions broadly inconsistent with A&S.
   - It doesn't look like firms react to re-optimize.
   - Audits may scare taxpayers like scarecrows scare birds.

Related Literature

- **Mailing experiments with enforcement "reminders"** (e.g., Slemrod, Blumenthal & Christian, 2001; Kleven et al., 2011; Fellner, Sausgruber & Traxler, 2013; Castro & Scartascini 2015; Pomeranz, 2015; Perez-Truglia & Troiano, 2016; Dwenger, Kleven, Rasul & Rincke, 2016; Hallsworth et al. 2017).
  - For recent reviews, see Pomeranz and Vila-Belda, 2018; Slemrod, 2018; Alm, 2019
- **Audits-in-the-lab** (e.g., Alm, Jackson & McKee, 1992; Alm, McClelland & Schulze,1992; Konrad, Lohse & Qari, 2015)
- **Puzzle of tax evasion and tax morale** (e.g. Luttmer & Singhal, 2014)

Outline

1. Research Design
2. Implementation
3. Results: ATE of Messages
4. Results: A&S Test
5. Interpretation
6. Conclusions

Baseline Letter

DGI Dirección General Impositiva

Montevideo, August 20th 2015

Mr./Ms. Taxpayer:

The DGI has the authority to perform inspections (see Art. 68 of the tax code) and routine audits of taxpayers on the basis of crosschecks and assessment of data compiled to detect oversights and inconsistency on tax returns as well as pending tax debts.

The aim of the DGI, and the primary challenge it faces, is to ensure the collection of revenue to sustain life in society. Additionally, its task is to generate a framework of fair and transparent competition where the failure of some to meet their obligations does not have an unfavorable impact on honest taxpayers. In order to meet these goals, inspections are performed in a routine fashion.

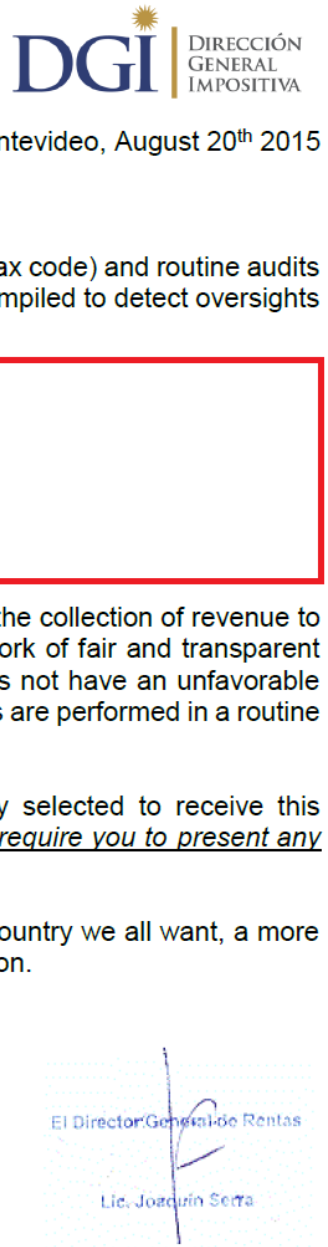
Your micro, small, or medium-sized business has been randomly selected to receive this information. *It is solely for your information and its receipt does not require you to present any documentation to the DGI offices.*

We ask you to comply with your tax obligations for the sake of the country we all want, a more and more developed Uruguay with greater and greater social cohesion.

Sincerely,

Collection and Controls Division
Internal Revenues Services

Baseline + Message



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MESSAGE

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El Director General de Rentas

Lic. Joaquín Serra

Audit-Statistics Letter

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On the basis of historical information on similar businesses, there is a probability of p% that the tax returns you filed for this year will be audited in at least one of the coming three years. If, pursuant to that auditing, it is determined that tax evasion has occurred, you will be required to pay not only the amount previously unpaid, but also a fee of approximately θ% of that amount.

The aim of the DGI, and the primary challenge it faces, is to ensure the collection of revenue to sustain life in society. Additionally, its task is to generate a framework of fair and transparent competition where the failure of some to meet their obligations does not have an unfavorable impact on honest taxpayers. In order to meet these goals, inspections are performed in a routine fashion.

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Additional Messages

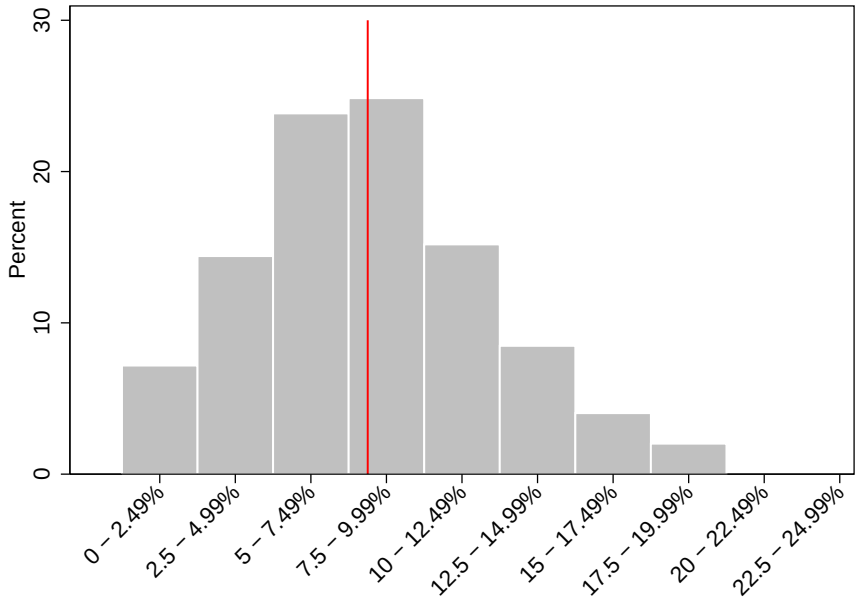
1. None (i.e., baseline letter).
2. *Audit-Statistics* (with sub treatments).
3. *Audit-Threat* (with sub treatments).
4. *Audit-Endogeneity*.
5. *Public-Goods*.

Audit-Statistics Message

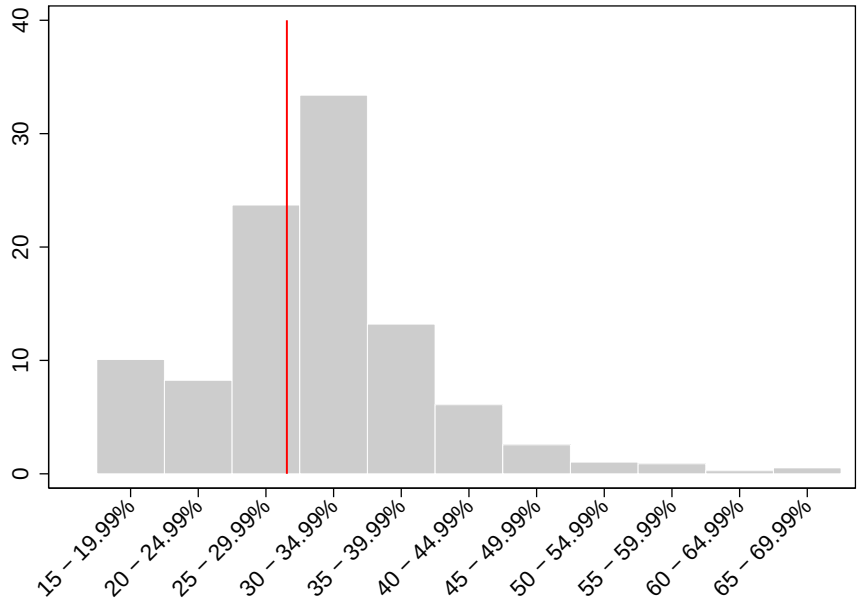
- Message presents statistics about p and θ.
  - This information is hard to obtain: e.g., not available online.
- Generated non-deceptive exogenous variation.
  - For each firm, compute $\hat{p}$ and $\hat{\theta}$ with a randomly drawn sample of "similar firms."
  - 950 unique combinations of $p \in [2\%, 25\%]$ and $\theta \in [15\%, 66\%]$.

Random Variation in Signals

Audit probability (p)



Penalty rate (θ)



Audit-Threat Message

"We would like to inform you that the business you represent is one of a group of firms pre-selected for auditing in 2016. A [p%] of the firms in that group will then be randomly selected for auditing."

