GR 6307
Public Economics and Development

2. Taxation:
Raising Revenues with Tax Evasion and Informality
Extra Slides on Papers we Don't Have Time for in Class

Michael Carlos Best

Outline

Taxation in Developing Countries: Big Picture

Tax Evasion: Theory and Evidence from Rich Countries

Taxation in Low- and Middle-Income Countries

International Taxation and Developing Countries

Outline

Taxation in Developing Countries: Big Picture

- Gordon & Li (JPubE 2009) *Tax Structures in Developing Countries: Many Puzzles and a Possible Explanation*

Gordon & Li (2009): Model

- J industries with CRS $f_j(K_j, L_j)$
- If don't use financial sector, informal firm and no tax:
  $\Pi = p_j^* f_j - rK_j - wL_j$
- If use finance, generate paper trail, but more efficient
  $\Pi = \frac{1+a_j}{1+s_j} p_j^* f_j - rK_j - wL_j$
- Let $\beta = I\{\text{use finance}\}$ then

$$\Pi = \max_{\beta_j, L_j, K_j} \left((1-\beta_j) p_j^* f_j + \beta_j p_j^* \frac{1+a_j}{1+s_j} p_j^* f_j - rK_j - w_{L_j} \right)$$

- Formalize if $s_j < a_j$

Gordon & Li (2009): Model

- Simple GE model with 3 goods to replicate stylized facts

0 Non-tradable good

1 Exported Tradable good

2 Imported Tradable good

- Tax instruments:
  - excise taxes s_j
  - corporate profit tax τ_j (base is $rK_j/(1-\tau_j)$ by CRS)
  - tariff m_2
  - seignorage iM (interest rate i, money stock M)

Gordon & Li (2009): Model

- Households: OLG.

$$V_t\left(\frac{wh}{g\left(p_t, \frac{p_{t+1}}{1+r}, \frac{i}{1+r}\right)}\right)$$

- $g(\cdot)$ is a price index, assume equal expenditure shares across hhs, welfare depends on g and wh

- Budget Constraint

$$whL_t = p_t C_t + \frac{p_{t+1}C_{t+1} + iM^h_{t+1}}{1+r}$$

Gordon & Li (2009): Model

- Assumption 1:
  1. Inelastic labor supply
  2. non-tradables weakly larger budget share for the old
- a_j varies across countries and industries: $a_c = \phi_j \theta_c$
- Assumption 2:
  1. $\phi_0 < \phi_1 < \phi_2$
  2. $\frac{K_0}{L_0} < \frac{K_1}{L_1} < \frac{K_2}{L_2}$ for all factor prices

Gordon & Li (2009): Formality Decision

- Formal firms: 0-profit condition gives

$$p_j \frac{1+a_j}{1+s_j} = c_j\left(w, r\left(1+\tau_j\right)\right)$$

- Informal firms: cash transactions $\rightarrow$ subject to inflation.
  - Costs $d\left(\mu\right)$ to hold a share μ of turnover in cash.
  - Profit rate: $\left(1-i\mu-d\left(\mu\right)\right)p_j - c_j\left(w,r\right)$
- Indifference:

$$p_j \frac{1+a_j}{1+s_j} - c_j\left(w, r\left(1+\tau_j\right)\right) = \left(1-i\mu^*-d\left(\mu^*\right)\right)p_j - c_j\left(w,r\right)$$

Gordon & Li (2009): Results

- Governments seek to maximize social welfare

$$\underbrace{\sum_t \frac{V_t}{(1+\rho)^t}}_{\text{HH welfare}} + R\left(\underbrace{\sum_t \frac{1}{(1+r)^t} \sum_j \left(s_j \frac{1+a_j}{1+s_j} p_{jt} + \tau_j r k_j\right) \beta_j p_{jt} f_{jt} + \left(1 - \frac{v}{i}\right) i M_t + m_2 p_{2t} I_{2t}}_{\text{Government Revenue}}\right)$$

- Government gets more revenues from formal firms, so won't raise taxes so much as to tip firms into informality
- Informality decision implies constraints on tax instruments.

$$\underbrace{s_j \frac{1+a_j}{1+s_j} p_j + c_j\left(w, r\left(1+\tau_j\right)\right) - c_j\left(w, r\right) - \mu^*\left(i-v\right) p_j}_{\text{Extra revenue if firms in sector j are formal}} \leq \underbrace{a_j p_j + d p_j + \mu^* v p_j}_{\text{costs firms willing to bear to avoid tax}}$$

Gordon & Li (2009): Results

- Proposition 1: Rich countries: θ_c high so no constraints bind and then
- uniform s_j
  - $\tau_j = 0$
  - $m_2 = 0$, low i

- Proposition 2: If constraint binds in sector 0
  - $1 + m_2 = \frac{1+s_2}{1+s_1}$
  - $s_2 > s_1$ if $e_0 > 1$ (PED of good 0)
  - $\tau > 0$
  - bigger i

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Tax Evasion: Theory and Evidence from Rich Countries

- Dwenger, Kleven, Rasul & Rincke (AEJ:Pol 2016) *Extrinsic and Intrinsic Motivations for Tax Compliance: Evidence from a Field Experiment in Germany*
- Alstadsæter, Johannesen & Zucman (AER 2019) *Tax Evasion and Inequality*
- Alstadsæter, Johannesen & Zucman (WP 2018) *Tax Evasion and Tax Avoidance*

Dwenger et al. (2016): Overview

- Perhaps A-S predicts poorly because people don't understand the incentives they face?
- Or because people comply for *non-pecuniary* reasons?
  - moral sentiments
  - guilt
  - reciprocity
  - social norms
- Label all of these *intrinsic motivation*
- Run a field experiment to contrast impact with *extrinsic motivation* (financial penalties for non-compliance)
- Study local church tax in Bavaria, Germany

Dwenger et al. (2016): Setting

- All members of protestant and catholic churches must pay tax
- local tax collected by individual parishes
- Everyone who is baptised is liable when they turn 18 (even though <8% actually attend church)
- progressive tax schedule from €5 to €100 based on broad income
- Each May, churches mail people to self-assess and deposit their tax liability
  - at baseline no deterrence
- Overpayment is encouraged, treated as donations
  - identify intrinsically motivated people as overpayers at baseline

Dwenger et al. (2016): Model

- Model merging A-S with warm-glow (Andreoni 1988, 1990)
- Taxpayers have true income $\bar{z}$ and face tax schedule $T(\bar{z})$. Report z and $T(z)$.
- Utility $u(c, T(z), s)$ c is consumption, $T(z)$ to capture warm glow, governed by parameter s.
- u'_T/u'_C increasing in s, 0 if $s = 0$. s is heterogeneous in population with cdf $F(s)$. $s = 0 \rightarrow$A-S
- Taxpayers choose z to maximize

$$\begin{aligned}&(1-p)\,u(\bar{z}-T(z), T(z), s)\\ +&pu(\bar{z}-T(z)-I\{z<\bar{z}\}(1+\theta)[T(\bar{z})-T(z)], T(z), s)\end{aligned}$$

where p is audit probability, θ is penalty

Dwenger et al. (2016): Model

- Three types of taxpayers
  1. *evaders:* $T(z) < T(\bar{z})$
  2. *compliers*: $T(z) = T(\bar{z})$
  3. *donors*: $T(z) > T(\bar{z})$
- Policy changes create intensive margin (changes in z within type) and extensive margin (taxpayers changing types) responses.
- Intensive margin response:

$$(1-p)\,u'_{c_N} + p\,(1 - I\{z < \bar{z}\}\,(1+\theta))\,u'_{c_A} = \mathsf{E}\left[u'_T\right]$$

where u'_{c_N} and u'_{c_A} are marginal utilities of consumption in non-audited and audited states

Dwenger et al. (2016): Model

- Intensive margin comparative statics: $p \uparrow \rightarrow z \uparrow$ for evaders, no effect on donors
- Extensive margin: $s < \bar{s}_1 \rightarrow$evader; $\bar{s}_1 \leq s \leq \bar{s}_2 \rightarrow$ complier; $\bar{s}_2 < s \rightarrow$donor. Cutoffs satisfy

$$\frac{u_T'\left(\bar{z} - T\left(\bar{z}\right), T\left(\bar{z}\right), \bar{s}_1\right)}{u_c'\left(\bar{z} - T\left(\bar{z}\right), T\left(\bar{z}\right), \bar{s}_1\right)} = 1 - p\left(1 + \theta\right)$$

$$\frac{u_T'\left(\bar{z} - T\left(\bar{z}\right), T\left(\bar{z}\right), \bar{s}_2\right)}{u_c'\left(\bar{z} - T\left(\bar{z}\right), T\left(\bar{z}\right), \bar{s}_2\right)} = 1$$

- Comparative statics: $p \uparrow \rightarrow \bar{s}_1 \downarrow$, no effect on $\bar{s}_2 \Rightarrow$ fewer evaders, more compliers

Dwenger et al. (2016): Experiment

- Experiment with 11 (!) treatment arms
  - T1. Control
- Tax Simplification and misperceptions
  - T2. Shorter, clearer message. Legal obligation, payment deadlines and schedule more salient
  - T3. T2 + paragraph saying $p = 0$
- Deterrence
  - T4. T2 + $p = 0.1$
  - T5. T2 + $p = 0.2$
  - T6. T2 + $p = 0.5$
  - T7. T2 + $p = 0.5$ if pay less than €10

Dwenger et al. (2016): Experiment

- Compliance Rewards

  T8. T2 + social recognition (in newspaper) of timely compliance

  T9. T2 + private raffle for €250

  T10. T2 + private raffle for €1,000

  T11. T2 + newspaper + €1,000 raffle

Dwenger et al. (2016): Analysis

- Data. Link church records (z) with tax records $(\bar{z})$ on 39,782 individuals
- Extensive margin: Estimate LPM

$$\Pr(i \text{ evades}) = \alpha + \beta I\{T_i = j\} + \pi E_{i,pre} + \lambda_S + u_i$$

where $I\{T_i = j\}$ indicates treatment j, $E_{i,pre}$ denotes evasion in previous years, λ_s are stratum FEs

- Total responses

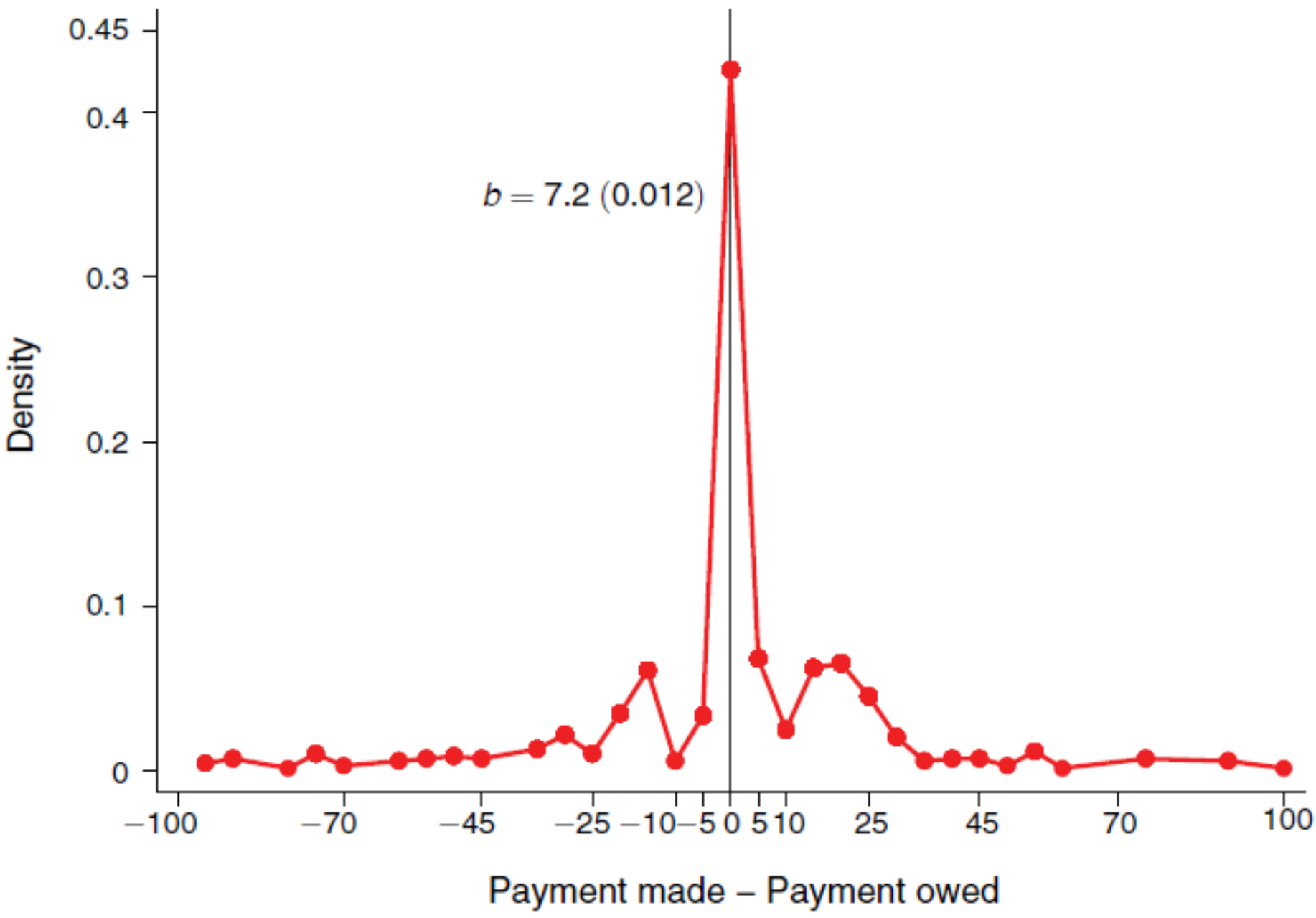
$$y_i = \delta + \gamma I\{T_i = j\} + \theta \bar{y}_{i,pre} + \lambda_s + \varepsilon_i$$

