

Fiscal Policy and Inequality

22. Tax Evasion & Avoidance

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 - ▶ What are the key determinants of the evasion decision?
 - ▶ Who responds more strongly to changes in those determinants?

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- ▶ How will cryptocurrencies change opportunities for evasion?

Outline

Estimating Tax Evasion

Allingham-Sandmo (1972)

Kleven et al (2011)

Pomeranz: VAT

Naritomi (2016)

Cryptocurrencies and Tax Evasion

How Do Governments Estimate Tax Evasion?

- ▶ Most governments do not attempt to estimate tax evasion in a rigorous way
- ▶ Some advanced economies have recently started producing estimates and, more importantly, making their estimates public

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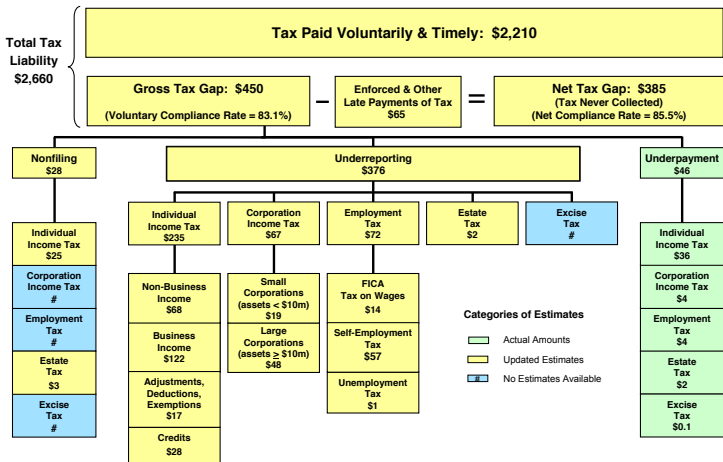
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 - ▶ Internal Revenue Service (IRS) in the US
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 - ▶ Internal Revenue Service (IRS) in the US
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- ▶ Definition of “**tax gap**”: difference between the amount of tax that should, in theory, be collected by HMRC, against what is actually collected.
 - ▶ Includes evasion *and* avoidance

IRS Tax Gap Estimates for 2006

Tax Gap “Map” Tax Year 2006 (\$ billions)

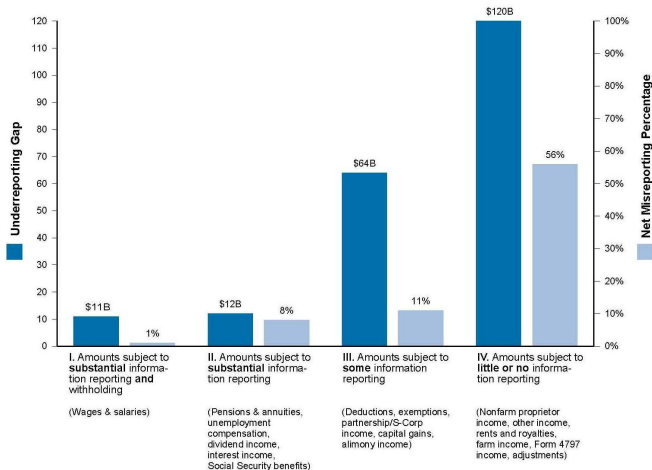


Internal Revenue Service, December 2011

IRS Tax Gap Estimates for 2006

Chart 1: Effect of Information Reporting on Taxpayer Compliance

Tax Year 2006 Individual Income Tax Underreporting Gap and Net Misreporting Percentage, by "Visibility" Category



NOTE: Net Misreporting Percentage is defined as the net misreported amount of income as a ratio of the true amount.
Internal Revenue Service, December 2011

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- ▶ Individual maximizes:

$$\begin{aligned}\max_{\bar{y}} \mathbb{E}[u(\bar{y})] = & (1 - p) \cdot u[y - \tau \cdot \bar{y}] \\ & + p \cdot u[y - \tau \cdot \bar{y} - \tau(y - \bar{y})(1 + \theta)]\end{aligned}$$

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- ▶ θ = fine factor if detected

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- ▶ FOC:

$$\begin{aligned}-\tau (1-p) \cdot u' [c^{NA}] + p\theta\tau \cdot u' [c^A] &= 0 \\ \Rightarrow \frac{u' [c^A]}{u' [c^{NA}]} &= \frac{1-p}{p\theta}\end{aligned}$$

Allingham-Sandmo (JPubEc, 1972): Comparative Statics

Let evasion be $e \equiv y - \bar{y}$. How does optimal evasion respond to changes in p , θ , and τ ?