- Randomly allocated to $p = 25\%$ and $p = 50\%$.
- Based on a secondary experimental sample, pre-selected by the IRS.
  - Not comparable to the baseline letter.

Audit-Endogeneity Message

"The IRS uses data on thousands of taxpayers to detect firms that may be evading taxes; most of its audits are aimed at those firms. Evading taxes, then, doubles your chances of being audited."

- Benchmark for other audit-related messages.
- Based on back-of-the-envelope calculations using the administrative data.
- In *A&S*, learning about endogeneity should reduce evasion.

Public-Goods Message

"If those who currently evade their tax obligations evaded 10% less, the additional revenue collected would enable all of the following: to supply 42,000 portable computers to school children; ..."

- Benchmark for non-audit information (e.g., Blumenthal et al. 2001).
- Message suggested to us by the IRS and believed to be "most effective."
- Intended to increase moral cost of non-compliance (Cowell & Gordon, 1988).

Survey Design

- Two key beliefs:
  1. Perceived Audit Probability: "In your opinion, what is the likelihood that the tax returns filed by a company like yours be audited at least in one of the next three years (from 0% to 100%)?"
  2. Perceived Penalty Rate: "Let's imagine that a company like yours is audited and that tax evasion is detected. What, in your opinion, is the penalty (in %) as determined by law that the firm must pay in addition to the originally unpaid amount?"

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Institutional Context: Uruguay

- VAT rate: 22%.
  - VAT revenues = 10% of GDP.
- Estimated VAT evasion: 26%.
  - Comparable to European countries (e.g., 26% for Italy)
- High tax morale: 77.2% agrees that evading taxes is never justified.
  - High by international standards (e.g., 68% for other LATAM and 70.9% U.S.A.).
- Imperfect third-party reporting controls - IRS relies heavily on tax audits

Subject Pool

- Active Small and Medium Enterprises.
  - Exclude very large/small firms subject to special treatment
- Pre-treatment average characteristics:
  - 5 employees.
  - 15 years of age.
  - \$7,700 in yearly VAT payments; + \$4,000 in other taxes.
- Quite representative across industries (30% Goods - no retail, 22% Goods - retail, 49% Services).

Implementation

- Letters sent directly to owner
  - Screened out accountants
- Certified mail through Uruguay Postal Service.
  - 82% confirmed delivery (treatment on treated).
- Letters delivered in September, 2015.
  - Pre-Treatment Year: Oct-2014 to Sep-2015.
  - Post-Treatment Year: Oct-2015 to Sep-2016.

Treatment Assignment

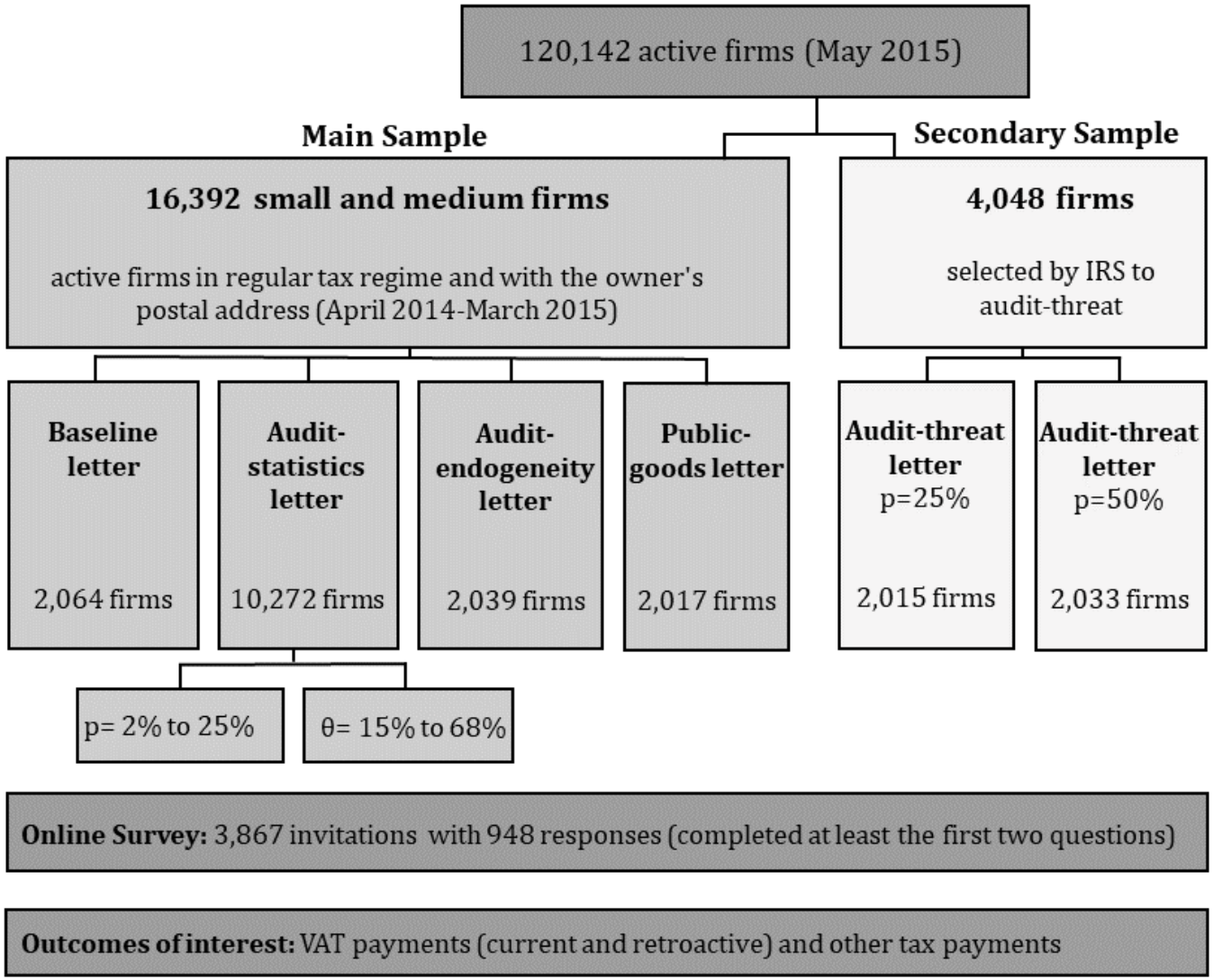
- 16,392 firms in primary sample:
  - 12.5% *Baseline*.
  - 62.5% *Audit-Statistics*.
  - 12.5% *Audit-Endogeneity*.
  - 12.5% *Public-Goods*.
- 4,048 firms in secondary sample:
  - 100% *Audit-Threat*.

Balance Test

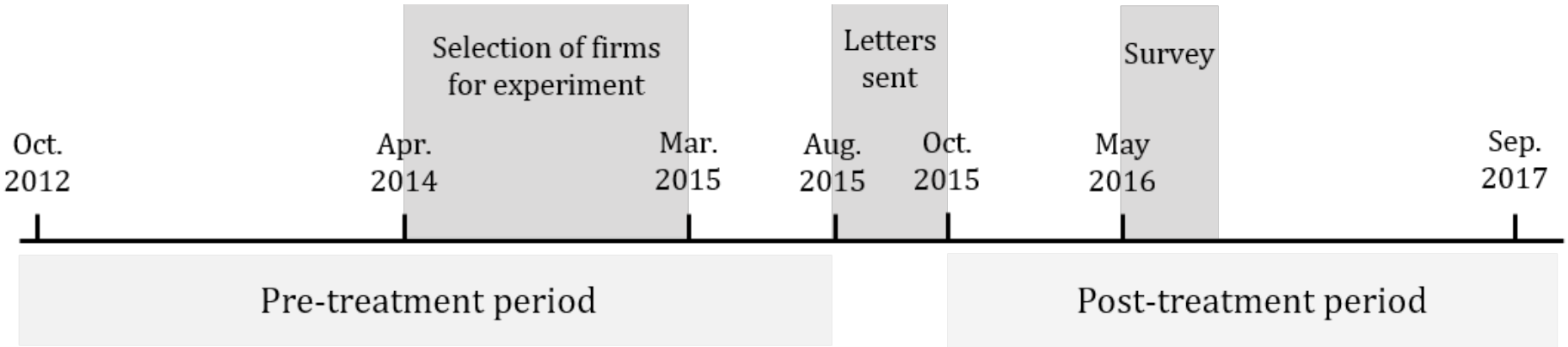
Survey Implementation

- Conducted 9 months after letters were delivered.
- Neutral surveyor: United Nations, Inter-American Center of Tax Administrations, and universities from Uruguay and Argentina.
- Anonymous, but can "track" letter-types.
- 3,867 firms (23%) from main experimental sample invited by email.
  - 24.5% started the survey (76.5% owners).
  - 22.3% dropped out before reaching relevant questions