where $\bar{y}_{i,pre}$ is average pre-treatment tax

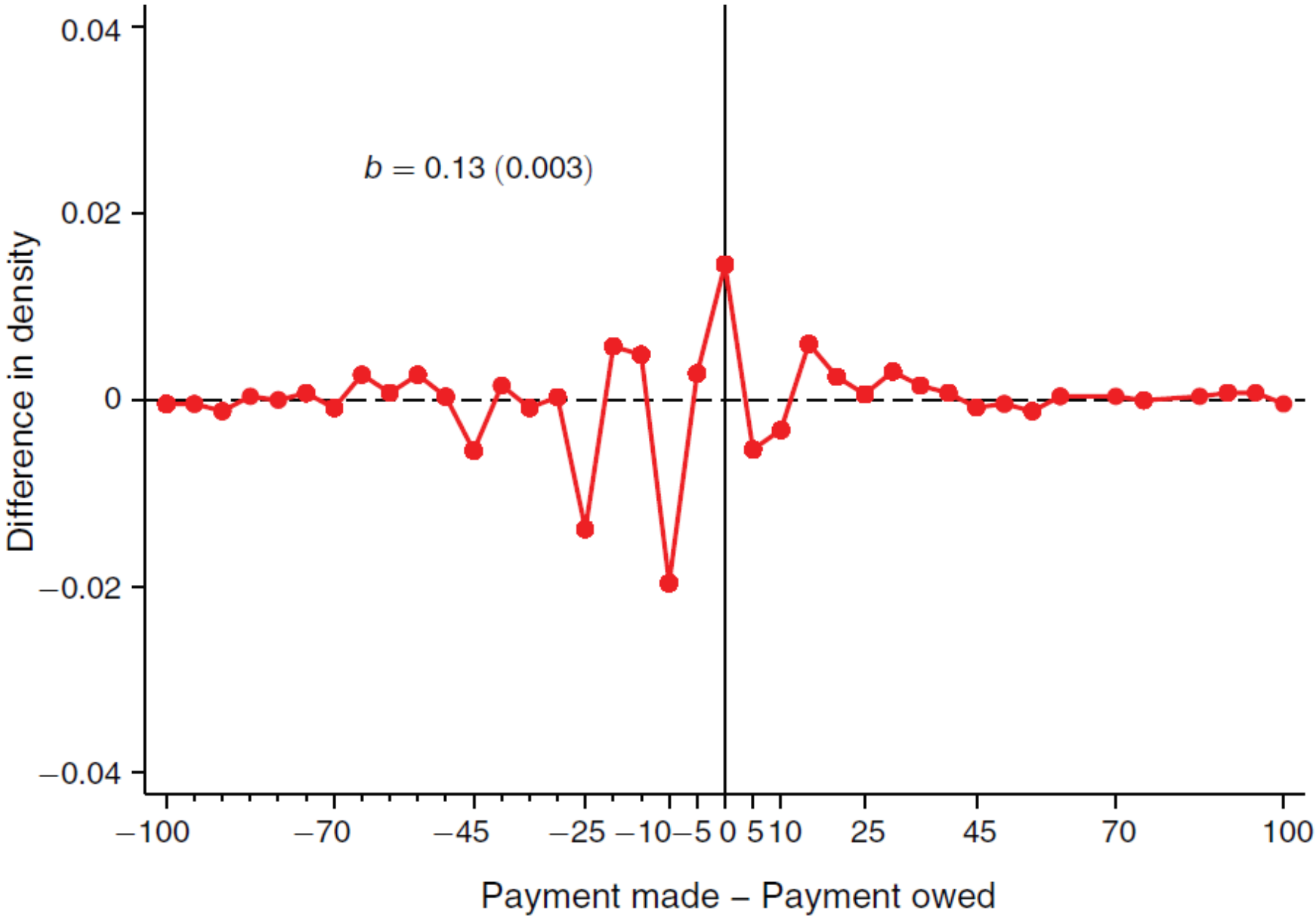
TABLE 1—COMPLIANCE UNDER ZERO DETERRENCE

Control group, means	Full sample (1)	Evaders (extrinsically motivated) (2)	Compliers/donors (intrinsically motivated) (3)
Number of individuals	2,532	2,004	528
Percentage of all individuals	100%	79.1%	20.9%
Full evaders	72.7%	91.9%	—
Partial evaders	6.4%	8.08%	—
Compliers	11.6%	—	55.5%
Donors	9.3%	—	44.5%
Payment amount	€10.32	€1.87	€42.40

Notes: The sample of individuals are all those assigned to the T1 control group in 2012 (2,532 individuals). The column headings refer to behavior in 2012, the year of the field experiment. Evaders are defined as those who pay strictly less than their legal tax liability, compliers are those who pay exactly their legal tax liability, and donors are those who pay strictly more than their legal tax liability.


Panel A. Bunching at exact compliance (duty-to-comply) control letter
0.45
0.4
0.3
0.2
0.1
0
Density
b = 7.2 (0.012)
−100
−70
−45
−25
−10
−5
0
5
10
25
45
70
100
Payment made – Payment owed

Panel B. Duty-to-comply versus attention simplification letter—control letter



Control group, means	Full sample			
	Probability of evading (1)	Probability of donating (2)	Payment amount (3)	Probability of payment increase (4)
Panel A. Tax simplification				
Simplification versus control				
Effect of tax simplification	−2.45	−0.438	9.73	33.61
	(0.971)	(6.90)	(3.73)	(10.25)
Average outcome in comparison group	79.29%	9.24%	€10.29	7.89%
Observations	5,076	5,076	5,076	5,076
Panel B. Misperception				
Zero audit probability versus simplification				
Effect of correcting misperception	0.942	−7.23	−0.766	−10.60
	(0.889)	(5.65)	(3.05)	(6.75)
Average outcome in comparison group	77.30%	9.75%	€11.65	10.92%
Observations	7,641	7,641	7,641	7,641
Panel C. Deterrence				
Positive audit probability versus zero audit probability				
Effect of deterrence	−3.13	13.71	10.45	26.93
	(0.660)	(4.59)	(2.37)	(5.84)
Average outcome in comparison group	78.04%	8.93%	€11.63	9.42%
Observations	12,692	12,692	12,692	12,692
Panel D. Compliance rewards				
Reward versus simplification				
Effect of compliance rewards	0.259	−0.040	1.24	−9.48
	(0.821)	(5.23)	(2.86)	(6.21)
Average outcome in comparison group	77.30%	9.75%	€11.65	10.92%
Observations	12,632	12,632	12,632	12,632

	Baseline evaders (extrinsically motivated)				Baseline donors (intrinsically motivated)			
	Probability of evading (5)	Probability of donating (6)	Payment amount (7)	Probability of payment increase (8)	Probability of evading (9)	Probability of donating (10)	Payment amount (11)	Probability of payment increase (12)
Panel A. Tax simplification								
Simplification versus control								
Effect of tax simplification	−2.66	6.58	43.40	64.82	−5.25	−4.04	−6.65	−37.29
	(0.747)	(22.86)	(10.60)	(13.69)	(19.67)	(6.97)	(4.85)	(19.38)
Average outcome in comparison group	94.98%	1.91%	€3.13	6.12%	17.32%	62.34%	€39.94	15.58%
Observations	4,007	4,007	4,007	4,007	476	476	476	476
Panel B. Misperception								
Zero audit probability versus simplification								
Effect of correcting misperception	1.53	−8.89	−9.83	−11.03	−16.75	1.52	8.79	32.37
	(0.715)	(17.47)	(6.75)	(7.55)	(17.63)	(5.78)	(4.78)	(28.02)
Average outcome in comparison group	92.35%	2.18%	€4.84	10.53%	15.92%	61.63%	€40.16	8.57%
Observations	6,049	6,049	6,049	6,049	723	723	723	723
Panel C. Deterrence								
Positive audit probability versus zero audit probability								
Effect of deterrence	−3.12	36.89	33.67	29.81	−0.093	7.07	2.10	30.85
	(0.536)	(15.22)	(6.28)	(6.64)	(15.48)	(4.22)	(3.25)	(19.16)
Average outcome in comparison group	93.80%	1.93%	€4.05	9.00%	12.55%	61.72%	€45.08	10.67%
Observations	9,979	9,979	9,979	9,979	1,261	1,261	1,261	1,261
Panel D. Compliance rewards								
Reward versus simplification								
Effect of compliance rewards	1.27	5.24	−5.46	−15.58	−11.64	2.02	4.87	48.34
	(0.664)	(16.17)	(6.33)	(6.90)	(15.11)	(4.95)	(3.83)	(25.27)
Average outcome in comparison group	92.35%	2.18%	€4.84	10.53%	15.92%	61.63%	€40.16	8.57%
Observations	9,909	9,909	9,909	9,909	1,247	1,247	1,247	1,247

	Full sample			
	Probability of evading (1)	Probability of donating (2)	Payment amount (3)	Probability of payment increase (4)
Panel A. Deterrence				
Positive audit probability versus zero audit probability				
Deterrence, pooled effect	−2.45	−0.438	9.73	33.61
	(0.971)	(6.90)	(3.73)	(10.25)
Deterrence, individual effects				
Audit probability = 0.1	−3.29	5.38	9.52	29.76
	(0.898)	(6.08)	(3.20)	(8.05)
Audit probability = 0.2	−3.11	17.61	11.48	26.81
	(0.923)	(6.44)	(3.37)	(8.11)
Audit probability = 0.5	−2.99	18.27	10.38	24.17
	(0.912)	(6.31)	(3.30)	(8.01)
Average outcome in comparison group	78.04%	8.93%	€11.63	9.42%
Observations	12,692	12,692	12,692	12,692
Panel B. Compliance rewards				
Reward versus simplification				
Compliance rewards, pooled effect	0.259	−0.040	1.24	−9.48
	(0.821)	(5.23)	(2.86)	(6.21)
Compliance rewards, individual effects				
Social reward	0.185	2.97	0.245	−11.60
	(1.03)	(6.68)	(3.51)	(7.71)
Small private reward	0.450	−4.59	−1.15	−10.88
	(1.03)	(6.74)	(3.56)	(7.74)
Large private reward	1.02	−3.30	2.12	−15.30
	(1.00)	(6.60)	(3.98)	(7.63)
Social and private reward combined	−0.618	4.75	3.74	−0.15
	(1.04)	(6.57)	(3.73)	(7.89)
Average outcome in comparison group	77.30%	9.75%	€11.65	10.92%
Observations	12,632	12,632	12,632	12,632

	Baseline evaders (extrinsically motivated)				Baseline donors (intrinsically motivated)			
	Probability of evading (5)	Probability of donating (6)	Payment amount (7)	Probability of payment increase (8)	Probability of evading (9)	Probability of donating (10)	Payment amount (11)	Probability of payment increase (12)
Panel A. Deterrence								
Positive audit probability versus zero audit probability								
Deterrence, pooled effect	−2.66	6.58	43.40	64.82	−5.25	−4.04	−6.65	−37.29
	(0.747)	(22.86)	(10.60)	(13.69)	(19.67)	(6.97)	(4.85)	(19.38)
Deterrence, individual effects								
Audit probability = 0.1	−3.09	14.43	31.69	34.91	15.80	−2.07	2.91	41.68
	(0.741)	(19.43)	(8.73)	(9.19)	(21.44)	(5.76)	(4.38)	(26.31)
Audit probability = 0.2	−3.60	44.22	42.19	29.86	7.45	10.92	−0.544	22.62
	(0.773)	(21.67)	(8.89)	(9.17)	(19.63)	(5.39)	(3.94)	(23.67)
Audit probability = 0.5	−2.69	52.86	27.48	24.55	−25.90	12.08	4.41	29.25
	(0.749)	(22.28)	(9.23)	(9.10)	(21.44)	(5.66)	(4.11)	(26.60)
Average outcome in comparison group	93.80%	1.93%	€4.05	9.00%	12.55%	61.72%	€45.08	10.67%
Observations	9,979	9,979	9,979	9,979	1,261	1,261	1,261	1,261
Panel B. Compliance rewards								
Reward versus simplification								
Compliance rewards, pooled effect	1.27	5.24	−5.46	−15.58	−11.64	2.02	4.87	48.34
	(0.664)	(16.17)	(6.33)	(6.90)	(15.11)	(4.95)	(3.83)	(25.27)
Compliance rewards, individual effects								
Social reward	1.02	17.93	−6.38	−16.84	−11.96	3.17	3.50	40.87
	(0.824)	(21.07)	(7.99)	(8.57)	(19.62)	(6.35)	(4.66)	(34.04)
Small private reward	1.22	2.66	−10.10	−17.50	−11.95	−4.56	5.15	56.00
	(0.825)	(20.60)	(7.87)	(8.50)	(18.48)	(6.32)	(4.57)	(32.76)
Large private reward	2.09	−7.38	−10.57	−21.24	−4.55	2.72	3.16	35.00
	(0.794)	(19.69)	(7.59)	(8.34)	(19.25)	(6.32)	(5.08)	(32.38)
Social and private reward combined	0.777	7.66	4.93	−6.95	−18.58	7.38	7.89	62.16
	(0.841)	(20.47)	(8.34)	(8.75)	(20.02)	(6.37)	(5.24)	(34.60)
Average outcome in comparison group	92.35%	2.18%	€4.84	10.53%	15.92%	61.63%	€40.16	8.57%
Observations	9,909	9,909	9,909	9,909	1,247	1,247	1,247	1,247

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Alstadsæter et al. (2019): Overview

- Who evades taxes? Is it the ultra-rich (panama papers) or the poor (self-employed/benefit fraud)?
- Combine financial leaks, amnesties, and tax data in Scandinavia to study distribution of evasion.
- Find that
  - evasion is higher amongst the rich (25-30% vs 3% in the overall population)
  - evasion and avoidance aren't good substitutes
- Provide a model of tax evasion intermediaries to rationalize results
- Implies that
  - high fiscal returns to clamping down on evasion
  - measured wealth inequality understated