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- ▶ Lower evasion if higher penalties $\Rightarrow \frac{\partial e}{\partial \theta} < 0$
- ▶ Ambiguous effect of tax rate $\Rightarrow \frac{\partial e}{\partial \tau} \gtrless 0$?
 - ▶ Depends on the structure of the penalty θ

Allingham-Sandmo (JPubEc, 1972): Intuition

- ▶ Intuition: tax evasion would be reduced by increasing p or θ
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 - ▶ Admin costs of audits also large on the taxpayer side

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- ▶ Extensions also studied by Allingham and Sandmo (1972):
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 - ▶ Endogenize p :
 - ▶ What is the best assumption about $\frac{dp}{de} \geq 0$?
 - ▶ Depends on how much we know about potential incomes

Allingham-Sandmo (JPubEc, 1972): Ensuing literature

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 - ▶ *Unwilling* to cheat: social norms and morality
 - ▶ *Unable* to cheat: probability of detection is higher than predicted by standard model
 - ▶ Due to extensive third-party reporting

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Kleven et al. (Ecma, 2011): Unable or Unwilling to Cheat?

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 - ▶ Two types of income
 - ▶ Self-reported (s) and Third-party reported (t)
- ▶ Experiment: random letters to taxpayers announcing higher audit probability

Kleven et al. (Ecma, 2011): Model

- Individuals maximize:

$$\max_e (1 - p(e)) [\bar{y}(1 - \tau) + \tau e] + p(e) [\bar{y}(1 - \tau) - \theta \tau e]$$

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- Defining elasticity of the probability of detection wrt evasion:

$$\varepsilon(e) \equiv p'(e) \frac{e}{p} \geq 0$$

$$\underbrace{p(e)(1 + \theta)(1 + \varepsilon(e))}_{\text{mgl cost evasion}} = \underbrace{1}_{\text{mgl benefit}}$$

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 - ▶ Raises the probability of detection for all evasion
- ▶ Even with $\theta = 0$, optimal evasion is not 100%
- ▶ No impact of tax rate on evasion
 - ▶ Rests on many assumptions: linear tax system, risk neutrality, linear penalty

Kleven et al. (Ecma, 2011): Third-Party Reporting

- Modify the model: self-reported (s) and third-party-reported income (t)

$$\text{True income: } \bar{y} \equiv \bar{y}^t + \bar{y}^s$$

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- ▶ The probability of detection is very low when $e < y^s$ and very high when $e > y^t$
 - ▶ Taxpayers first evade taxes on income with low detection probability, and then on items with high detection probability
 - ▶ Notice that tax rate and penalty are the same for both types of income
 - ▶ Implies that function of detection probability has an S shape

Kleven et al. (Ecma, 2011): Optimal Evasion

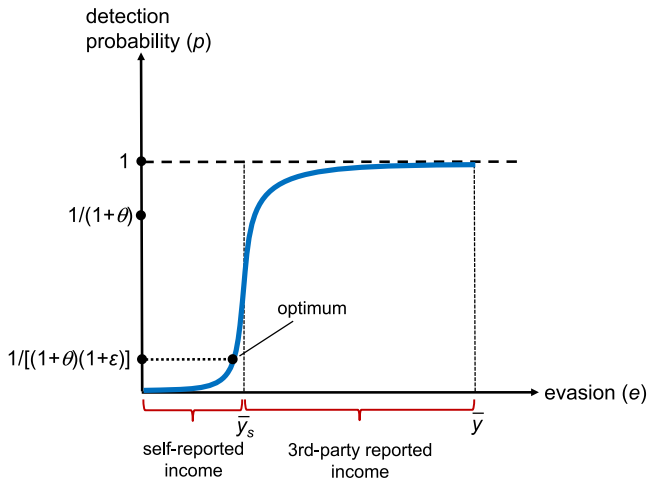


FIGURE 1.—Probability of detection under third-party reporting.