Experiment Design - Summary



Experiment Implementation - Summary



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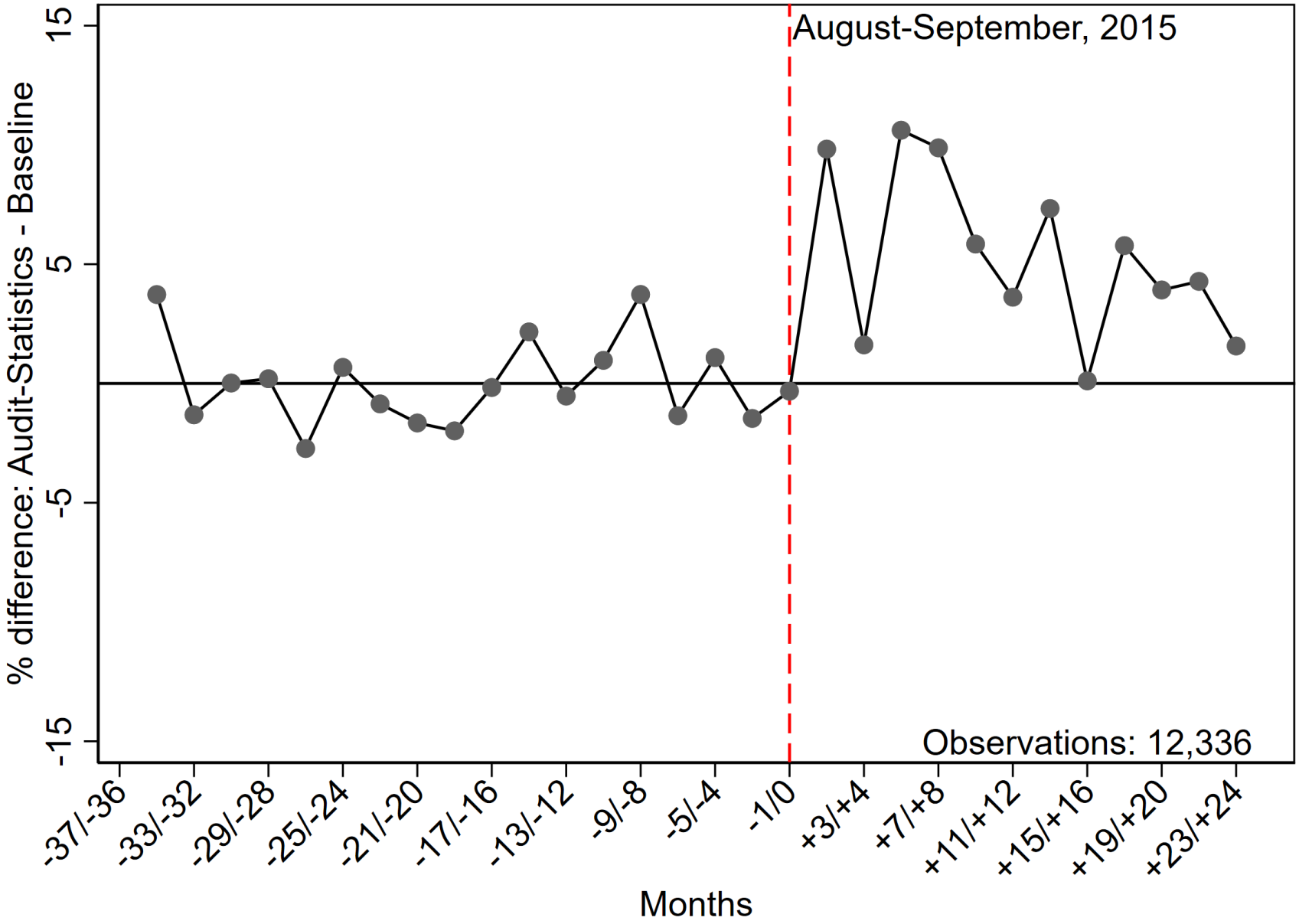
Outcomes of interest

- VAT payments (65% of total tax payments)
  - **1st year** vs 2nd year
  - Concurrent vs retroactive
- Other taxes:
  - Corporate income tax, wealth tax, personal income tax withholdings
  - Allow to test substitution between different taxes
- VAT annual liabilities reported in tax returns

Audit-Statistics vs. *Baseline*



ATE - Estimation

Difference-in-Difference specification to increase precision:

$$Y_{it} = \alpha_0 + \gamma_1 \cdot D_i^1 \cdot Post_t + \alpha_1 \cdot D_i^1 + \alpha_2 \cdot Post_t + \epsilon_{it}$$

- i indexes firm
- $t = \{1, 2\}$ denotes time
- Y_{it} is the outcome variable
- D_i^1 is a dummy variable indicating treatment
- $Post_t$ is a dummy for the post-treatment period
- SE clustered at the firm level
- γ_1 is the treatment effect

ATE of *Audit-Statistics*

	By Time Horizon		By Payment Timing		By Tax Type	
	First Year (1)	Second Year (2)	Retroactive (3)	Concurrent (4)	Non - VAT (5)	VAT + Non-VAT (6)
a. Audit - Statitstics (N= 10,272) vs Baseline (N= 2,064)						
Post-Treatment	0.070***					
	(0.021)					
Pre-Treatment	-0.009					
	(0.020)					

- Effect size:
  - 27% when compared to baseline VAT evasion rate
  - Quantitatively similar to Pomeranz (2015)
  - Qualitatively similar to related studies

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a. Audit - Statitstics (N= 10,272) vs Baseline (N= 2,064)						
Post-Treatment	0.070***	0.032				
	(0.021)	(0.027)				
Pre-Treatment	-0.009	0.004				
	(0.020)	(0.026)				

- Effects fade-out after a year:
  - Consistent with forgetting or updating for other reasons
  - Consistent with findings in Pomeranz (2015)

ATE of *Audit-Statistics*

	By Time Horizon		By Payment Timing		By Tax Type	
	First Year (1)	Second Year (2)	Retroactive (3)	Concurrent (4)	Non - VAT (5)	VAT + Non-VAT (6)
a. Audit - Statitstics (N= 10,272) vs Baseline (N= 2,064)						
Post-Treatment	0.070***	0.032	0.383***			
	(0.021)	(0.027)	(0.140)			
Pre-Treatment	-0.009	-0.004	-0.048			
	(0.020)	(0.026)	(0.118)			

ATE of *Audit-Statistics*

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	(0.021)	(0.027)	(0.140)	(0.021)		
Pre-Treatment	-0.009	-0.004	-0.048	0.012		
	(0.020)	(0.026)	(0.118)	(0.020)		

- Apparently different effects in retroactive vs concurrent
  - **CAVEAT: Baseline levels are very different (300 USD vs 7,700 USD)**