Alstadsæter et al. (2019): Data

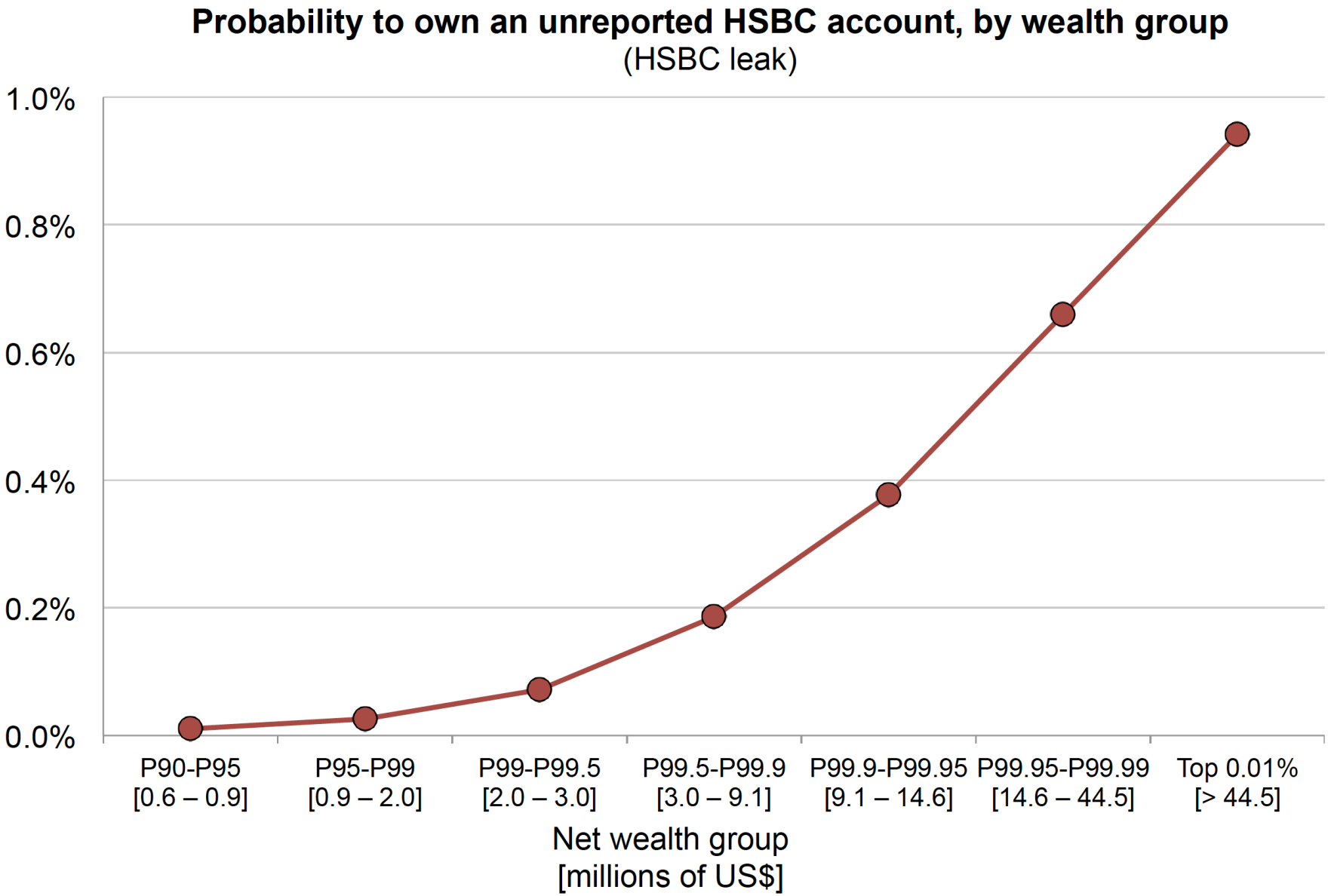
1. HSBC Switzerland Leak
   - 1.1 In 2007, an engineer at HSBC Private Bank Switzerland leaked details of 30,142 clients' accounts to French tax authorities.
   - 1.2 Contains beneficial ownership information linking owners to wealth even if held through shell companies
   - 1.3 HSBC a big player in offshore wealth management.
   - 1.4 Link to Scandinavian tax data: Match 520 households who did not declare the accounts.
2. Panama Papers Leak
   - 2.1 2016 leak of names & addresses of owners of shell companies created by Mossack Fonseca
   - 2.2 Match to 165 taxpayers in Norway & Sweden
3. Tax Amnesty Participants in Norway and Sweden
   - 3.1 1,422 in NO; 6,811 in SE
4. Tax microdata from Denmark, Norway & Sweden

Alstadsæter et al. (2019): Wealth Distribution

- Construct full distribution of wealth
- Distribute aggregate wealth in national accounts amongst households

1. 3rd-party reports from banks, insurers etc of end-of-year market value of clients' wealth
2. land/real-estate assets valued using transaction prices
3. Impute non-coporate business assets and unlisted equities by capitalizing business/dividend income on tax returns

Alstadsæter et al. (2019): Leaks Results



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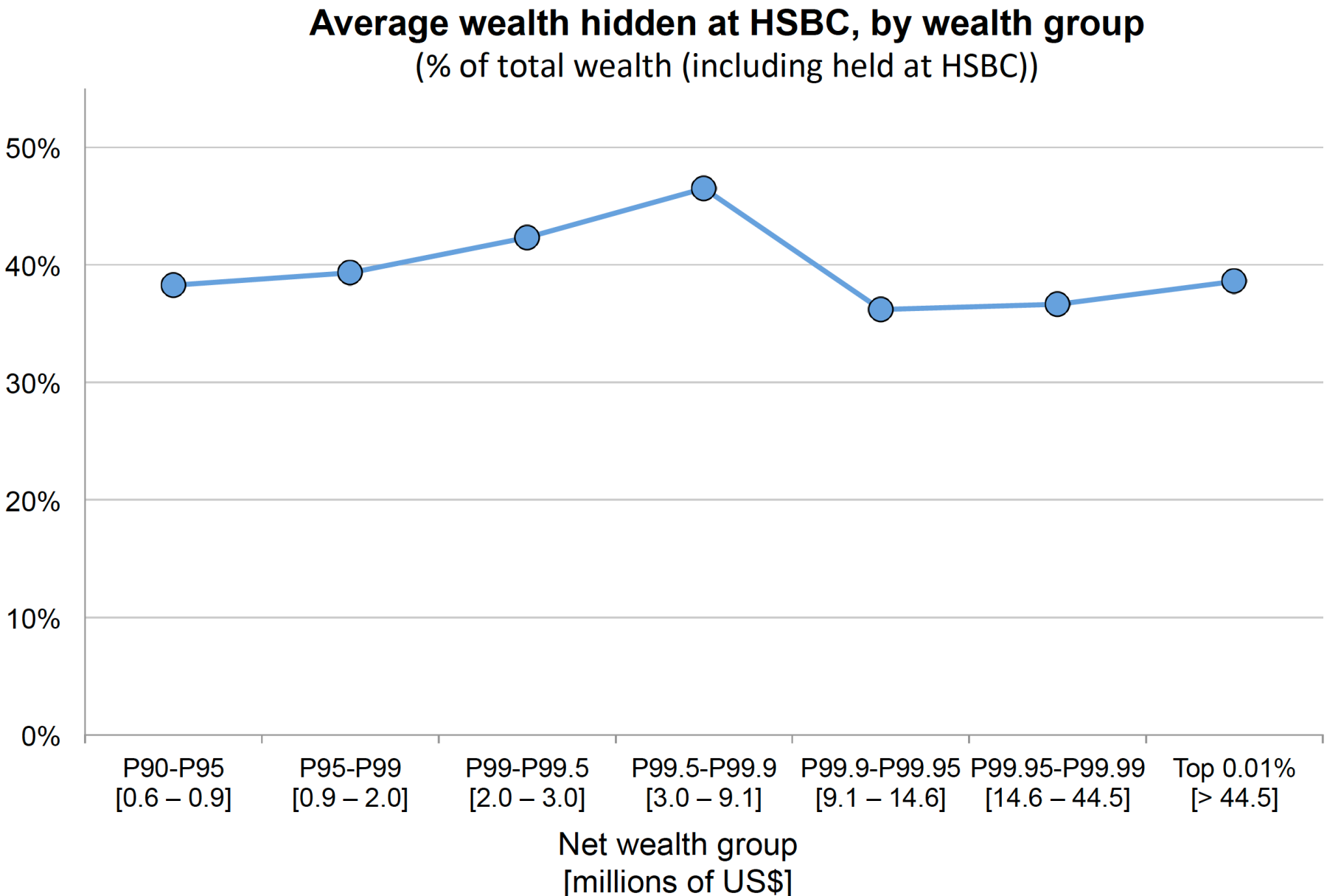
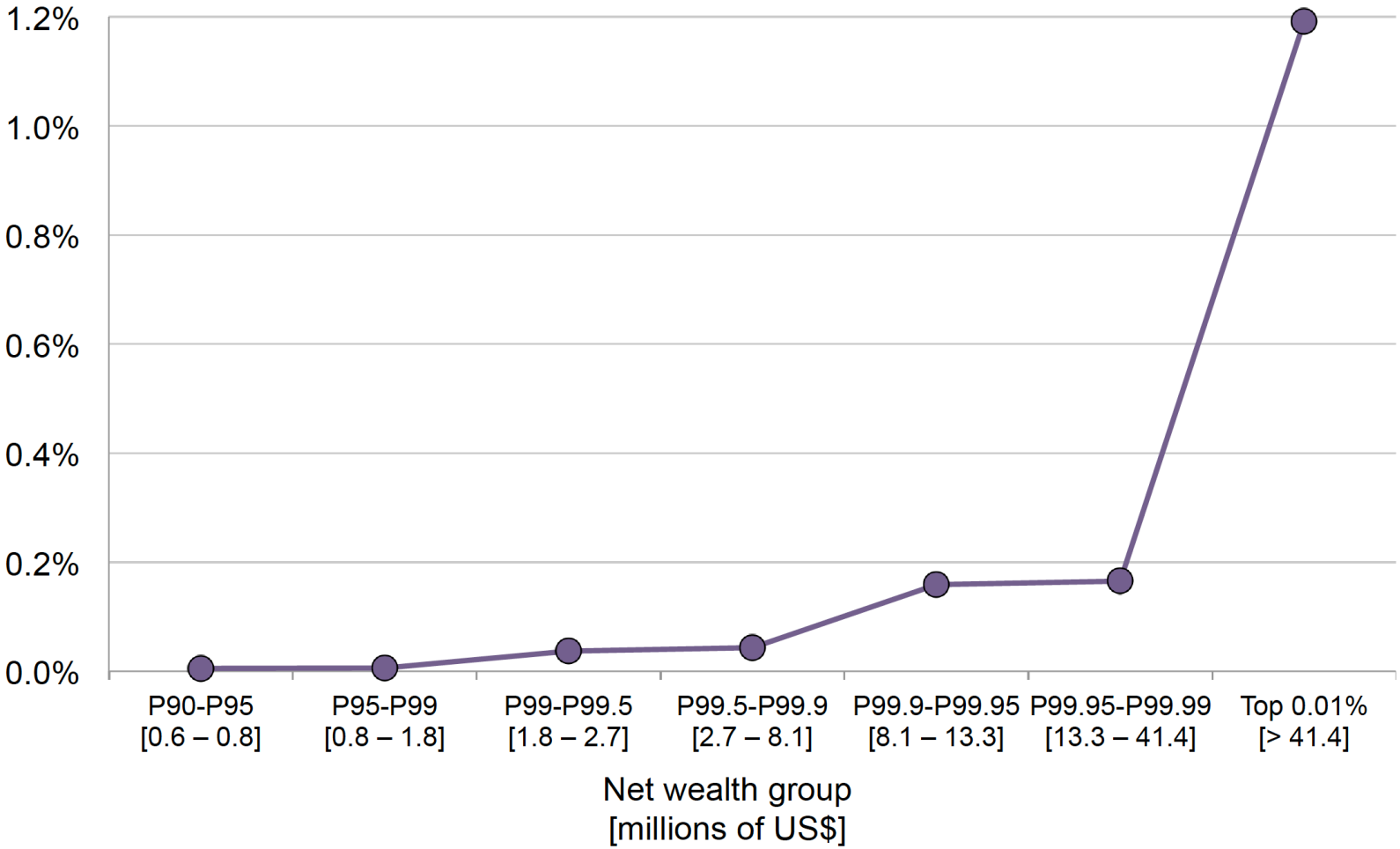


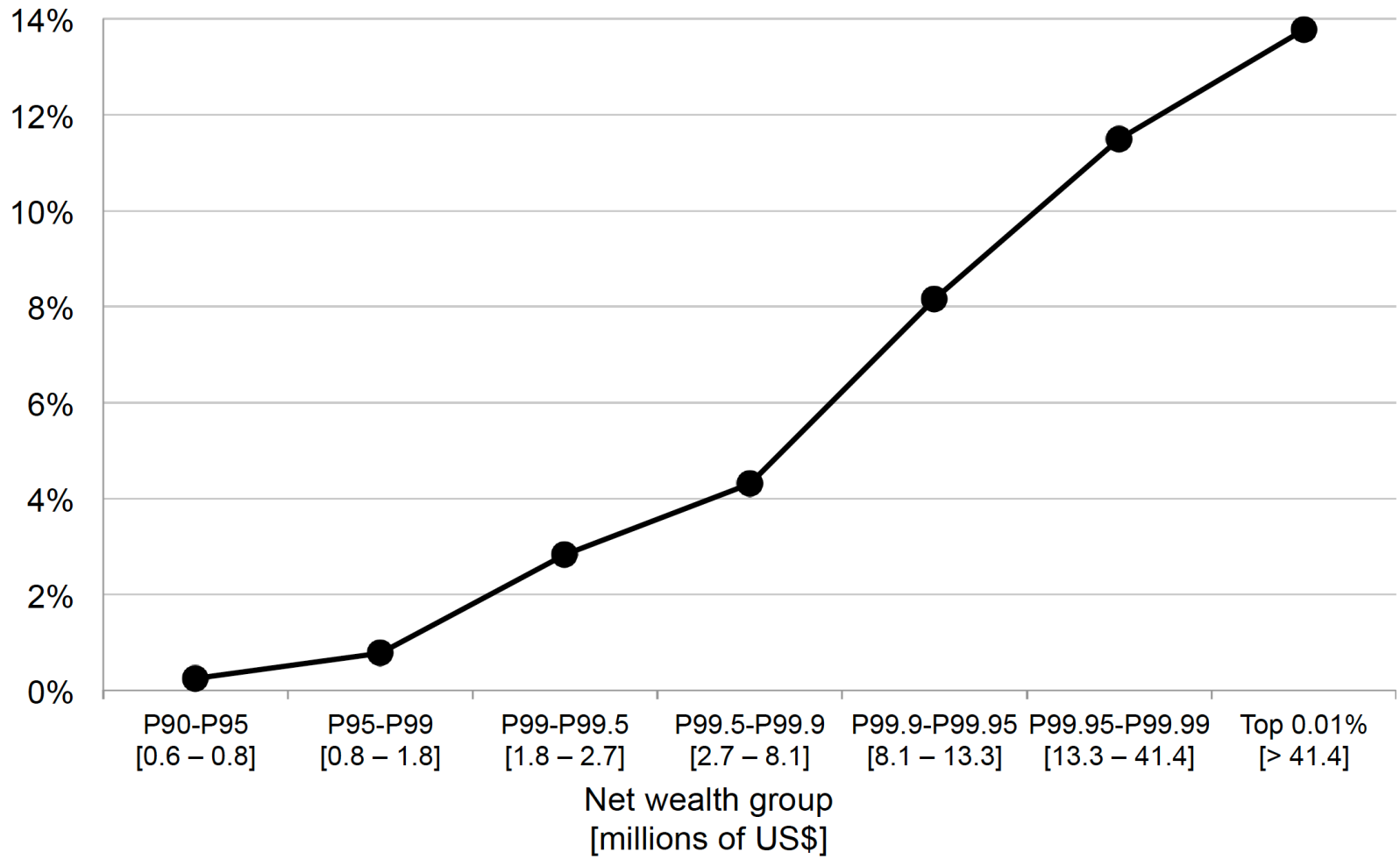
Alstadsæter et al. (2019): Leaks Results