Kleven et al. (Ecma, 2011): Heterogeneous Taxpayers

- ▶ With heterogeneity in the sources of income, additional predictions.
- ▶ Taxpayers with mostly self-reported income ($\bar{y}^s \approx \bar{y}$) will:
 - ▶ Evade most of their income if \bar{y}^s is low

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 - ▶ Evade most of their income if \bar{y}^s is low
 - ▶ Evade only a small fraction of their income if \bar{y}^s is large
 - ▶ Govt likely to observe their consumption & wealth
 - ▶ Remember: Al Capone was convicted *only* for tax evasion

Kleven et al. (Ecma, 2011): Experimental Design

- ▶ First stage: random audits (not announced)
 - ▶ 0% audit group vs 100% audit group
 - ▶ Comprehensive audits: matching returns to other information sources
 - ▶ Cost of experimental audits: 21% of total audit resources
 - ▶ *Detectable* evasion is a fraction of total evasion

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 - ▶ *Detectable* evasion is a fraction of total evasion
- ▶ Second stage: random letters pre-announcing future audits (only employees)
 - ▶ 100% prob. letter, 50% prob. letter, no letter
 - ▶ Randomized within audit & no audit groups

Kleven et al. (Ecma, 2011): Experimental Design

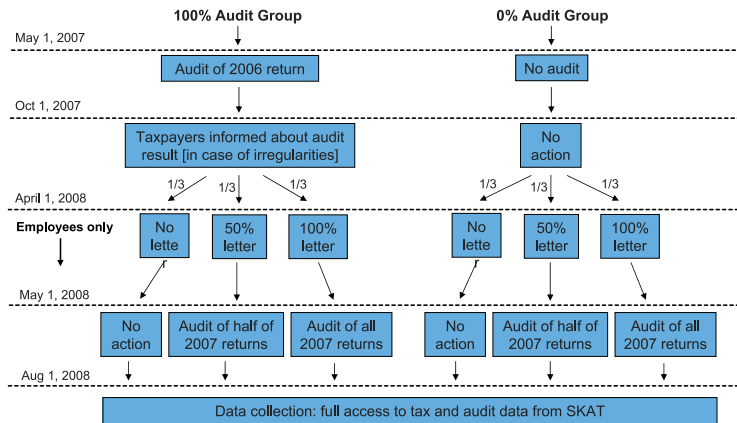


FIGURE 2.—Overview of experimental design.

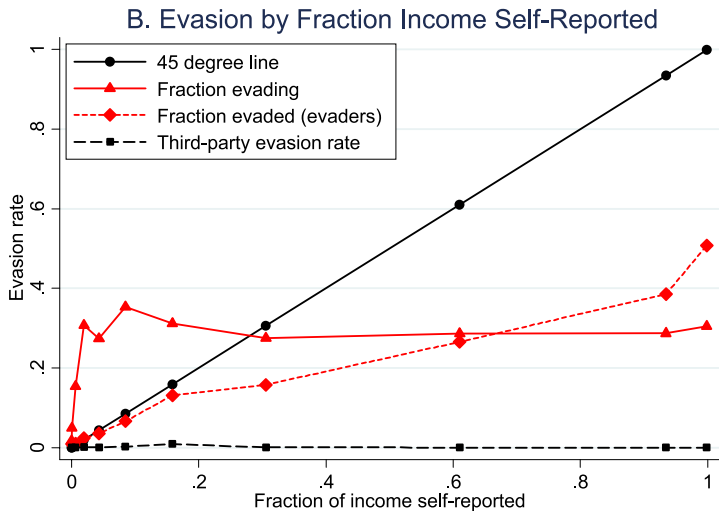
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- ▶ The rates of *detectable* evasion vary by income type:
 - ▶ 1.1% for personal income
 - ▶ 2.3% for capital income
 - ▶ 1.6% for tax deductions (various)
 - ▶ 4.6% for stock income
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- ▶ Share of taxpayers evading by income type:
 - ▶ 2.6% of those who have wage income
 - ▶ **44.9%** of those who have self-employment income