ATE of *Audit-Statistics*

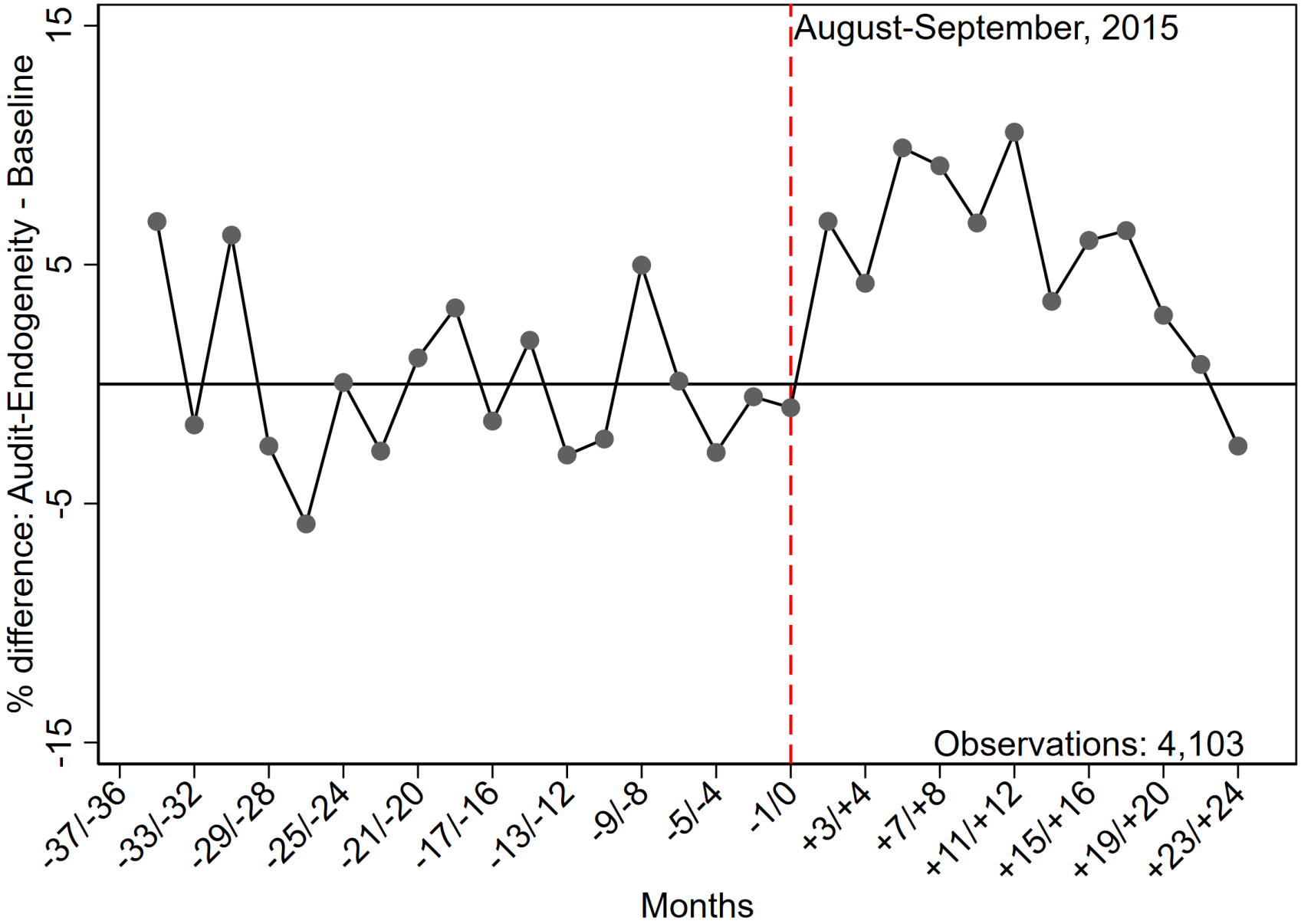
	By Time Horizon		By Payment Timing		By Tax Type	
	First Year (1)	Second Year (2)	Retroactive (3)	Concurrent (4)	Non - VAT (5)	VAT + Non-VAT (6)
a. Audit - Statitstics (N= 10,272) vs Baseline (N= 2,064)						
Post-Treatment	0.070***	0.032	0.383***	0.053**	0.086**	
	(0.021)	(0.027)	(0.140)	(0.021)	(0.037)	
Pre-Treatment	-0.009	-0.004	-0.048	-0.012	0.008	
	(0.020)	(0.026)	(0.118)	(0.020)	(0.043)	

ATE of *Audit-Statistics*

	By Time Horizon		By Payment Timing		By Tax Type	
	First Year (1)	Second Year (2)	Retroactive (3)	Concurrent (4)	Non - VAT (5)	VAT + Non-VAT (6)
a. Audit - Statitstics (N= 10,272) vs Baseline (N= 2,064)						
Post-Treatment	0.070***	0.032	0.383***	0.053**	0.086**	0.073***
	(0.021)	(0.027)	(0.140)	(0.021)	(0.037)	(0.020)
Pre-Treatment	-0.009	-0.004	-0.048	0.012	0.008	0.014
	(0.020)	(0.026)	(0.118)	(0.020)	(0.043)	(0.021)

- Effects in non-VAT taxes too
  - No substitution

Audit-Endogeneity vs. *Baseline*

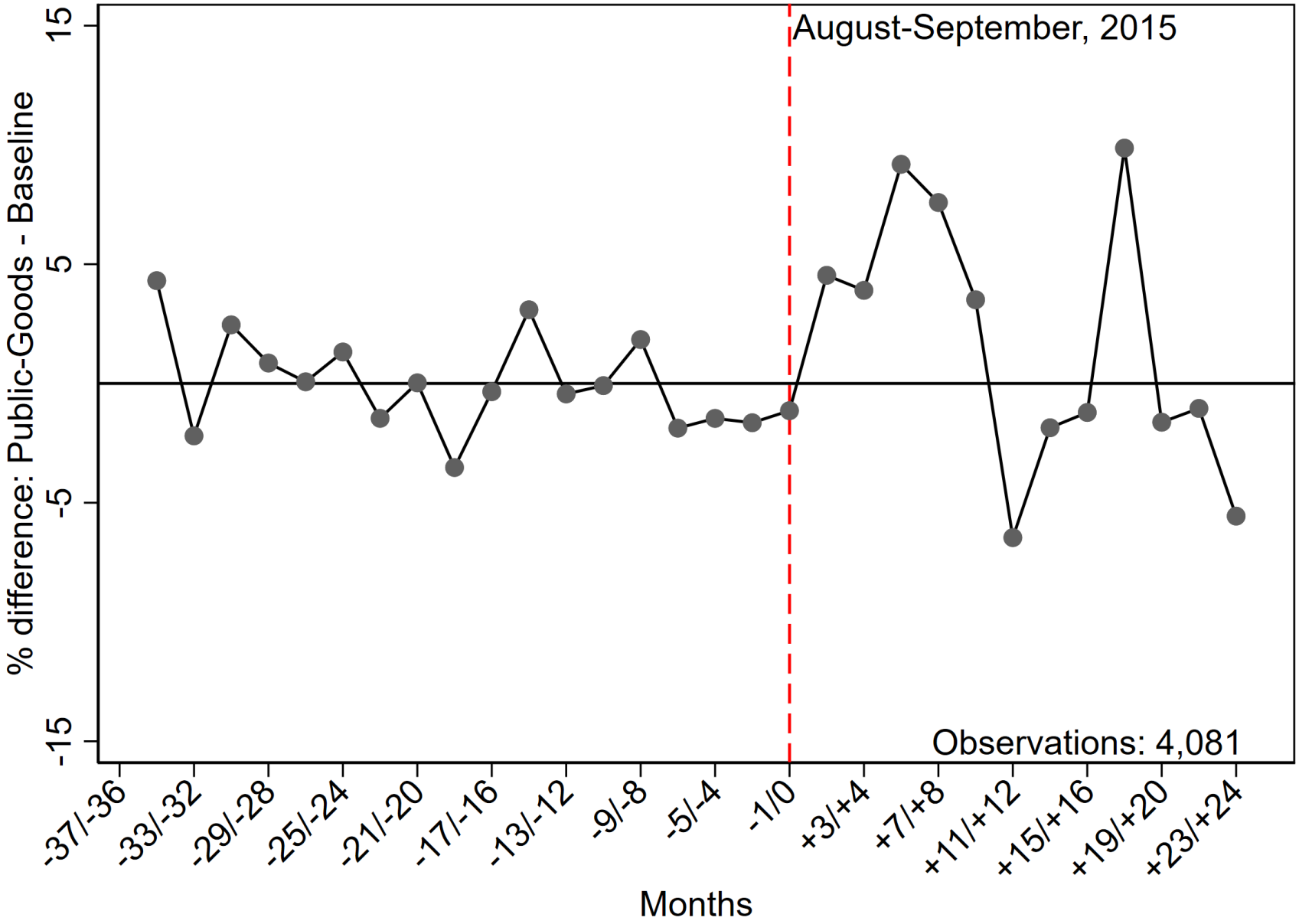


ATE of *Audit-Endogeneity*

	By Time Horizon		By Payment Timing		By Tax Type	
	First Year	Second Year	Retroactive	Concurrent	Non - VAT	VAT + Non-VAT
	(1)	(2)	(3)	(4)	(5)	(6)
b. *Audit-Endogeneity* (2,039 firms) vs *Baseline* (2,064 firms)						
Post-Treatment	0.071***	0.032	0.264*	0.061**	0.090*	0.078***
	(0.028)	(0.036)	(0.160)	(0.028)	(0.054)	(0.028)
Pre-Treatment	-0.005	-0.009	0.097	-0.010	0.056	0.017
	(0.028)	(0.035)	(0.164)	(0.028)	(0.055)	(0.028)