Figure 4: Probability to appear in the Panama Papers, by wealth group



Alstadsæter et al. (2019): Amnesty Results

Figure 5: Probability to use a tax amnesty, by wealth group

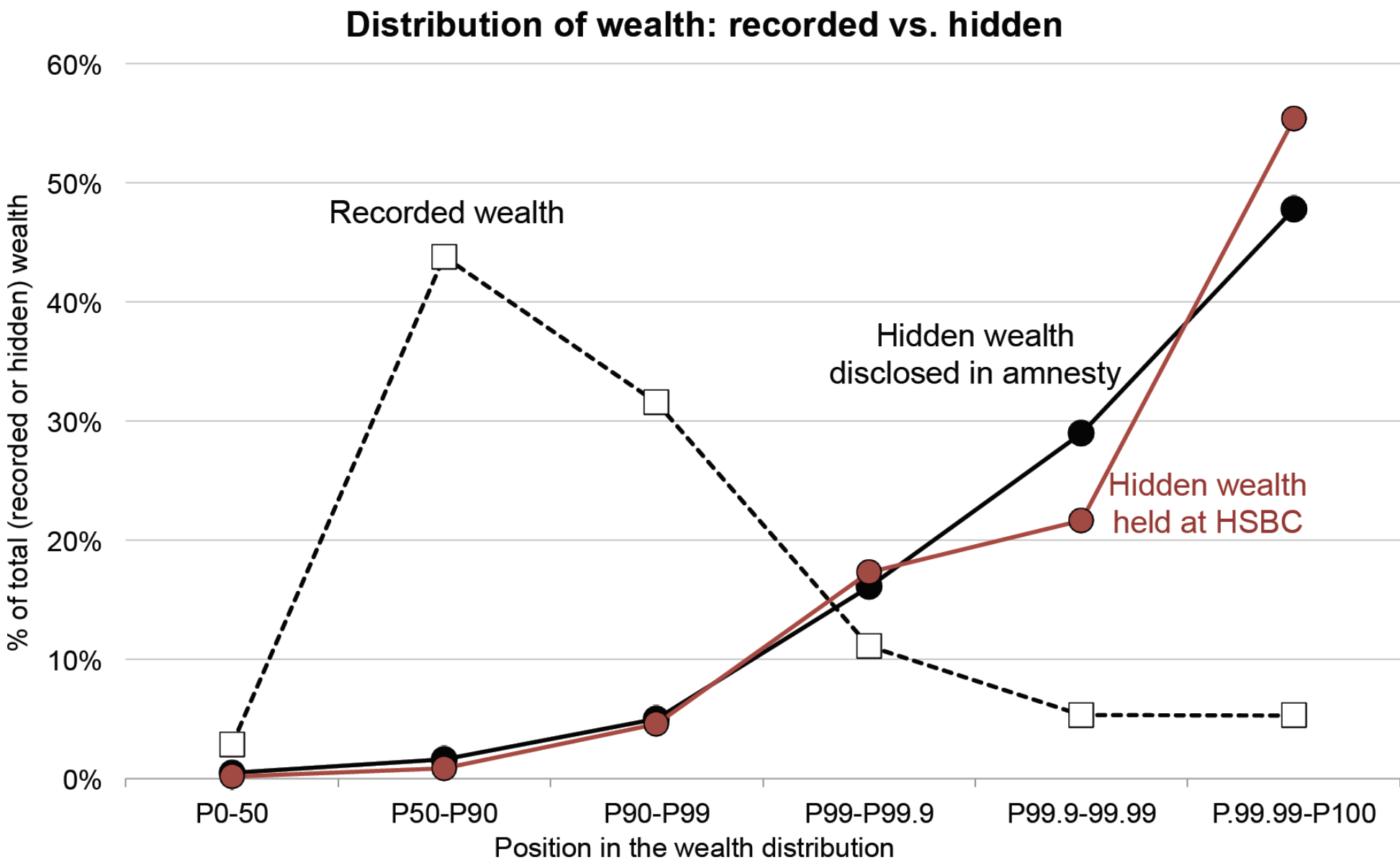


Alstadsæter et al. (2019): Tax Evasion

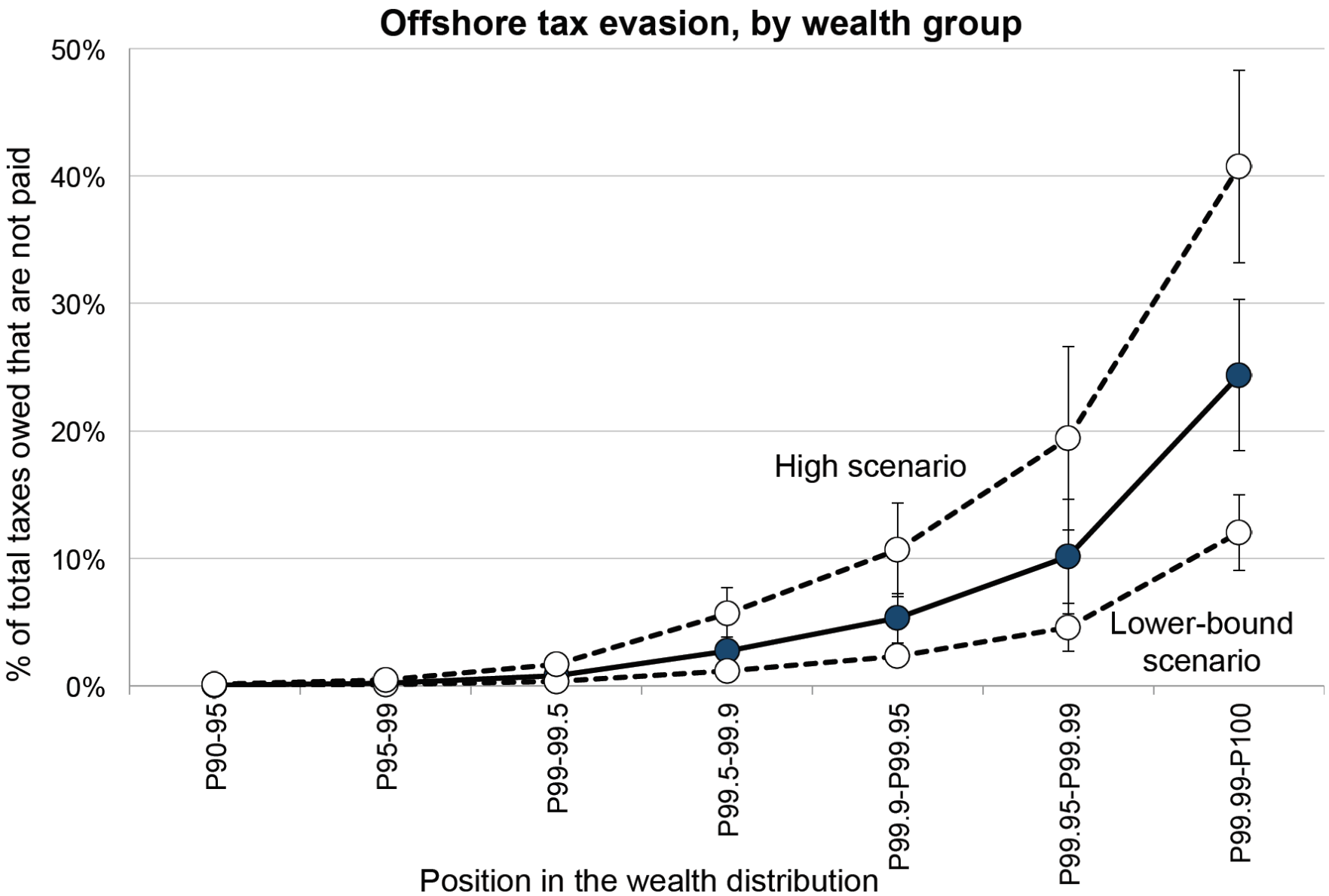
- Can we use this to try and estimate how much tax is missing from each group?
- Their approach:

1. Estimate total amount of offshore wealth
   - Zucman (2013) estimates $5.6 trn of offshore wealth in the world. Use Swiss bilateral bank deposit data to allocate to Scandinavian countries. $\rightarrow$1.6% of Scandinavian wealth is in tax havens.
2. Estimate distribution of offshore wealth across wealth groups
   - Use distributions in leak/amnesty data.
3. Estimate how much offshore wealth is hidden vs declared
   - To match aggregates and HSBC investigations assume 10% is reported
4. Compute amount of taxes due on hidden wealth
   - Assume 4.5% taxable rate of return plus tax simulator to estimate tax due.

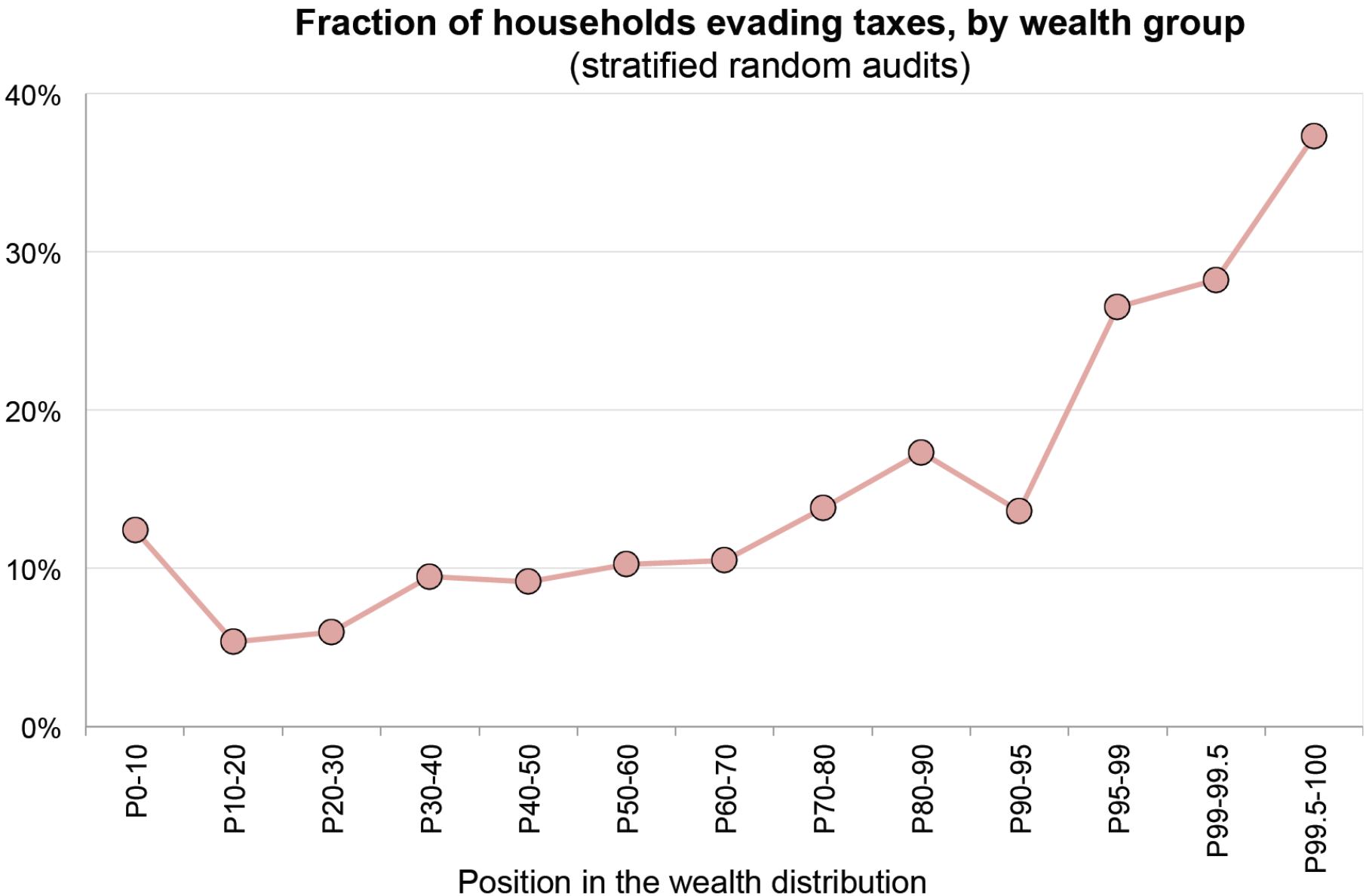
Alstadsæter et al. (2019): Wealth Distribution