Kleven et al. (Ecma, 2011): Anatomy of Tax Evasion



Kleven et al. (Ecma, 2011): Social vs. Information Factors

**Determinants of the Probability of Audit Adjustment:
Social, Economic, and Information Factors**

	Social factors		Socio-economic factors		Information factors		All factors	
Constant	14.42	(0.64)	11.92	(0.66)	1.44	(0.25)	3.98	(0.62)
Female	-5.76	(0.43)	-4.45	(0.45)			-2.05	(0.41)
Married	1.55	(0.46)	-0.36	(0.48)			-1.64	(0.44)
Member of church	-1.98	(0.59)	-2.67	(0.58)			-1.19	(0.54)
Copenhagen	-0.29	(0.67)	1.20	(0.67)			1.00	(0.62)
Age above 45	-0.37	(0.45)	-0.35	(0.45)			0.10	(0.42)
Home owner			5.96	(0.48)			-0.35	(0.46)
Firm size below 10			4.43	(0.82)			2.97	(0.76)
Informal sector			3.25	(0.86)			-0.99	(0.79)
Self-Reported Income					9.47	(0.53)	9.72	(0.54)
Self-Reported Income > 20K					17.46	(0.91)	17.08	(0.92)
Self-Reported < -10K					14.63	(0.72)	14.53	(0.72)
Audit Flag					15.48	(0.59)	15.32	(0.60)
R-square	1.1%		2.1%		17.1%		17.4%	
Adjusted R-square	1.0%		2.1%		17.1%		17.4%	

Source: Kleven et al. (2010)

Beyond Individual Income Tax: The Role of Firms

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 - ▶ Potential collusion between firm and employees (Yaniv, 1992)
 - ▶ Some evidence of collusion in developing countries (Kumler, Verhoogen 2015; Best 2013)

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 - ▶ Potential collusion between firm and employees (Yaniv, 1992)
 - ▶ Some evidence of collusion in developing countries (Kumler, Verhoogen 2015; Best 2013)
- ▶ Key question: who reports on firms' transactions?
 - ▶ Business partners: especially in countries with a VAT
 - ▶ Financial institutions
 - ▶ Public financial statements, audit companies

Kleven, Kreiner, Saez (2016): Firms as Fiscal Intermediaries

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 - ▶ Requires the use of accurate business records

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- ▶ Records available throughout the firm
 - ▶ A single employee could easily reveal true records to the govt
- ▶ Therefore, enforcement capacity depends directly on the size distribution of firms
 - ▶ Through the channel of third-party information
 - ▶ In other words, depends on the level of development of the economy

Gordon, Li (JPubEc, 2009): Tax Structures in Dev. Countries

- ▶ Developing countries feature many suboptimal tax policies:
 - ▶ Tariffs, differential commodity taxes, high taxes on capital income, seigniorage
 - ▶ All violate production efficiency (Diamond and Mirrlees, 1971)

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- ▶ Main hypothesis: govts rely on info from bank records to identify taxable entities
 - ▶ If benefits of financial services smaller than costs of taxation, some firms choose to operate in cash (ie, be “informal”)
 - ▶ The “threat of disintermediation” only affects relatively large firms, which are few in developing countries

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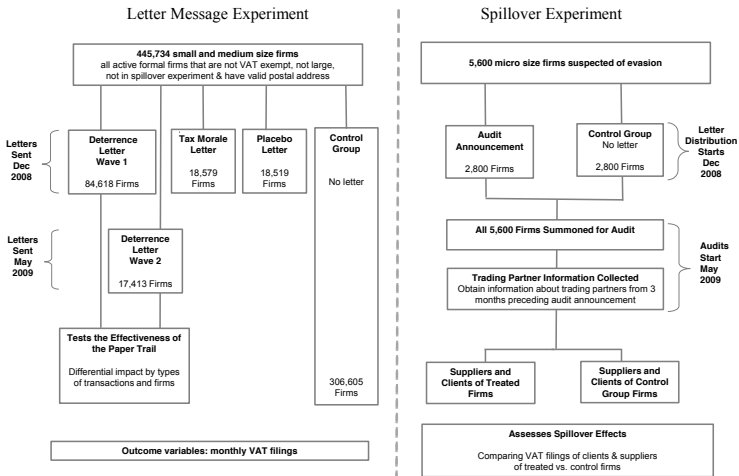
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 3. Effect of audit announcement transmitted up the VAT chain (suppliers comply more), but not downwards (no effect on clients)