- Very similar effect in magnitude and timing

Public-Goods vs. *Baseline*



ATE of *Public-Goods*

	By Time Horizon		By Payment Timing		By Tax Type	
	First Year	Second Year	Retroactive	Concurrent	Non - VAT	VAT + Non-VAT
	(1)	(2)	(3)	(4)	(5)	(6)
c. *Public-Goods* (2,017 firms) vs *Baseline* (2,064 firms)						
Post-Treatment	0.051**	0.004	0.208	0.043*	0.067	0.056**
	(0.025)	(0.032)	(0.170)	(0.025)	(0.043)	(0.024)
Pre-Treatment	-0.003	-0.017	-0.088	0.001	-0.038	-0.015
	(0.024)	(0.033)	(0.163)	(0.024)	(0.054)	(0.026)

- Effects are weaker and fade out sooner
  - Similar to Pomeranz (2015) - positive effect but not as large
  - Similar pattern to Bott et al. (2020)

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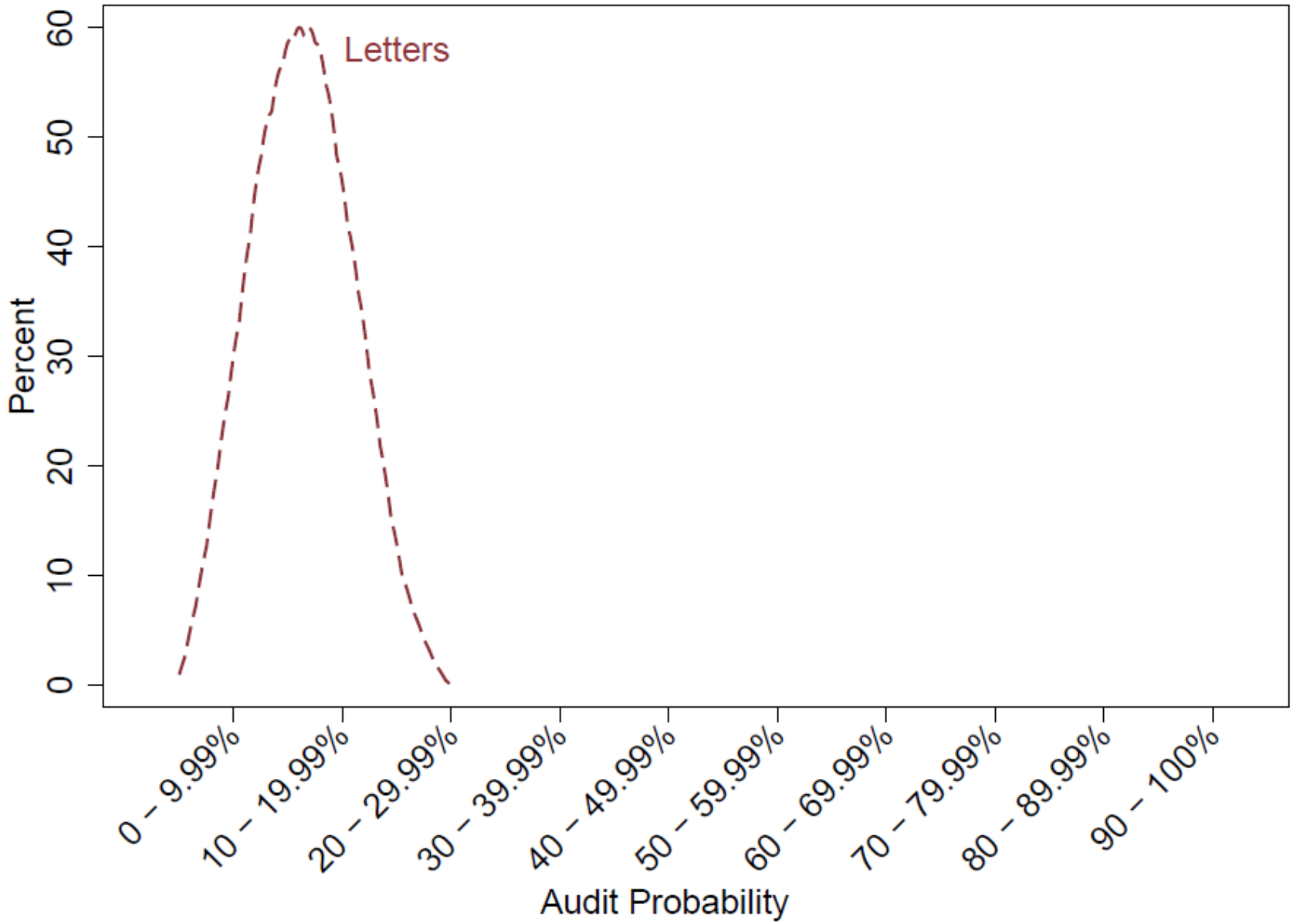
Mechanisms

- Remaining question: is the reaction to audit messages consistent with A&S?
- Two tests:
  - Test 1: Exploit survey data on perceived $\{p, \theta\}$.
  - Test 2: Exploit heterogeneity by signal $\{p, \theta\}$.

Test 1: Survey Data

- Average firm increased tax payments with *audit-statistics*.
- A&S rationalization:
  - Average firm under-estimated p or θ.
  - They revised p or θ upwards.
  - They re-optimized by increasing tax payments.

Test 1: Survey Data (p)