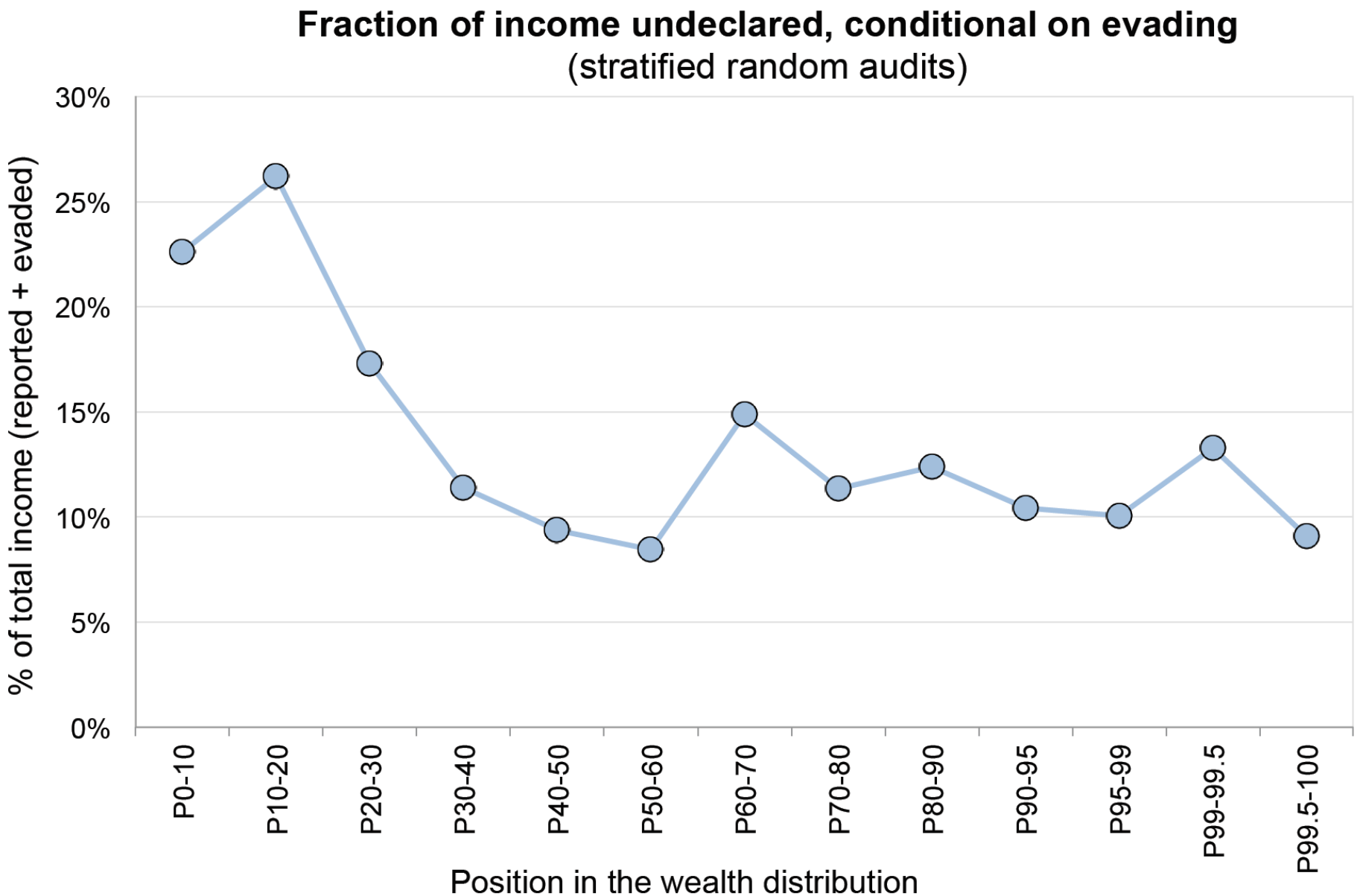
Alstadsæter et al. (2019): Tax Evaded



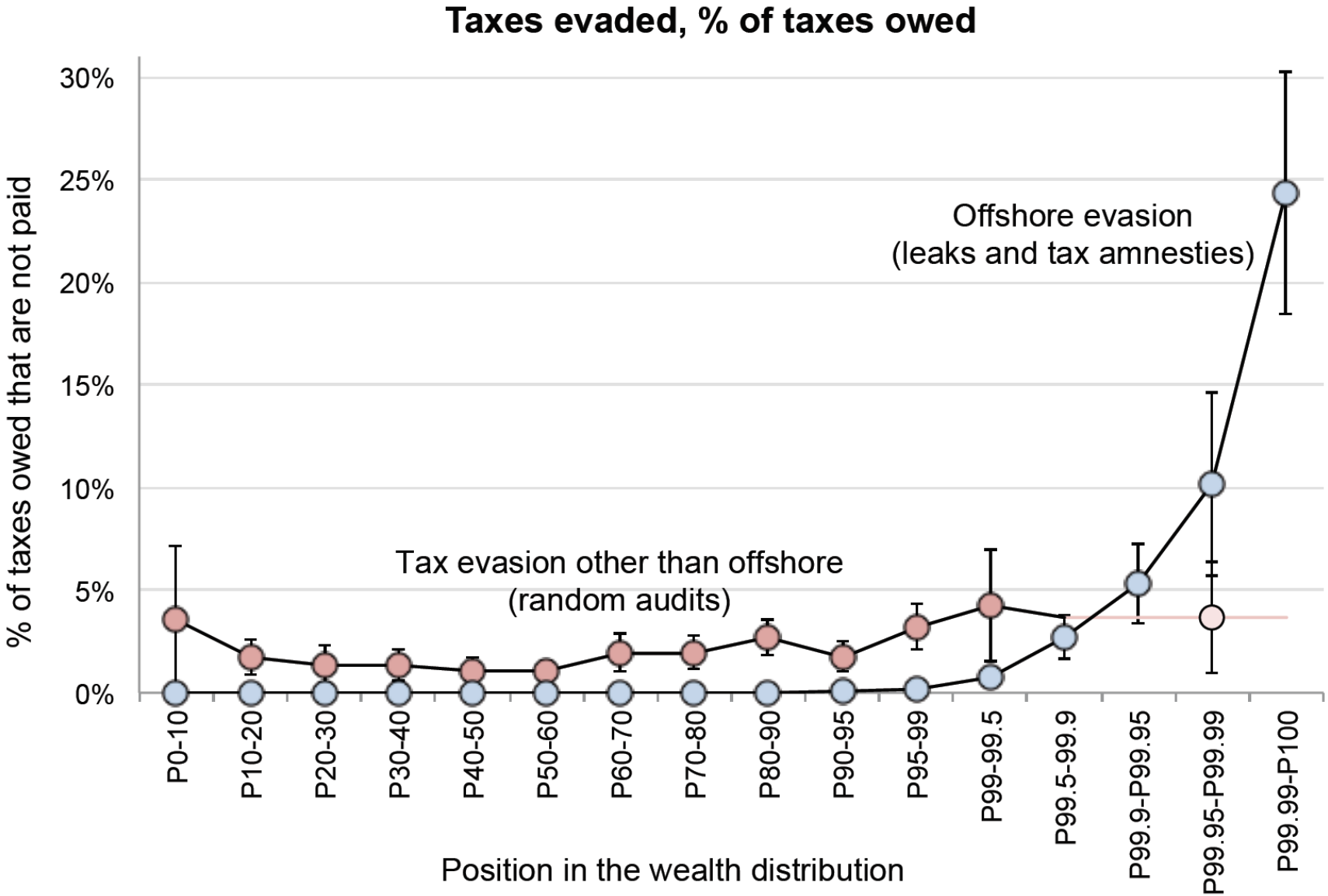
Alstadsæter et al. (2019): Random Audits Comparison



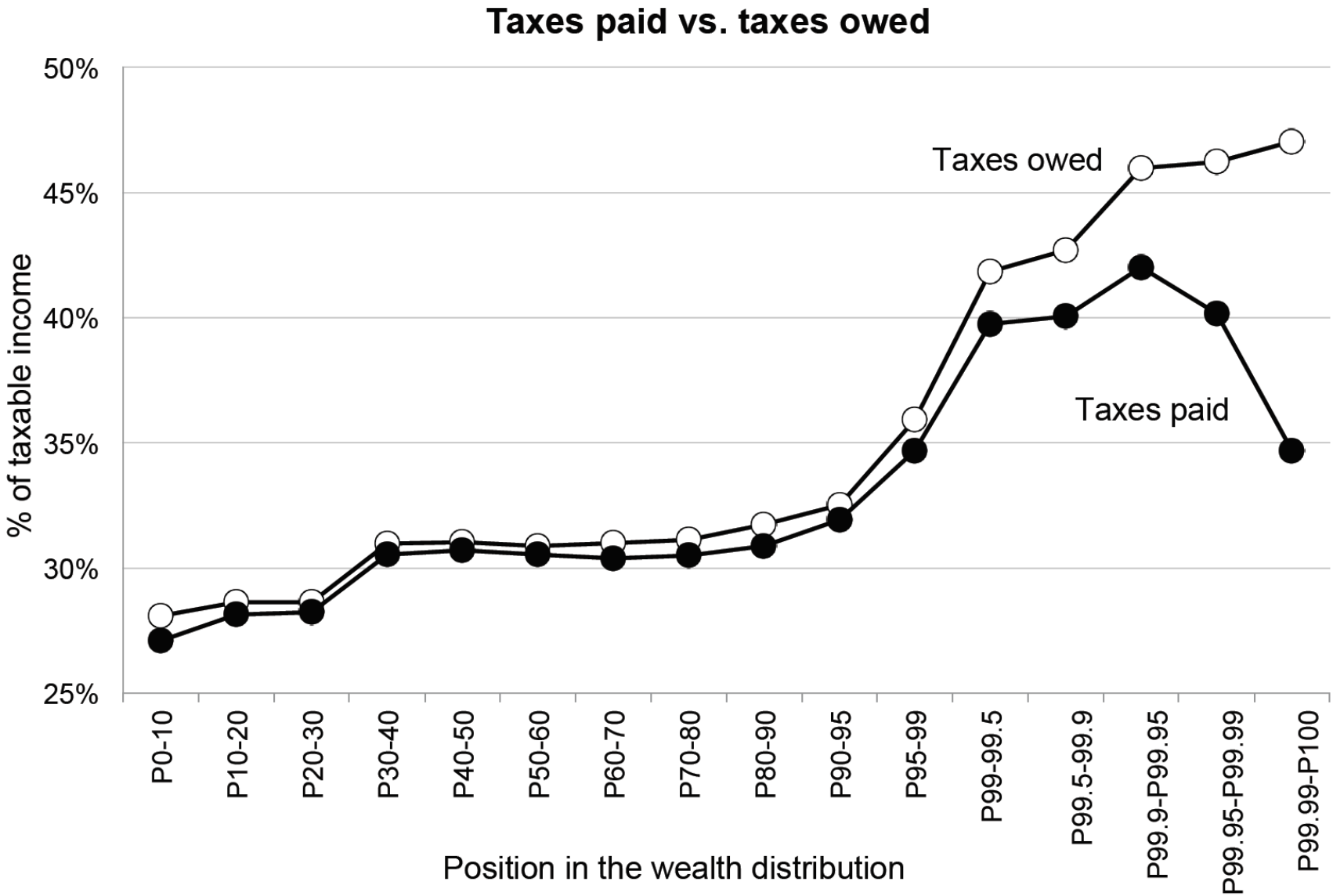
Alstadsæter et al. (2019): Random Audits Comparison



Alstadsæter et al. (2019): Total Tax Evasion



Alstadsæter et al. (2019): Effective Tax Rates



Alstadsæter et al. (2019): Model

- Allingham-Sandmo model would predict less evasion by wealthy, they have higher probability of detection
- Extend the model to have a bank providing evasion services.
- Households have wealth $y \sim f(y)$ and wtp θ per dollar of hidden wealth.
- Bank serves s clients. Detected w/pr λs and pays fine of ϕ per dollar of assets it manages. Charges price $p(y)$

$$\pi = \int yp(y)\, s(y)\, f(y)\, dy - \lambda s \phi \int ys(y)\, f(y)\, dy$$

- Monopolist $\rightarrow$ optimal price $p^*(y) = \theta$ (why?)

Alstadsæter et al. (2019): Model

- Now profits are

$$\pi = \theta k(s) - \lambda s \phi k(s)$$

where $k(s)$ is wealth of s wealthiest households

- So profit-maximizing s^* satisfies

$$\theta = \left(1 + \frac{1}{\epsilon_k(s^*)}\right) \phi \lambda s^*$$

where $\epsilon_k(s) = sk'(s)/k(s)$

- *Proposition 1: the wealthiest s^* households evade at price θ. All others do not evade.*

Alstadsæter et al. (2019): Model

- Assume further that $f(y)$ is pareto with parameter $a > 1$ $\left(F(y) = 1 - \left(\underline{y}/y\right)^a\right)$ then we can state

- *Proposition 2: The share s^* of households who evade taxes (i) falls with the probability of detection λ (ii) falls with the penalty rate ϕ, and (iii) falls as wealth becomes more unequally distributed (i.e. as the Pareto coefficient falls)*

- NB that even though the number of evaders drops when inequality rises, the fraction of total wealth that is hidden increases.

Outline

Tax Evasion: Theory and Evidence from Rich Countries

- Dwenger, Kleven, Rasul & Rincke (AEJ:Pol 2016) *Extrinsic and Intrinsic Motivations for Tax Compliance: Evidence from a Field Experiment in Germany*
- Alstadsæter, Johannesen & Zucman (AER 2019) *Tax Evasion and Inequality*
- Alstadsæter, Johannesen & Zucman (WP 2018) *Tax Evasion and Tax Avoidance*

Alstadsæter et al. (2018): Overview

- Companion to the AER paper.
- Look at how amnesties affect reporting.
- Look in particular for effects on switching between illegal (evasion) and legal (avoidance) strategies to reduce tax liability

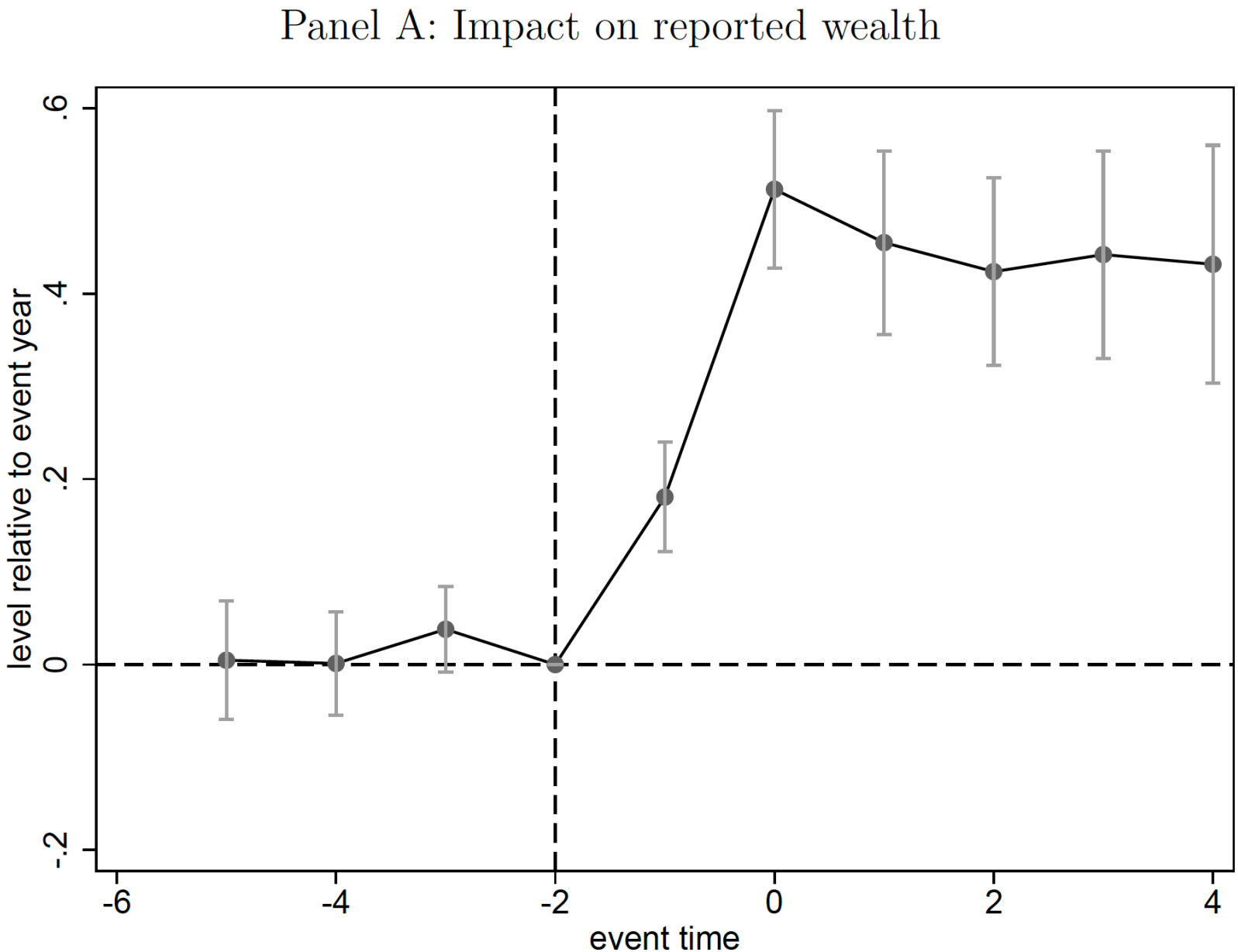
Alstadsæter et al. (2018): Substitution to Avoidance?