Pomeranz (AER, 2015): Experimental Design

Figure 1: Research Design Diagrams



Source: Pomeranz (2015)

Pomeranz (AER, 2015): Self-Enforcing Property of VAT

- ▶ Consider a B2B transaction under the VAT
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- ▶ Given these conflicting incentives, we should observe:

$$Y_S = Y \text{ and } C_B = C$$

- ▶ Without collusion, $Y_S = C_B$ in this case

Pomeranz (AER, 2015): Self-Enforcing Properties of VAT

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- ▶ At a given level of evasion, firms should respond more to an increased audit risk on transactions with a paper trail.

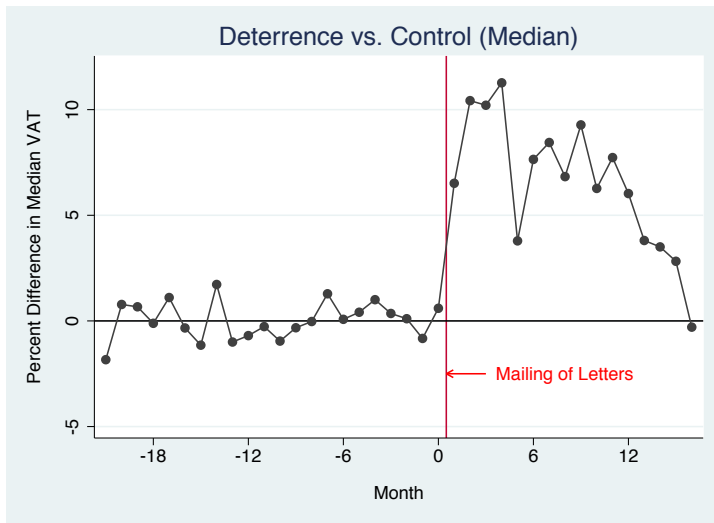
Pomeranz (AER, 2015): VAT Evasion Incentives

Table 1: Responses to Increase in Audit Probability: Collusive and Unilateral Evasion

Position in supply chain	Collusive Evasion		Unilateral Evasion	
Supplier	Sales ↑	VAT ↑	Sales ↑	VAT ↑
Treated firm	Inputs ↑ Sales ↑	VAT (↑)	Inputs ↓ Sales ↑	VAT ↑
Client	Inputs ↑	VAT ↓	Inputs ↓	VAT ↑

Notes: “Collusive evasion” stands for the type of evasion where a transaction is omitted from the books of both the seller and the buyer firm. “Unilateral evasion” stands for the type of evasion where the books of the seller and the buyer reveal discrepancies. Buyers, for whom inputs represent a tax deduction, will tend to overstate the value of the transaction, while sellers, for whom the transaction represents a tax liability, will tend to understate its value. The arrows indicate the expected direction of change for the line item in question resulting from an increased audit probability on the treated firm.

Pomeranz (AER, 2015): Effect of Threat-of-Audit Letters



Pomeranz (AER, 2015): Effect of Threat-of-Audit Letters

Table 4: Letter Message Experiment: Intent-to-Treat Effects on VAT Payments by Type of Letter

	(1) Mean VAT	(2) Median VAT	(3) Percent VAT > Previous Year	(4) Percent VAT > Predicted	(5) Percent VAT > Zero
Deterrence letter X post	-1,114 (2,804)	1,326*** (316)	1.40*** (0.12)	1.42*** (0.10)	0.53*** (0.09)
Tax morale letter X post	-1,840 (6,082)	262 (666)	0.40 (0.25)	0.30 (0.22)	0.44** (0.20)
Placebo letter X post	835 (6,243)	383 (687)	-0.11 (0.26)	-0.19 (0.23)	-0.14 (0.20)
Constant	268,810*** (1,799)	17,518*** (112)	47.50*** (0.07)	48.27*** (0.07)	67.30*** (0.06)
Month fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	No	Yes	Yes	Yes
Treatment Assignment	No	Yes	No	No	No
Number of observations	7,892,076	1,221,828	7,892,076	7,892,076	7,892,076
Number of firms	445,734	445,734	445,734	445,734	445,734
Adjusted R^2	0.40		0.14	0.28	0.47