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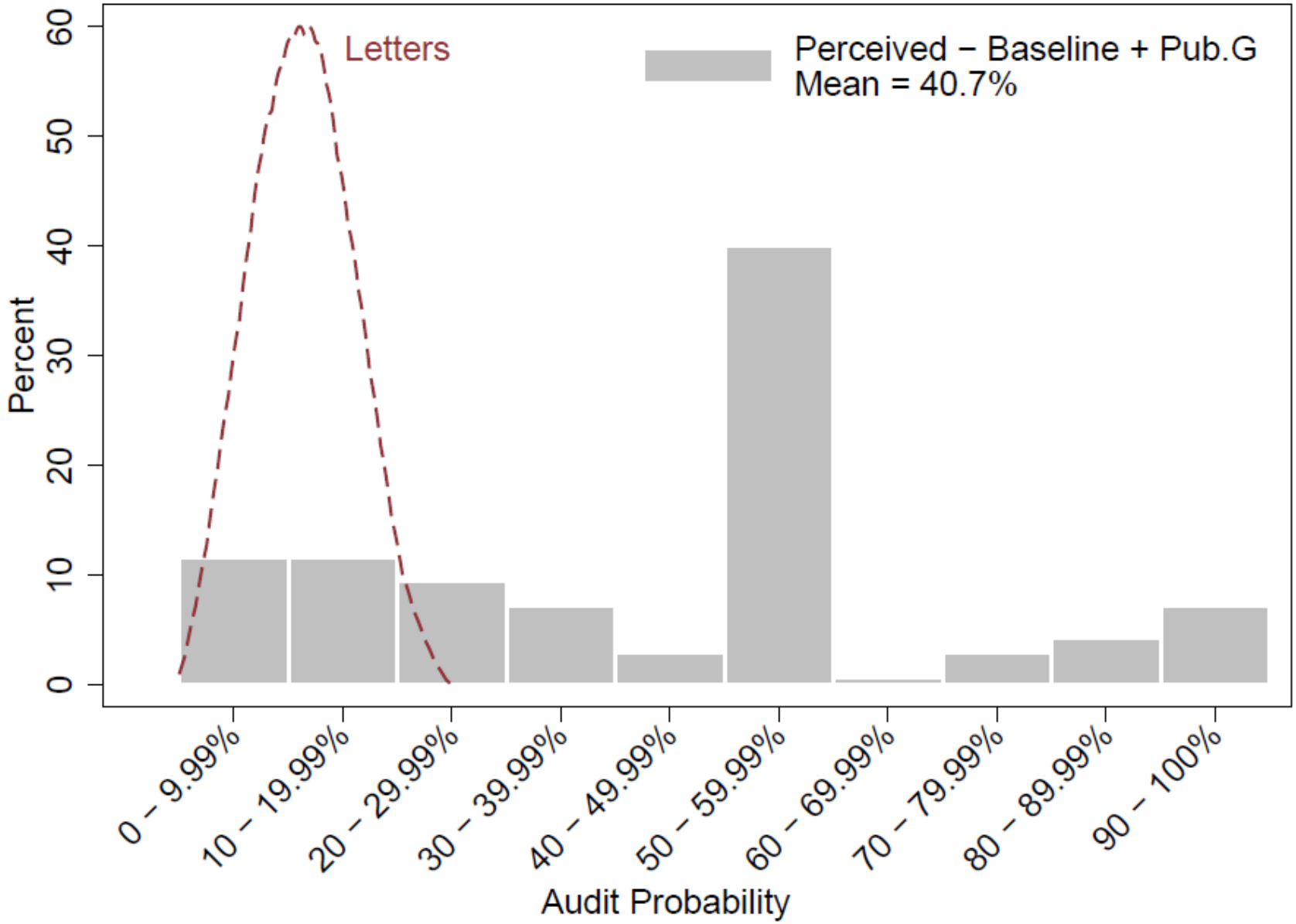
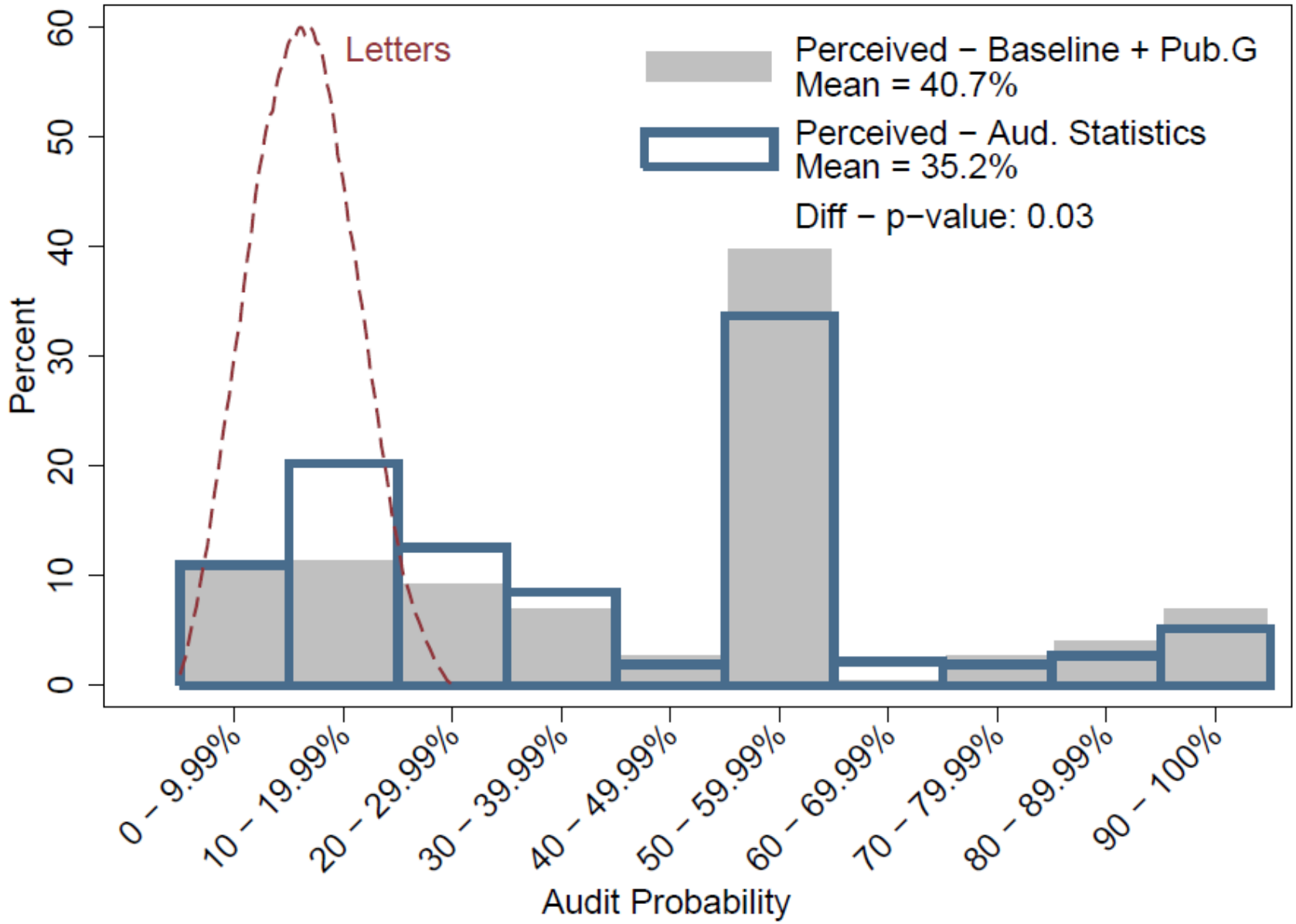


Test 1: Survey Data (p)