- Event study approach.
- Sample:
  - All Amnesty users
  - All non-disclosers in top 10% and random 10% of the other 90%
- Estimate

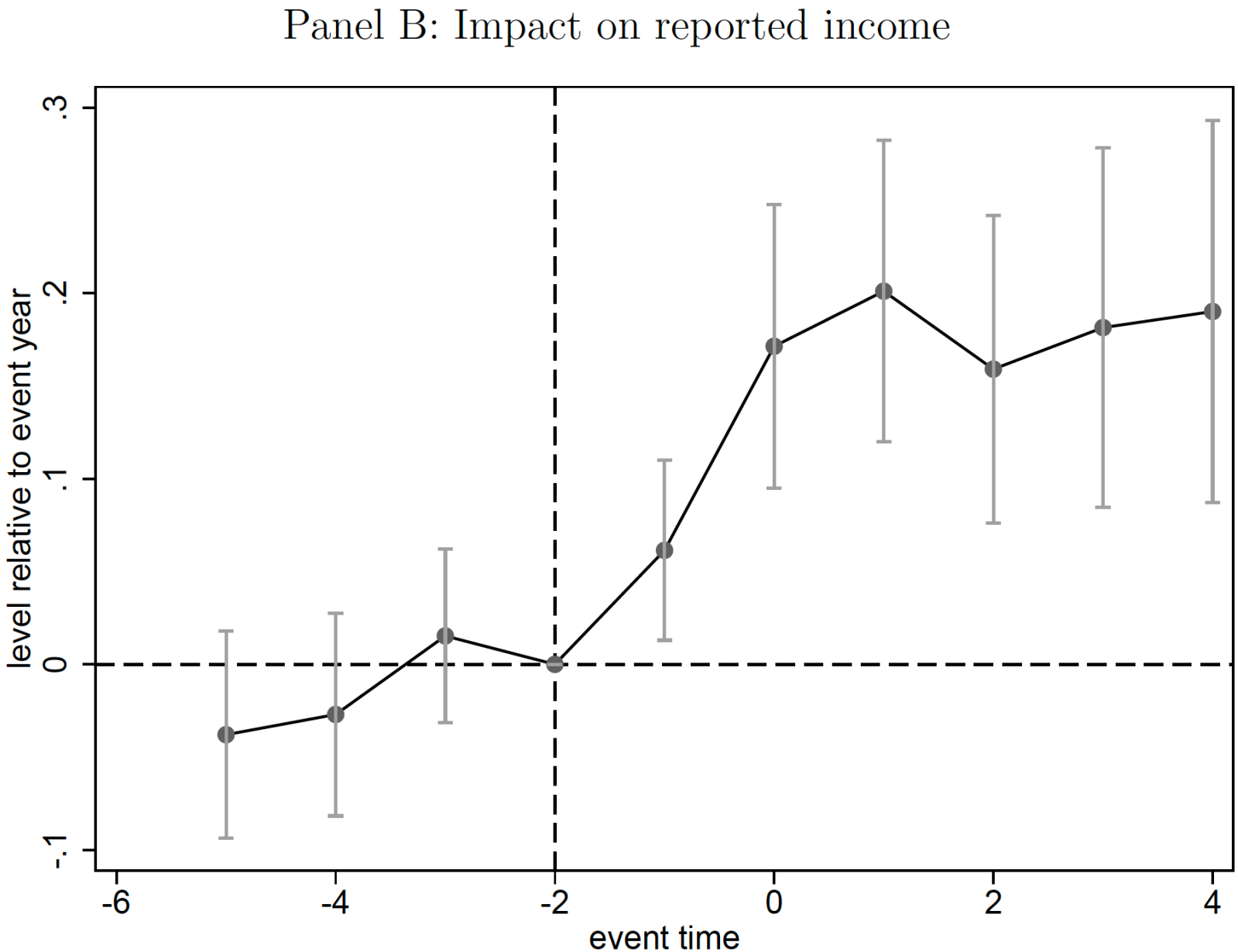
$$\log(Y_{it}) = \alpha_i + \gamma_t + X'_{it}\psi + \sum \beta_k D^k_{it} + u_{it}$$

  where α_i, γ_t are indiv/yr FEs, X_{it} contains wealth, income, age groups and D^k_{it} are event-time (year - year used amnesty) dummies
- Omitted year is $t-2$ since assets disclosed can be incorporateed into $t-1$ return.

Alstadsæter et al. (2018): Event Study-Wealth

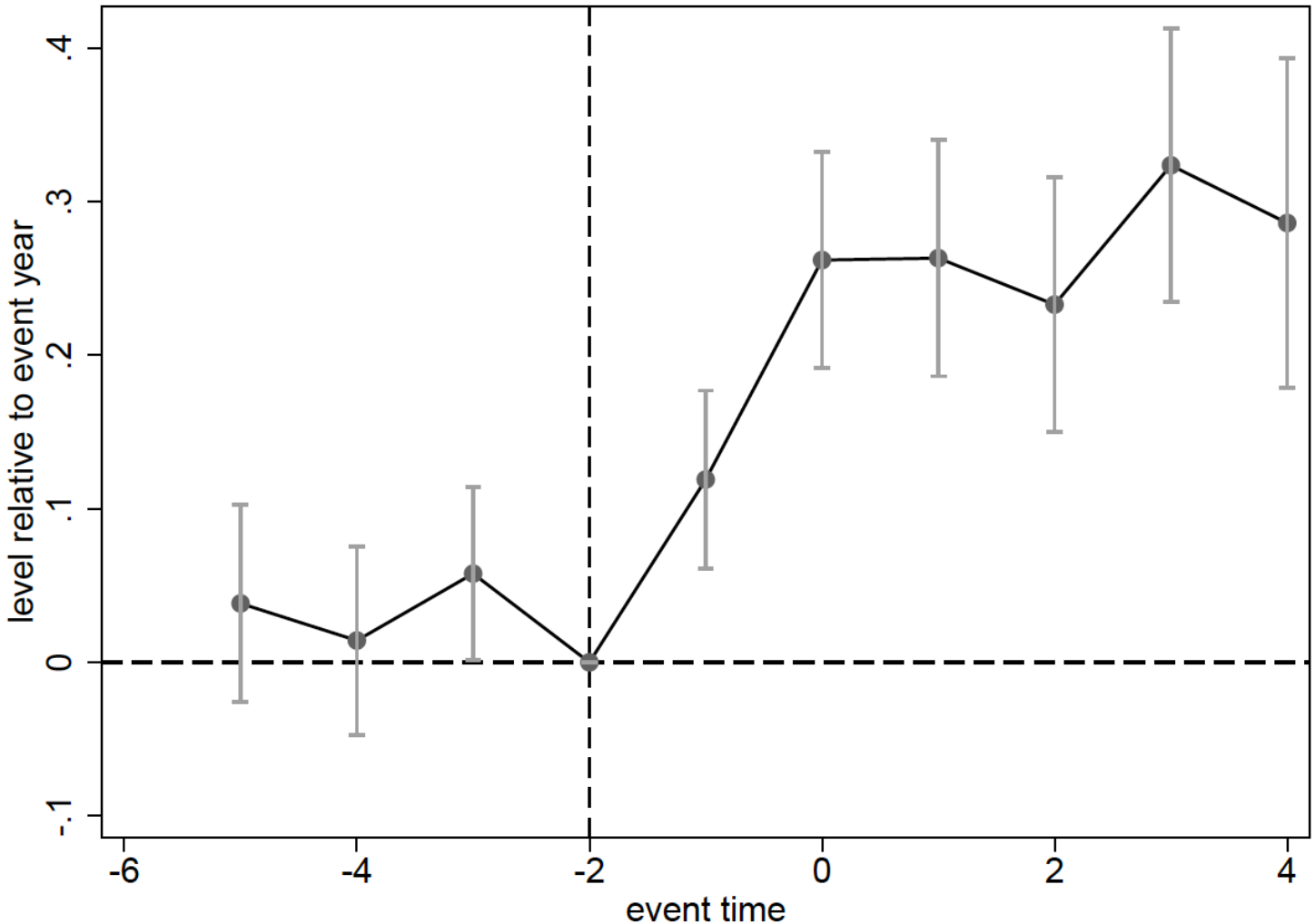


Alstadsæter et al. (2018): Event Study-Income

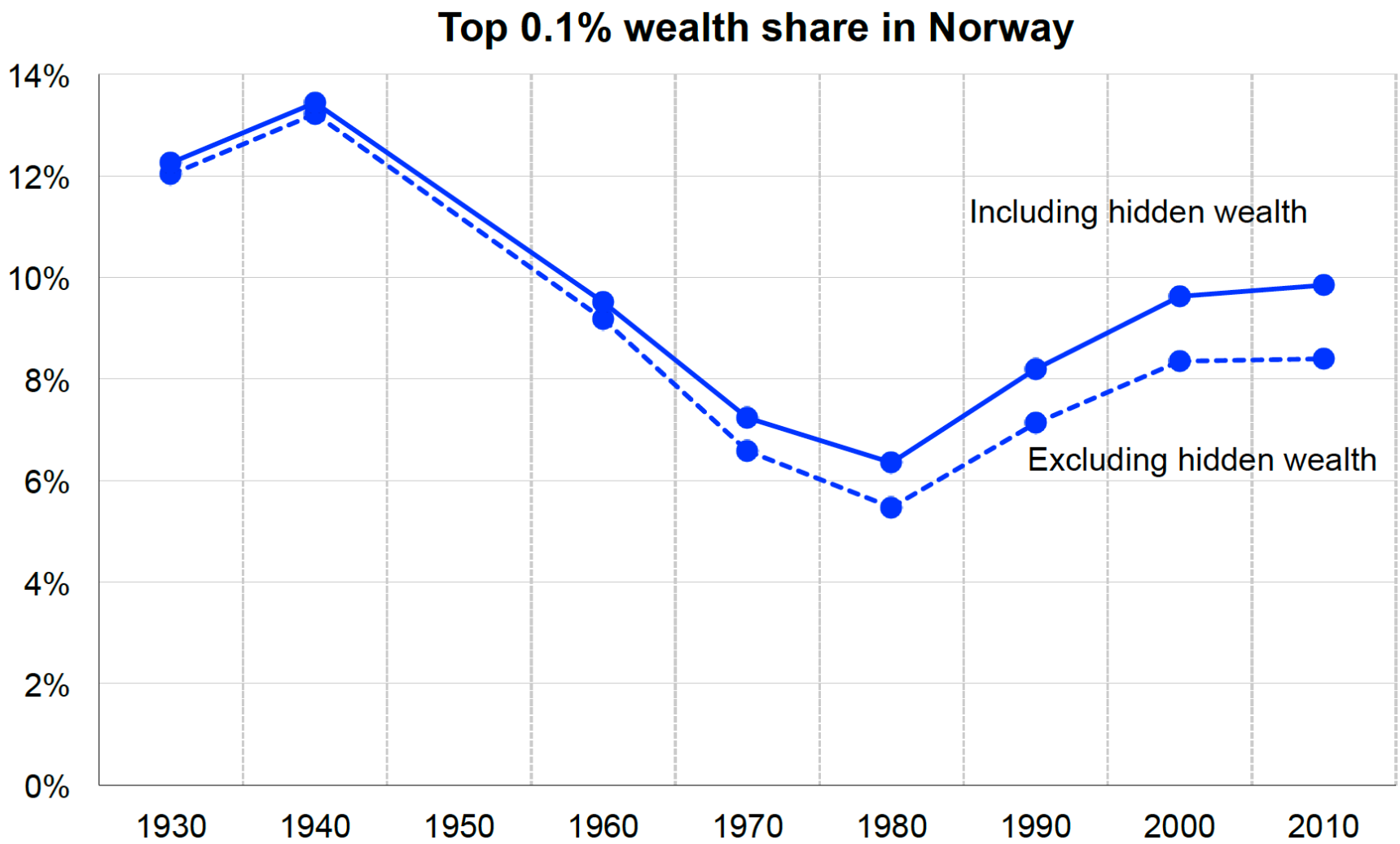


Alstadsæter et al. (2018): Event Study-Taxes

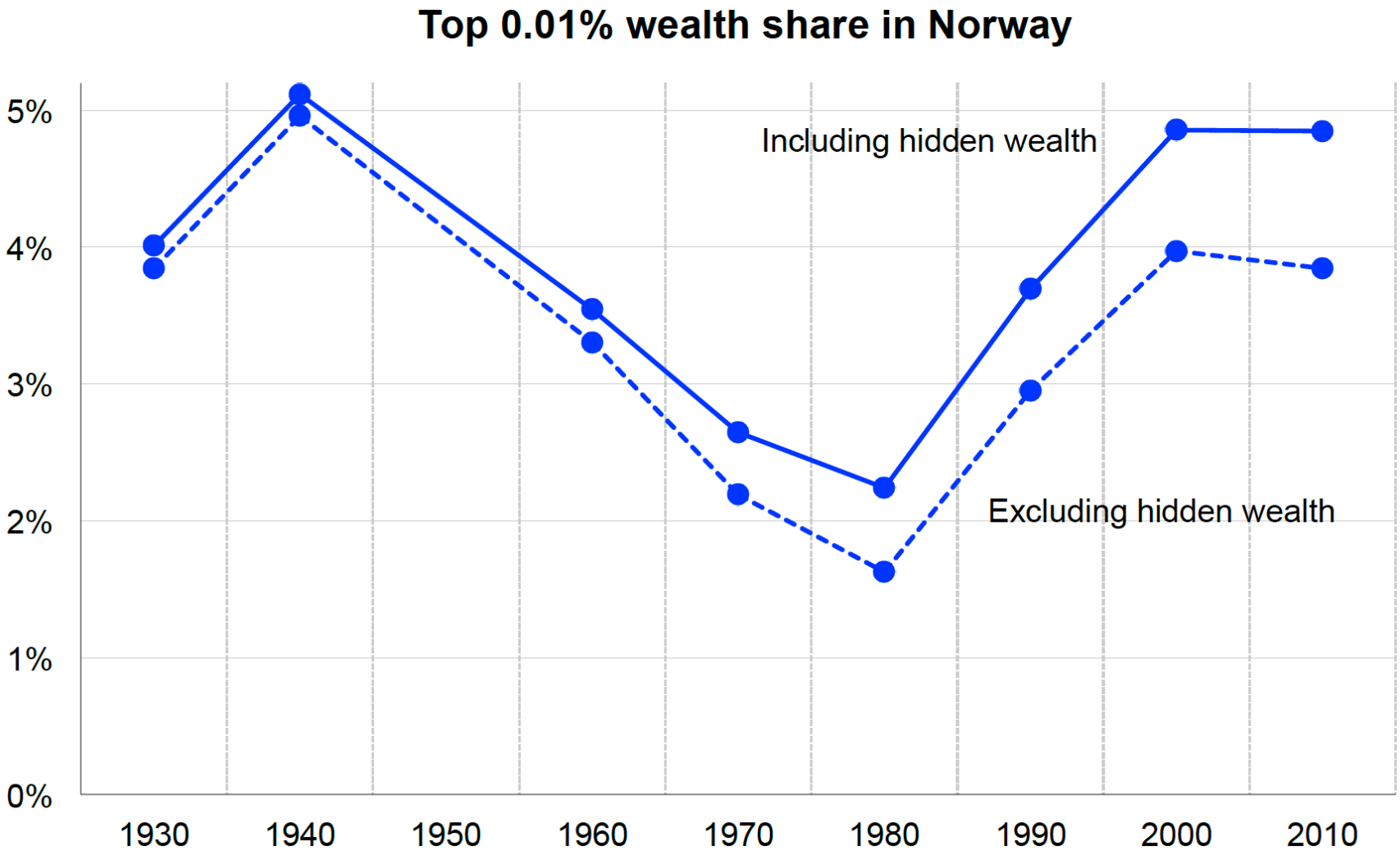
Figure 10: The impact of using a tax amnesty on taxes paid