Pomeranz (AER, 2015): Effects by Type of Transaction

Table 5: Impact of Deterrence Letter on Different Types of Transactions

	(1) Percent Sales > Previous Year	(2) Percent Input Costs > Previous Year	(3) Percent Intermediary Sales > Previous Year	(4) Percent Final Sales > Previous Year
Deterrence letter X post	1.17*** (0.22)	0.16 (0.21)	0.12 (0.19)	1.33*** (0.21)
Constant	55.39*** (0.13)	53.25*** (0.13)	38.37*** (0.12)	45.04*** (0.12)
Month fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,392,529	2,392,529	2,392,529	2,392,529
Number of firms	133,156	133,156	133,156	133,156
Adjusted R^2	0.25	0.22	0.30	0.32

Pomeranz (AER, 2015): Effects by Share of Final Sales

Table 6: Interaction of Firm Size and Share of Sales to Final Consumers

Panel A:	Percent VAT > Previous Year				
	(1)	(2)	(3)	(4)	(5)
Deterrence letter X final sales share	1.61*** (0.26)			1.48*** (0.27)	1.43*** (0.26)
Deterrence letter X size category		-0.17*** (0.04)		-0.10*** (0.04)	
Deterrence letter X log employees			-0.45*** (0.11)		-0.29** (0.12)
Deterrence letter	0.68*** (0.16)	2.63*** (0.29)	1.66*** (0.13)	1.49*** (0.35)	0.92*** (0.19)
Constant	47.53*** (0.08)	48.87*** (0.08)	47.50*** (0.08)	48.89*** (0.08)	47.53*** (0.08)
Final sales share X post	Yes	No	No	Yes	Yes
Size measure X post	No	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Month dummies	Yes	Yes	Yes	Yes	Yes
Observations	7,308,631	7,116,590	7,340,994	7,084,823	7,308,631
Number of firms	406,834	396,135	408,636	394,367	406,834
Adjusted R^2	0.14	0.14	0.14	0.14	0.14

Pomeranz (AER, 2015): Spillover Effects

Table 7: Spillover Effects on Trading Partners' VAT Payments

	(1)	(2)	(3)	(4)	(5)	(6)
	Percent VAT > Previous Year	Percent VAT > Predicted	Percent VAT > Previous Year	Percent VAT > Predicted	Percent VAT > Previous Year	Percent VAT > Predicted
Audit announcement X post	2.41** (1.14)	2.03* (1.11)				
Audit announcement X supplier X post			4.28*** (1.54)	3.92*** (1.50)	4.14*** (1.52)	3.83*** (1.52)
Audit announcement X client X post			-0.26 (1.64)	-0.28 (1.51)	-0.14 (1.67)	-0.28 (1.55)
Supplier X post			-0.64 (1.62)	0.34 (1.59)	-1.11 (1.67)	0.60 (1.64)
Constant	52.07*** (0.95)	49.06*** (0.94)	52.07*** (0.95)	49.06*** (0.94)	52.75*** (0.96)	50.11*** (0.96)
Controls X post	No	No	No	No	Yes	Yes
Controls X audit announcement X post	No	No	No	No	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	45,264	45,264	45,264	45,264	44,288	44,288
Number of firms	2,829	2,829	2,829	2,829	2,768	2,768
Adjusted R^2	0.05	0.11	0.05	0.11	0.05	0.10

Outline

Estimating Tax Evasion

Allingham-Sandmo (1972)

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Naritomi (2016): Consumers as Tax Auditors