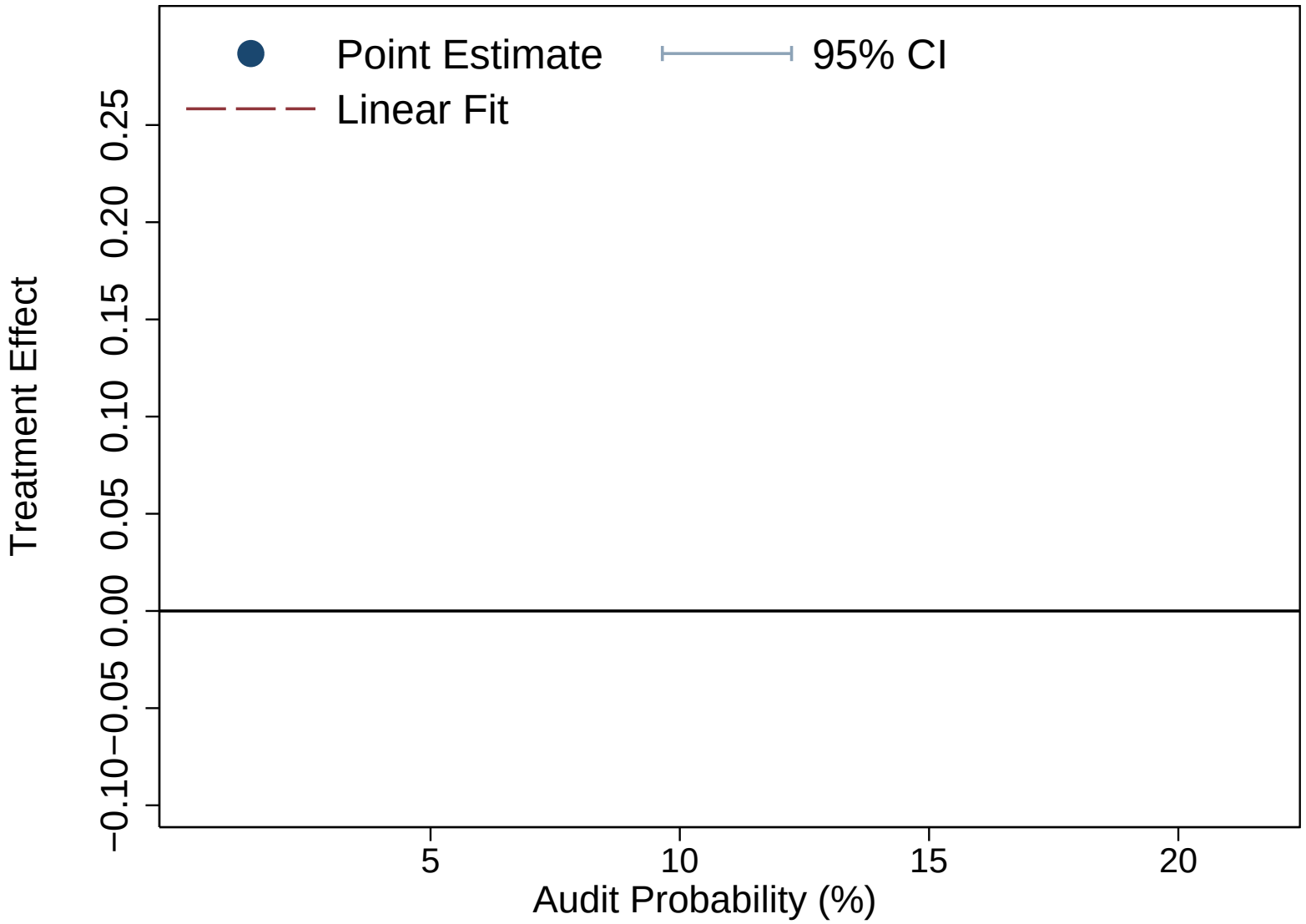
Confidence | Effect on θ



Test 2: Heterogeneity by Signals

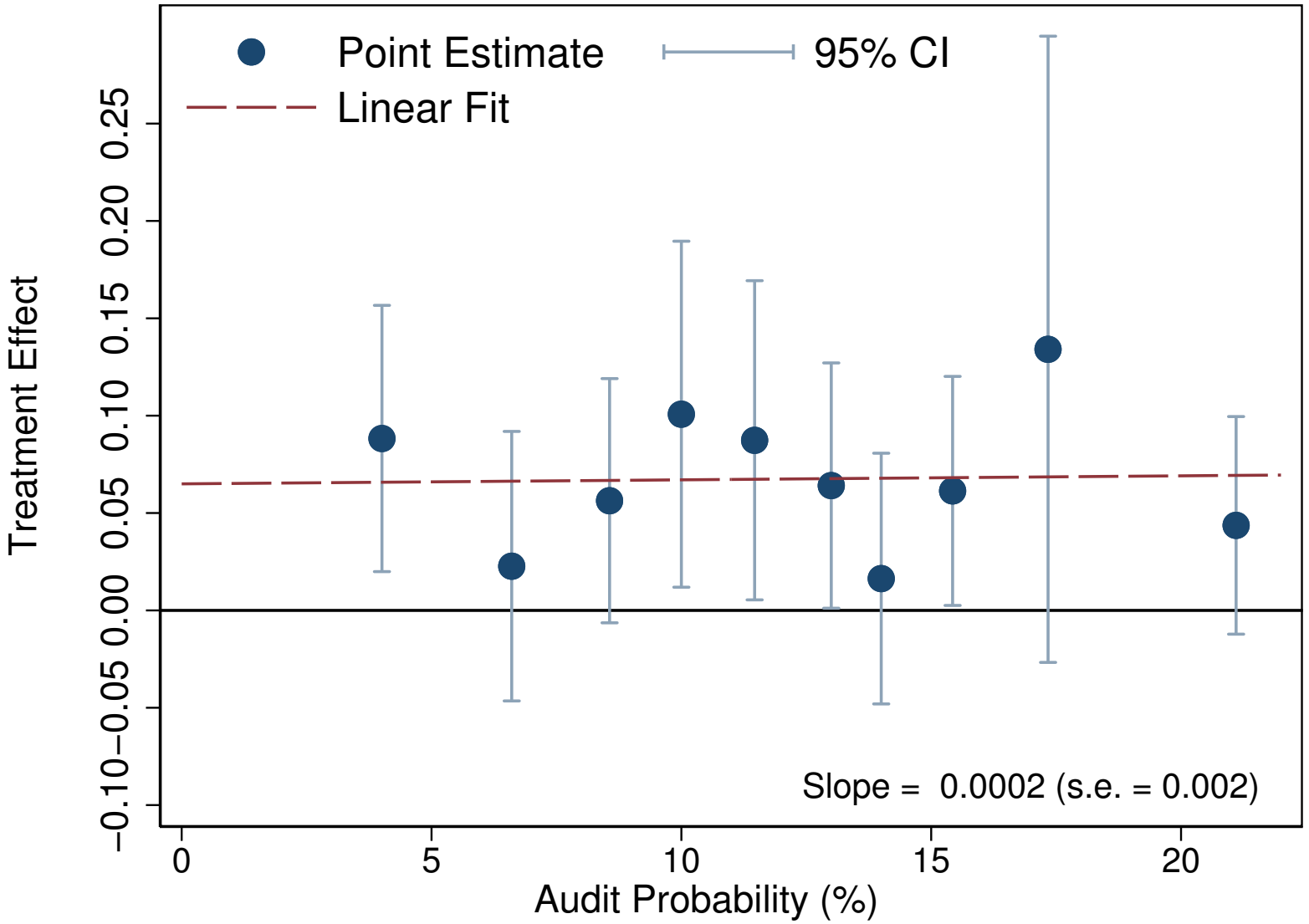
- Sampling variation in signal shown to firms.
- *A&S* predictions:
  - Higher signal of p should increase taxes paid.
  - Higher signal of θ should increase taxes paid.

Test 2: Heterogeneity by Signals



Test 2: Heterogeneity by Signals

Event Study



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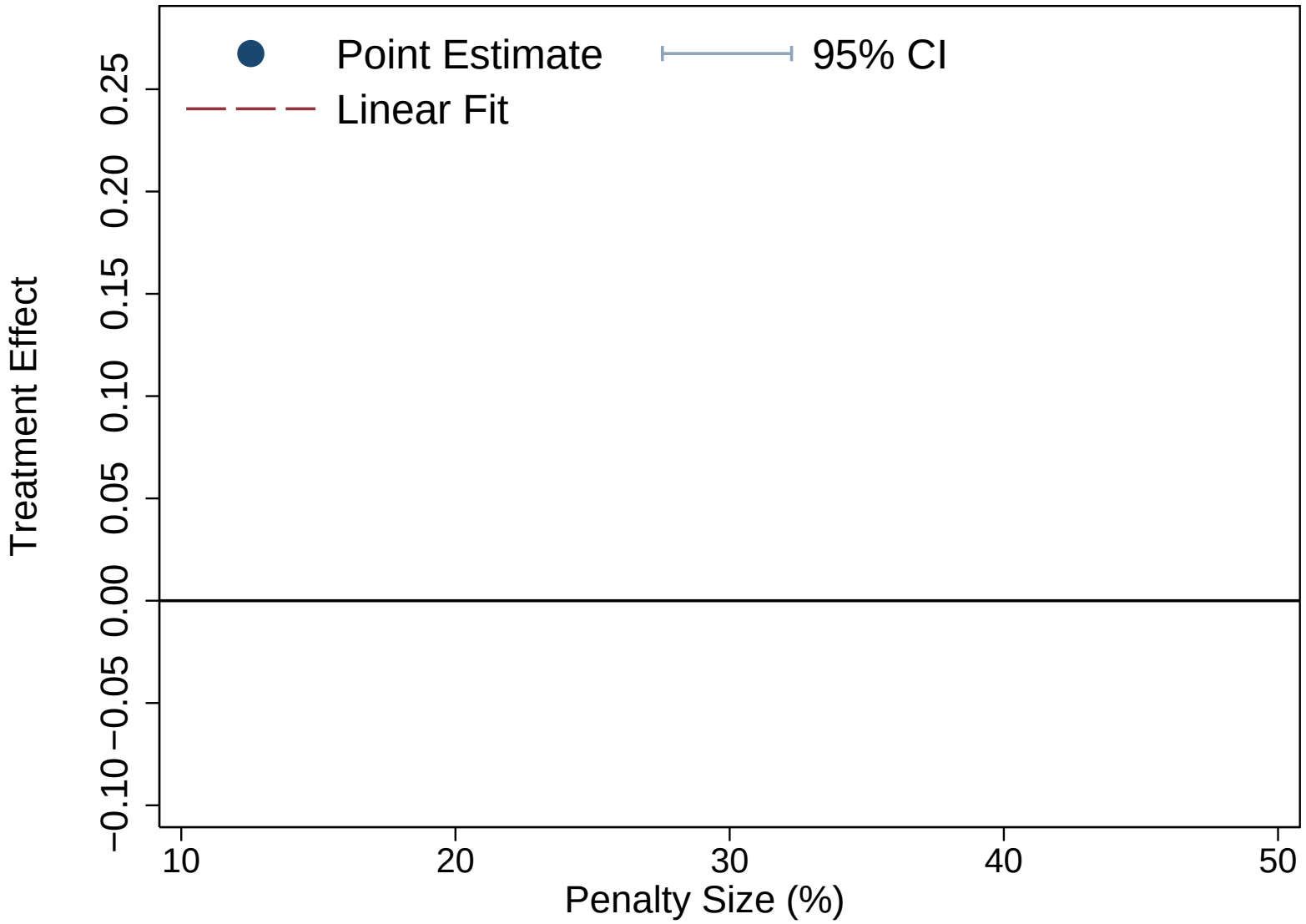