Alstadsæter et al. (2018): Implication for Measured Wealth Inequality



Alstadsæter et al. (2018): Implication for Measured Wealth Inequality



Outline

Taxation in Developing Countries: Big Picture

Tax Evasion: Theory and Evidence from Rich Countries

Taxation in Low- and Middle-Income Countries

International Taxation and Developing Countries

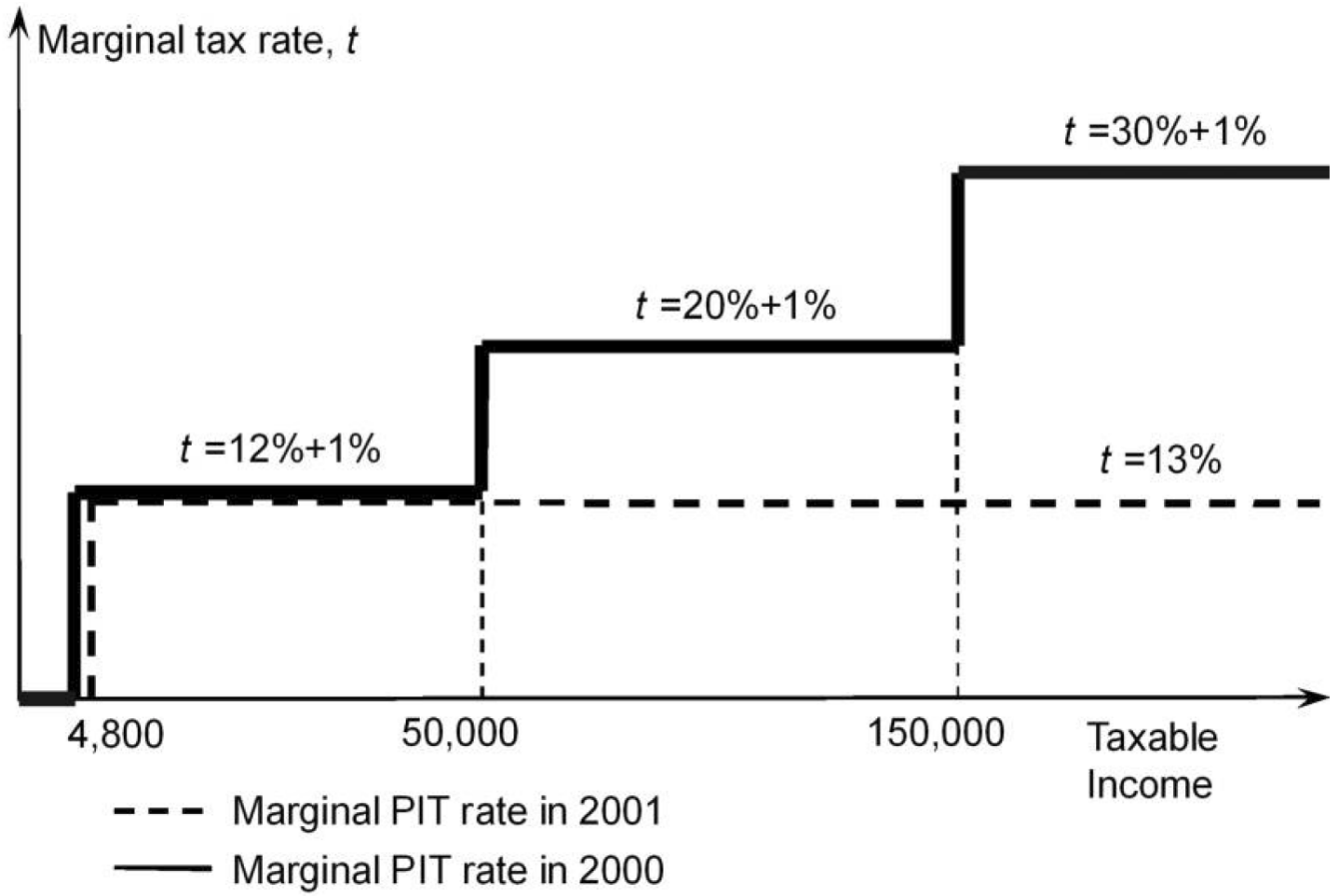
Outline

Taxation in Low- and Middle-Income Countries

- Gorodnichenko, Martinez-Vazquez & Peters (JPE 2009) *Myth and Reality of Flat Tax Reform*
- Benhassine, McKenzie, Pouliquen & Santini (JPubE 2018) *Does Inducing Informal Firms to Formalize Make Sense? Experimental Evidence From Benin*

Gorodnichenko et al. (2009): Overview

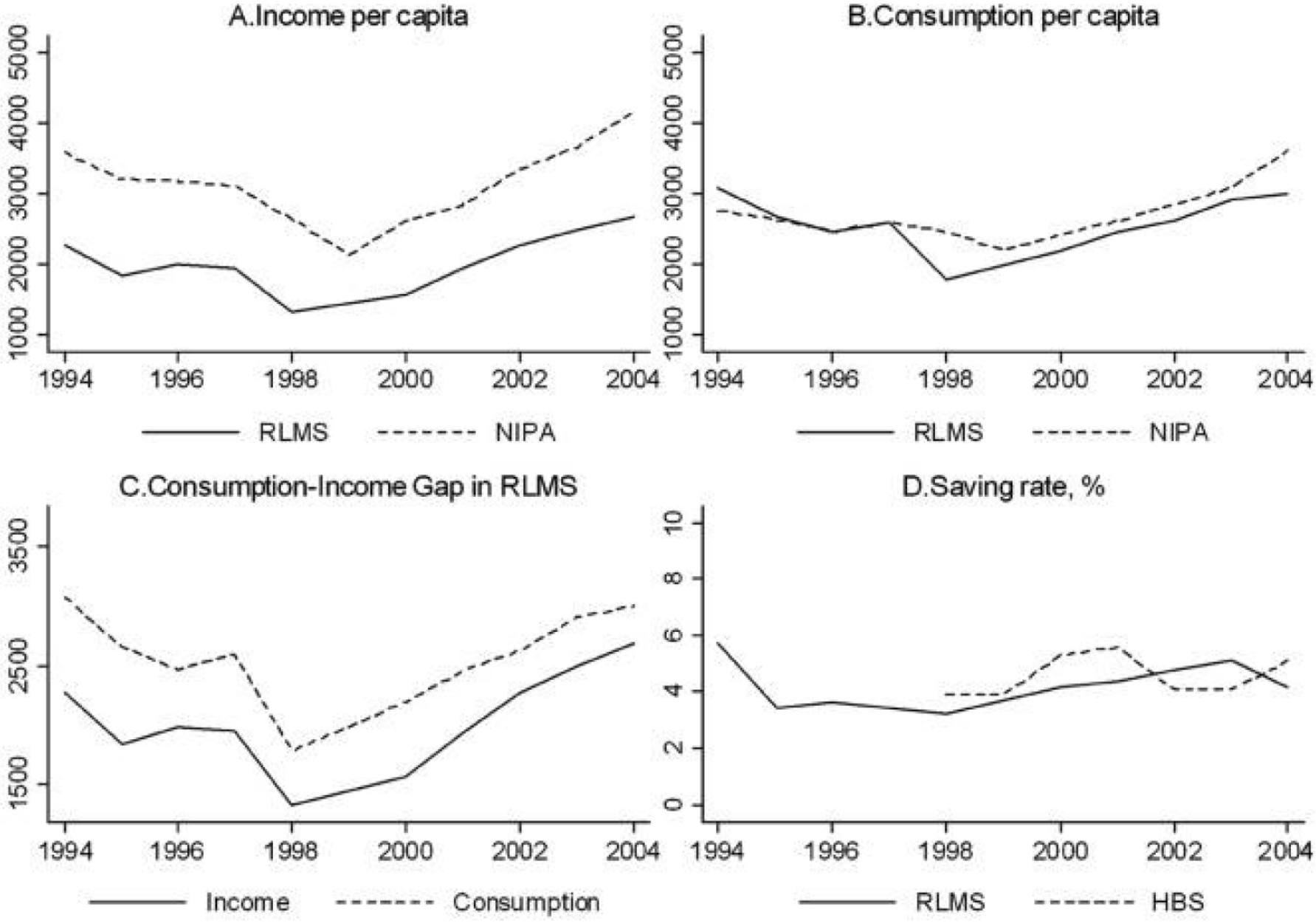
- In 2001 Russia replaces progressive income tax with a flat one
- Use household survey data and D-i-D approach to estimate evasion response
- Measure of evasion: Gap between income and consumption



Gorodnichenko et al. (2009): Data

- Use 1998 and 2000-2004 waves of Russian Longitudinal Monitoring Survey (RLMS)
- Detailed consumption data on last 30 days' consumption
  - 50+ food items
  - alcohol & tobacco
  - clothes, fuel
  - entertainment, education...
- Combine these into "nondurable expenditures" C1
- Add in transfers to other households (alimony etc.) $\rightarrow$ C2
- All hh members' income in money, goods, in kind $\rightarrow$ Y1
- Add in lump-sum payments in last 30 days $\rightarrow$ Y2
- Add in income from selling agricultural output $\rightarrow$Y3

Gorodnichenko et al. (2009): Aggregate Comparison



Gorodnichenko et al. (2009): Conceptual Framework

- Let household h's true income at time t be Y_{ht}^{*}
- However, reported income is only $Y_{ht}^{R} = \Gamma_{ht} Y_{ht}^{*}$
- Model misreporting as $\Gamma\left(S_{ht}\right) = \exp\left(-\gamma S_{ht} + \text{error}\right)$ where S_{ht} includes job, worker characteristics, government policies
- Model true income as $Y_{ht}^{*} = H_{ht} Y_{ht}^{P}$ where Y_{ht}^{P} is permanent income
- $H_{ht} = H\left(X_{1,ht}\right) = \exp\left(\eta X_{1,ht} + \text{error}\right)$ where $X_{1,ht}$ captures life-cycle factors like age, schooling employment, #children etc.

Gorodnichenko et al. (2009): Conceptual Framework

- Model expenditure on non-durables as $C_{ht} = \Theta_{ht} Y_{ht}^P$
- Where $\Theta_{ht} = \Theta\left(X_{2,ht}\right) = \exp\left(\theta X_{2,ht} + \text{error}\right)$ where $X_{2,ht}$ contains # of hh members, # of children, age, schooling etc.
- Together these assumptions imlpy

$$\ln Y_{ht}^R - \ln Y_{ht}^* = -\gamma S_{ht} + \text{error}$$
$$\ln Y_{ht}^* - \ln Y_{ht}^P = \eta X_{1,ht} + \text{error}$$
$$\ln C_{ht} - \ln Y_{ht}^P = \theta X_{2,ht} + \text{error}$$

- Don't observe Y_{ht}^* or Y_{ht}^P, but combining assumptions

$$\ln C_{ht} - \ln Y_{ht}^R = \gamma S_{ht} + \beta X_{ht} + u_h + \varepsilon_{ht}$$

where X_{ht} combines $X_{1,ht}$ and $X_{2,ht}$

TAX EVASION FUNCTION, FIXED EFFECTS

	ln C1 − ln Y1	ln C2 − ln Y1	ln C1 − ln Y2	ln C2 − ln Y2
	Panel A			
Number of household members	−.010	−.033**	.018	−.005
	(.013)	(.013)	(.013)	(.013)
Number of senior household members, 60+	−.210***	−.200***	−.180***	−.169***
	(.022)	(.022)	(.022)	(.022)
Number of children in household (<18)	.088***	.076***	.034	.023
	(.022)	(.022)	(.021)	(.021)
Year = 1998	−.026	−.025	−.026	−.025
	(.020)	(.020)	(.020)	(.020)
Year = 2001	−.142***	−.139***	−.140***	−.137***
	(.017)	(.017)	(.018)	(.018)
Year = 2002	−.221***	−.213***	−.216***	−.208***
	(.018)	(.018)	(.018)	(.018)
Year = 2003	−.208***	−.203***	−.217***	−.213***
	(.018)	(.018)	(.018)	(.018)
Year = 2004	−.268***	−.262***	−.265***	−.260***
	(.018)	(.018)	(.018)	(.018)

Household head characteristics:				
Age	−.004***	−.004***	−.002**	−.001*
	(.001)	(.001)	(.001)	(.001)
Years of schooling	−.006	−.004	−.007*	−.005
	(.004)	(.004)	(.004)	(.004)
Married	−.093***	−.087***	−.060**	−.053**
	(.024)	(.024)	(.023)	(.023)
Currently works	−.298***	−.278***	−.151***	−.130**
	(.055)	(.054)	(.052)	(.052)
Years of tenure	.003**	.003***	.002*	.002**
	(.001)	(.001)	(.001)	(.001)
Works at enterprise	−.076*	−.083*	−.081*	−.089**
	(.046)	(.045)	(.044)	(.044)
Works in private sector	−.105***	−.105***	−.085***	−.084***
	(.021)	(.021)	(.021)	(.021)
Log (firm size)	−.020***	−.019***	−.016***	−.015***
	(.006)	(.006)	(.006)	(.006)
Observations (households)	24,129	24,129	24,723	24,723
	(6,135)	(6,135)	(6,202)	(6,202)
R^2 overall	.05	.04	.03	.03
	Panel B			
After-reform trend (2001 = 1)	−.067***	−.066***	−.066***	−.065***
	(.005)	(.005)	(.005)	(.005)