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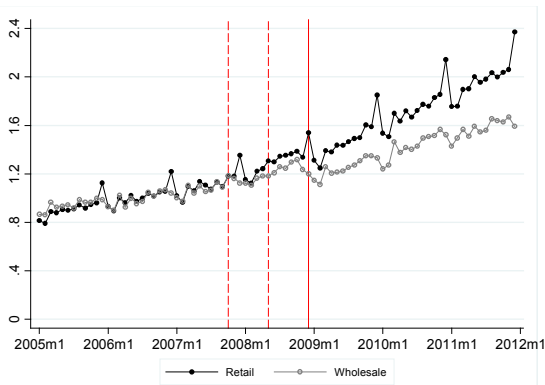
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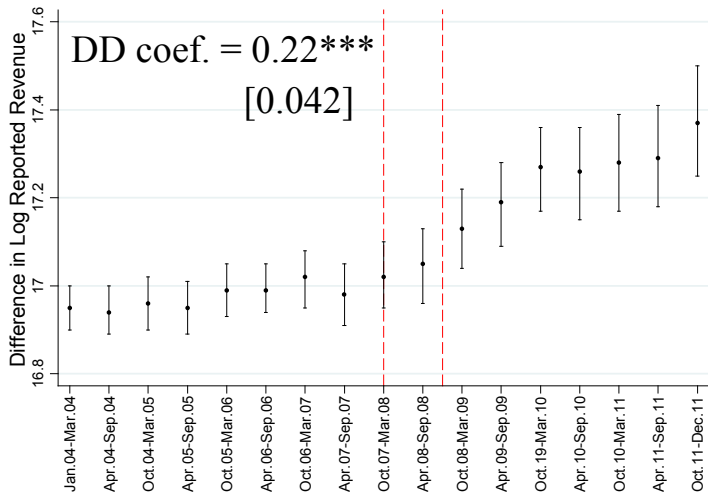
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- ▶ **Setting:** policy that provides incentives (lottery prizes) for consumers to collect & report sales receipts
- ▶ **Data:** admin data on all reported transactions in the state of Sao Paulo (Brazil)
- ▶ **Estimation strategy:** compare the evolution of sales in retail (many sales to final consumers) vs. wholesale (mostly business-to-business sales)

Naritomi (2016): Policy Context

- ▶ *Nota Fiscal Paulista* was introduced in the retail sector between Oct-2007 and Dec-2008
- ▶ The first lottery prizes to consumers were announced in Dec-2008

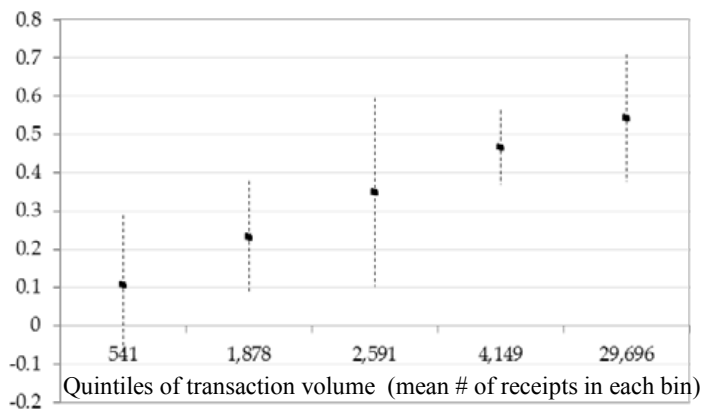


Naritomi (2016): Diff-in-Diff Estimates



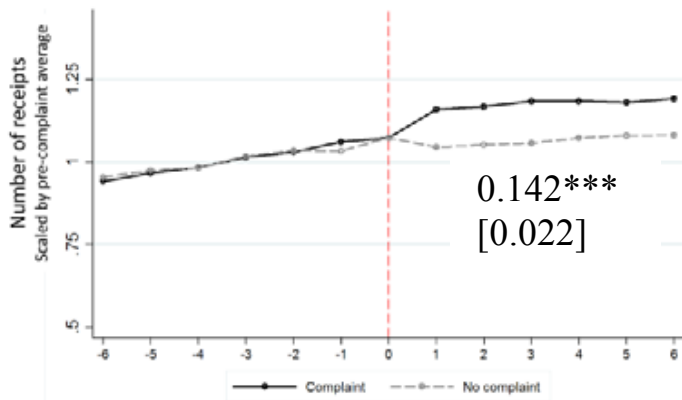
Source: Naritomi (2016)

Naritomi (2016): Whistle-blower Threat



Source: Naritomi (2016)