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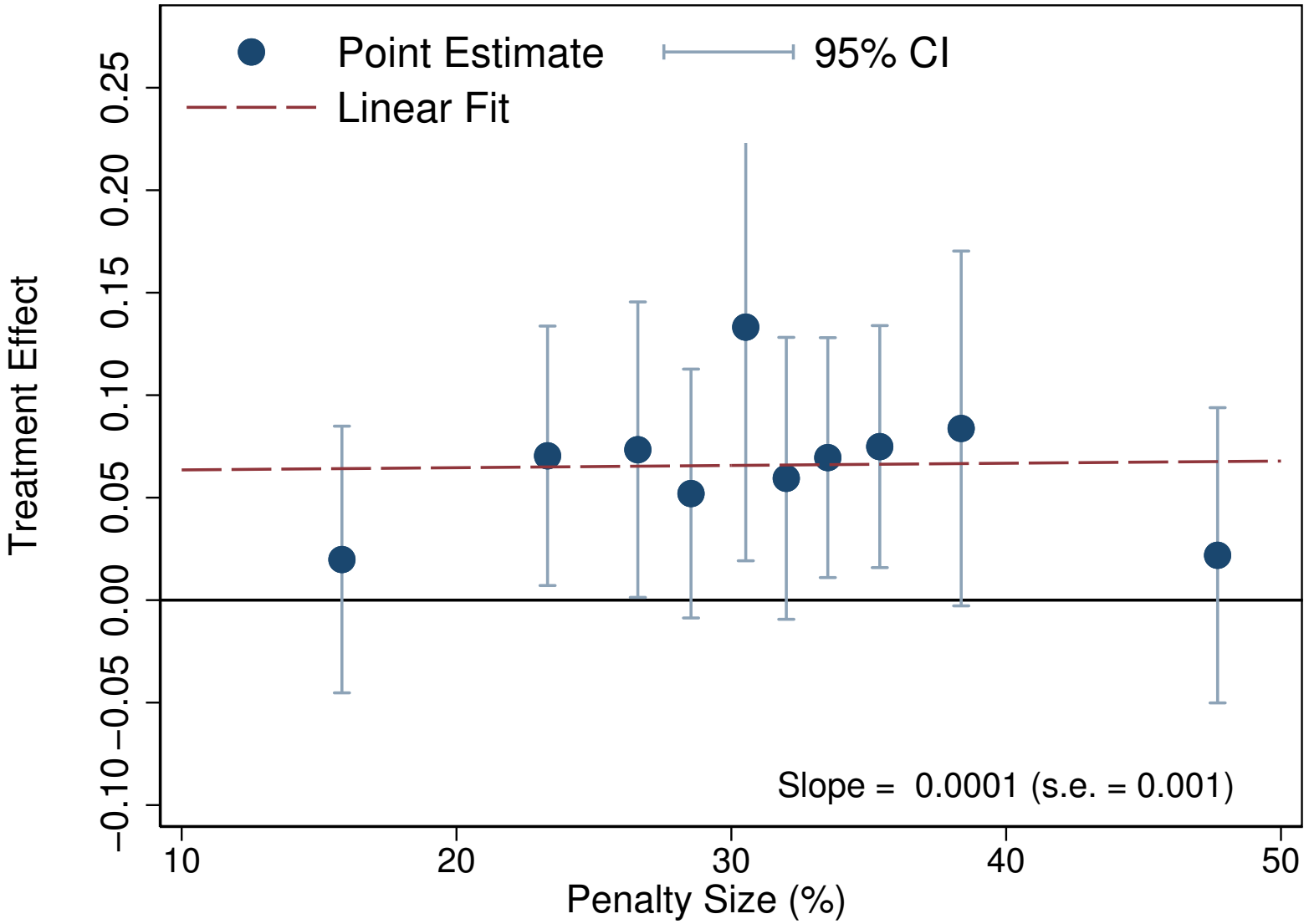

Test 2: Heterogeneity by Signals

		Experimental Estimates	
	A–S Calibration	*Audit-Statistics*	*Audit-Threat*
$\frac{\partial log(\tau(Y-E))}{\partial p}$	4.55		
$\frac{\partial log(\tau(Y-E))}{\partial \theta}$	3.48		

Test 2: Heterogeneity by Signals

		Experimental Estimates	
	A–S Calibration	*Audit-Statistics*	*Audit-Threat*
$\frac{\partial log(\tau(Y-E))}{\partial p}$	4.55	-0.063 (0.242)	
$\frac{\partial log(\tau(Y-E))}{\partial \theta}$	3.48	-0.033 (0.118)	

Test 2: Heterogeneity by Signals

		Experimental Estimates	
	A–S Calibration	*Audit-Statistics*	*Audit-Threat*
$\frac{\partial log(\tau(Y-E))}{\partial p}$	4.55	-0.063 (0.242)	0.217 (0.142)
$\frac{\partial log(\tau(Y-E))}{\partial \theta}$	3.48	-0.033 (0.118)	

Bonus Test: Heterogeneity by Prior p

- Construct a proxy for prior belief about p.
- Firms born with a beta-binomial prior with parameters $\{\alpha_0, \beta_0\}$.
- Let T_i be the number of years filing taxes and N_i number of years audited.
- Prior belief at time of our experiment Distribution:

$$\hat{p}_i = 1 - \left(1 - \frac{\alpha_0 + N_i}{\alpha_0 + \beta_0 + T_i}\right)^3$$

- *A&S* predictions:
  - Positive if $\hat{p}_i < 11.7\%$, negative if $\hat{p}_i > 11.7\%$.
  - Results: inconsistent with A&S Results

Outline

1. Research Design
2. Implementation
3. Results: ATE of Messages
4. Results: A&S Test
5. Interpretation
6. Conclusions

Summary of Findings

- Three key findings:
  1. *Increased compliance*: on average, the audits-statistics message had a positive effect on tax compliance.
  2. *Negative perception update*: on average, the audits-statistics message decreased the perceived probability of being audited.
  3. *Probability neglect*: the effect of the audits-statistics message did not change with the probability of audit included in the letter, nor with the firms' prior beliefs.

Alternative Explanations

- Salience (Chetty et al., 2009).
  - Can rationalize *increased compliance* with *negative perception update*.
  - But inconsistent with *probability neglect*.
  - Also inconsistent with long-lasting effects.

- Agency issues within the firm:
  - The recpient of the letter doesn't decide how much to evade
  - But even in SMEs (less concerns of agency issues) we still we find (non-heterogeneous) effects

Favorite Interpretation: Risk-as-Feelings

- Risk-as-feelings (Loewenstein et al., 2001).
  - Fear triggers intuitive/automatic responses (C-B is based on cognitive evaluations)
  - Decision-making happening outside of the prefrontal cortex.
  - Abundant evidence of probability neglect and "over-reaction"
- Tip for graduate students:
  - There is a large literature on risk-as-feelings in psychology.
  - Potentially relevant in many economic questions (e.g., insurance, crime).
  - Yet no serious applications in Economics: low-hanging fruit?

Interpretation: Risk-as-Feelings

- Consistent with survey data:
  - 61% of taxpayers say they pay their taxes because of "fear of an audit" (IRS, 2018).
  - In extreme cases, can lead to phobia (New York Times, 2009).
- Consistent with evidence suggesting that tax agencies "exploit" fear:
  - Tax enforcement press releases spike right before to Tax Day (Blank and Levin, 2010) or celebrity targeting (Forbes, 2008).
  - Advertising campaigns designed to evoke fear...

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Interpretation: Risk-as-Feelings

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Conclusions

- Threat of audits has significant effect on tax compliance.
- However, this reaction does not seem consistent with *A&S*.
- Provides (new) alternative explanation for the puzzle of "too much compliance" (Luttmer and Singhal, 2014).
  - Audits may scare taxpayers like scarecrows scare birds.

Policy Implications

- Findings suggest a new "lever" for policy-makers.
- Traditional view: increase audits until the marginal cost of auditing equals marginal benefit.
- Revised view: holding audits constant, compliance can be increased through communication policies (e.g., ads, mailers).