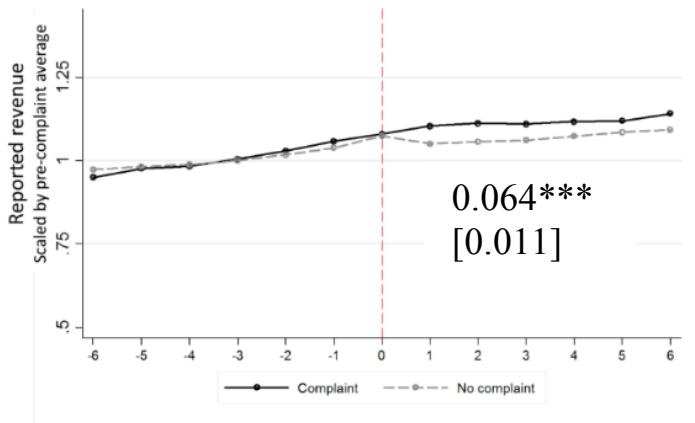
Naritomi (2016): Number of Receipts



a. Changes in the number of receipts

Source: Naritomi (2016)

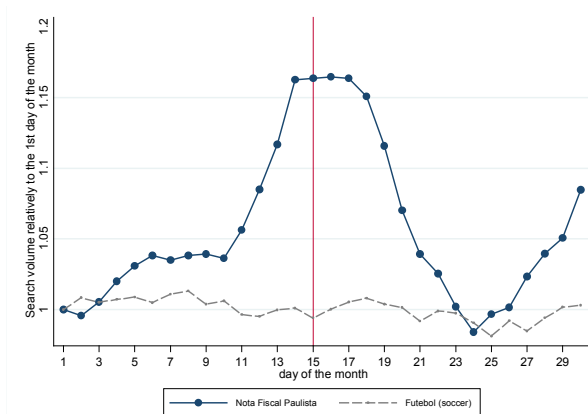
Naritomi (2016): Reported Revenue



ed **b. Changes in reported revenue**

Source: Naritomi (2016)

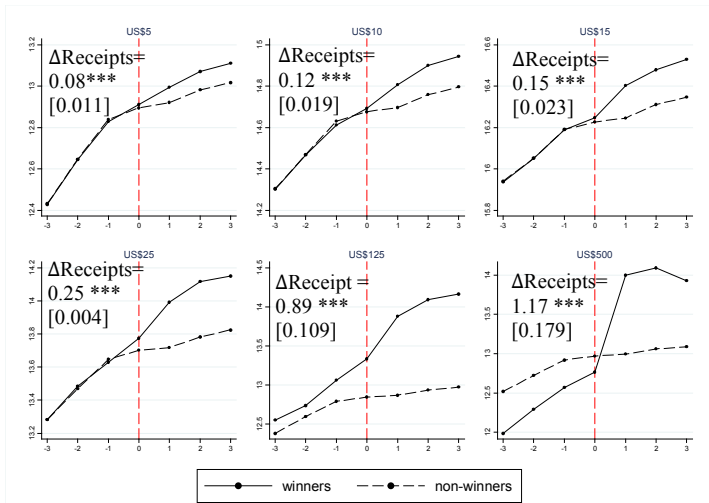
Naritomi (2016): Lottery Searches on Google



**a: Timing of lottery results - Google searches
for *Nota Fiscal Paulista*.**

Source: Naritomi (2016)

Naritomi (2016): Effects by Lottery Size



Source: Naritomi (2016)

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- ▶ Effect stronger in sectors with large number of transactions
 - ▶ Higher probability of detection
- ▶ Direct evidence of whistle-blower effects
 - ▶ 14% more receipts and 6% more revenue after receiving first complaint

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Cryptocurrencies and Tax Evasion

Cryptocurrencies and Tax Evasion

- ▶ Bitcoin and other cryptocurrencies have the potential to establish a decentralized ledger system.
- ▶ While transactions are public and verifiable within the bitcoin economy, the associated real-world individuals are anonymous.
- ▶ This means that payments in cryptocurrencies, by construction, cannot be taxed.
- ▶ A world in which more and more incomes are generated via crypto transactions will have serious evasion problems.
- ▶ Mobile wealth is not taxable, as it can be liquidated into cryptocurrency.
- ▶ In the event of mass movement to cryptocurrencies, taxes on real property, and especially on land value, will become a more desirable, and perhaps a necessary, policy.