Gorodnichenko et al. (2009): Evasion and Perceptions

TABLE 3
CONSUMPTION-INCOME GAP AND ATTITUDES TOWARD TAXES, 1998 AND 2002

	ln C1− ln Y1	ln C2− ln Y1	ln C1− ln Y2	ln C2− ln Y2
Evasion perception index (at the district level; 38 PSUs)	.244**	.246**	.368***	.370***
	(.119)	(.119)	(.118)	(.118)
Year = 2002	−.173***	−.162***	−.170***	−.160***
	(.020)	(.020)	(.020)	(.020)
Observations	7,539	7,539	7,806	7,806
R^2	.09	.07	.05	.04

Gorodnichenko et al. (2009): Diff in Diff

- To estimate impact of 2001 reform. Diff in Diff strategy

$$\ln C_{ht} - \ln Y_{ht}^{R} = \gamma S_{ht} + \beta X_{ht} + \mu d_{ht}^{\text{treat}} + \alpha \left(d_{ht}^{\text{treat}} \times D_p \right) + \psi D_p + u_h + \varepsilon_{ht}$$

  where $d_{ht}^{\text{treat}} = I\left\{\tau_{ht} < \tau_{ht-1}\right\}$ and D_p indicates post-reform years

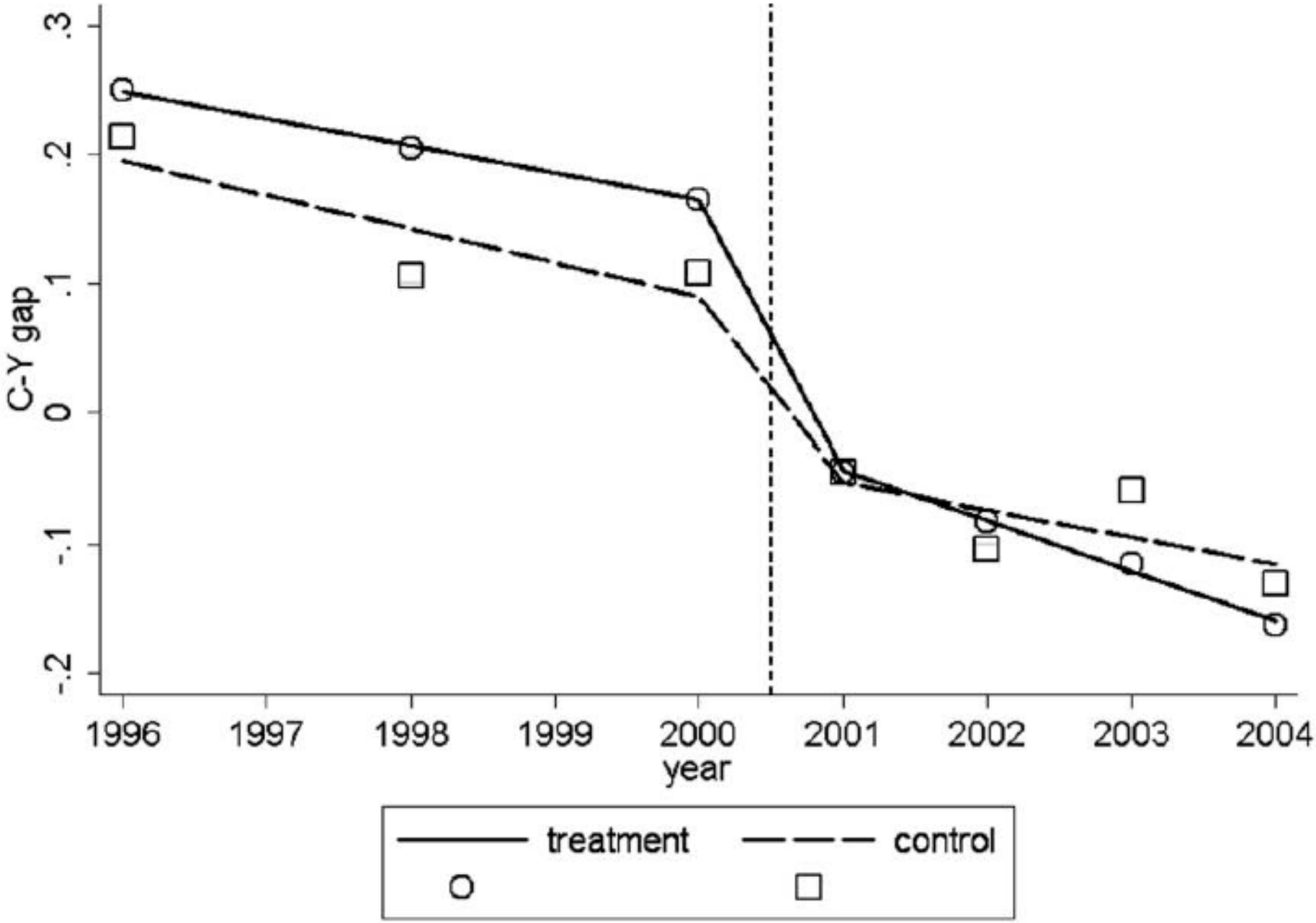
- Note, potential endogeneity of d_{ht}^{treat}. Income choices put people in range to be affected. Instead, use post-reform income. Tax is flat, so no tax reasons to locate above or below threshold
- Transitory fluctuations in Y also an issue: Instead use 4-year average of contractual earnings to assign treatment.

TAX EVASION FUNCTION: DIFFERENCE-IN-DIFFERENCE APPROACH, FIXED EFFECTS

	ln C1− ln Y1	ln C2− ln Y1	ln C1− ln Y2	ln C2− ln Y2
Number of household members	−.016	−.037***	.014	−.007
	(.014)	(.014)	(.014)	(.014)
Number of senior household members, 60+	−.181***	−.173***	−.159***	−.152***
	(.027)	(.027)	(.026)	(.026)
Number of children in household, <18	.087***	.077***	.034	.024
	(.022)	(.022)	(.022)	(.022)
Year = 1998	−.020	−.016	−.028	−.025
	(.025)	(.025)	(.025)	(.025)
Year = 2002	−.073***	−.068***	−.072***	−.066***
	(.020)	(.020)	(.020)	(.019)
Year = 2003	−.076***	−.073***	−.080***	−.077***
	(.020)	(.020)	(.019)	(.019)
Year = 2004	−.136***	−.129***	−.128***	−.120***
	(.021)	(.021)	(.020)	(.020)
Household head characteristics: Age	−.004***	−.003***	−.002**	−.001
	(.001)	(.001)	(.001)	(.001)

Years of schooling	−.007	−.006	−.010**	−.009*
	(.005)	(.005)	(.005)	(.005)
Married	−.070***	−.071***	−.031	−.030
	(.027)	(.027)	(.026)	(.026)
Currently works	−.293***	−.277***	−.158***	−.142***
	(.055)	(.055)	(.052)	(.051)
Years of tenure	.002*	.002*	.001	.002
	(.001)	(.001)	(.001)	(.001)
Works at enterprise	−.083*	−.084*	−.081*	−.083*
	(.046)	(.046)	(.043)	(.043)
Works in private sector	−.100***	−.099***	−.085***	−.083***
	(.021)	(.021)	(.021)	(.021)
Log (firm size)	−.019***	−.018***	−.014**	−.013**
	(.006)	(.006)	(.006)	(.006)
After-reform dummy (D_p)	−.103***	−.104***	−.106***	−.107***
	(.031)	(.031)	(.031)	(.031)
$d^{treat} \times D_p$	−.109***	−.108***	−.105***	−.102***
	(.033)	(.033)	(.033)	(.033)
Observations (households)	17,081	17,081	17,444	17,444
	(4,174)	(4,174)	(4,184)	(4,184)
R^2 overall	.06	.05	.04	.04

Gorodnichenko et al. (2009): Results



Gorodnichenko et al. (2009): Heterogeneity

TREATMENT EFFECT IN THE DIFFERENCE-IN-DIFFERENCE APPROACH: HETEROGENEOUS RESPONSE

Alternative Specifications	ln C1− ln Y1	ln C2− ln Y1	ln C1− ln Y2	ln C2− ln Y2
State vs. public sector:				
$d^{treat} \times D_p$ (state sector is omitted)	.001	−.017	−.014	−.030
	(.054)	(.054)	(.052)	(.052)
$d^{treat} \times D_p \times$ private	−.229***	−.192**	−.236***	−.201**
	(.080)	(.080)	(.079)	(.079)
Observations	17,287	17,287	17,684	17,684
Blue collar vs. white collar:				
$d^{treat} \times D_p \times$ private (blue-collar workers are omitted)	−.111	−.073	−.133	−.097
	(.103)	(.103)	(.099)	(.099)
$d^{treat} \times D_p \times$ private × white collar	−.302**	−.308**	−.295**	−.297**
	(.123)	(.125)	(.124)	(.124)
Observations	17,287	17,287	17,684	17,684

Gorodnichenko et al. (2009): Welfare

- Use the setup in Chetty (2009) to characterize DWL

	B. Russian Case	
Deadweight loss, $DWL_W = -0.5t\epsilon_W/[1-(e/wl)]$ (% taxable income)		
Point estimate, DWL_W^M	2.17%	1.41%
Lower bound, DWL_W^L	X	.64%
Upper bound, DWL_W^U	X	2.17%

NOTE.—See Sec. VII for details on notation and definitions.

Outline

Taxation in Low- and Middle-Income Countries

- Gorodnichenko, Martinez-Vazquez & Peters (JPE 2009) *Myth and Reality of Flat Tax Reform*
- Benhassine, McKenzie, Pouliquen & Santini (JPubE 2018) *Does Inducing Informal Firms to Formalize Make Sense? Experimental Evidence From Benin*

Benhassine et al (2018): Overview

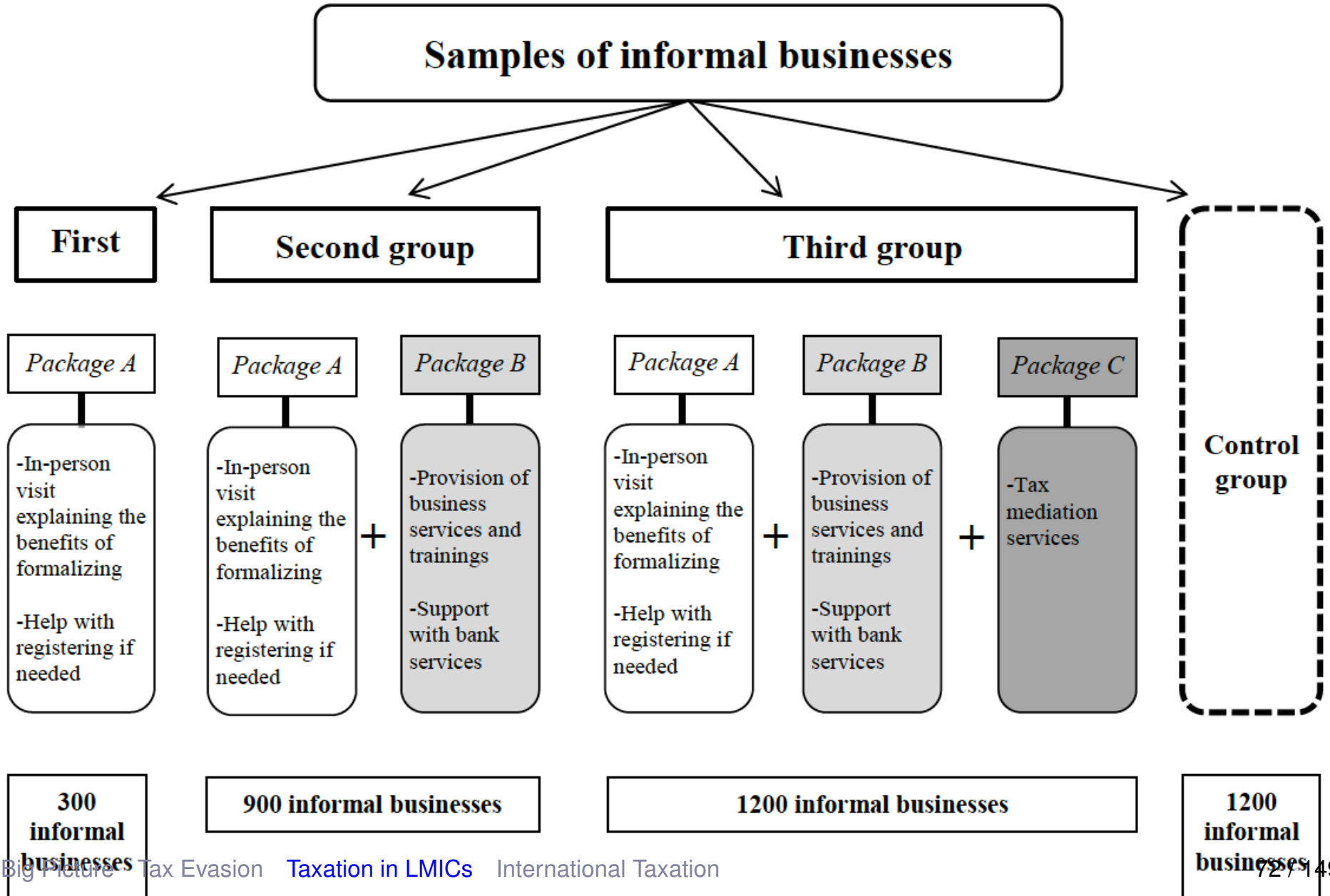
- Informality is widespread in the developing world (LaPorta & Shleifer 2014)
  - Costly for firms: Can't access finance, public contracts etc. (de Soto, 1989)
  - Costly for governments: Lose tax revenues.
- Governments have tried many things to get firms to formalize, but with little success. Should they try harder?
- Conduct experiment in Benin around introduction of simplified legal status *"entreprenant"*
- Conclude:
  - Costs of inducing formalization outweigh benefits to govt and firm
  - Better targeting can tip the balance a bit.

Benhassine et al (2018): Context

- Experiment in Benin: $\sim$70% of GDP and 95% of employment is informal
- In 2011 introduced *entreprenant* legal status. Simplified legal regime for small businesses.
  - one-stop shop for registration
  - Free to register
  - Only require legal ID, a short form, 2 photos
- 4 treatment arms:

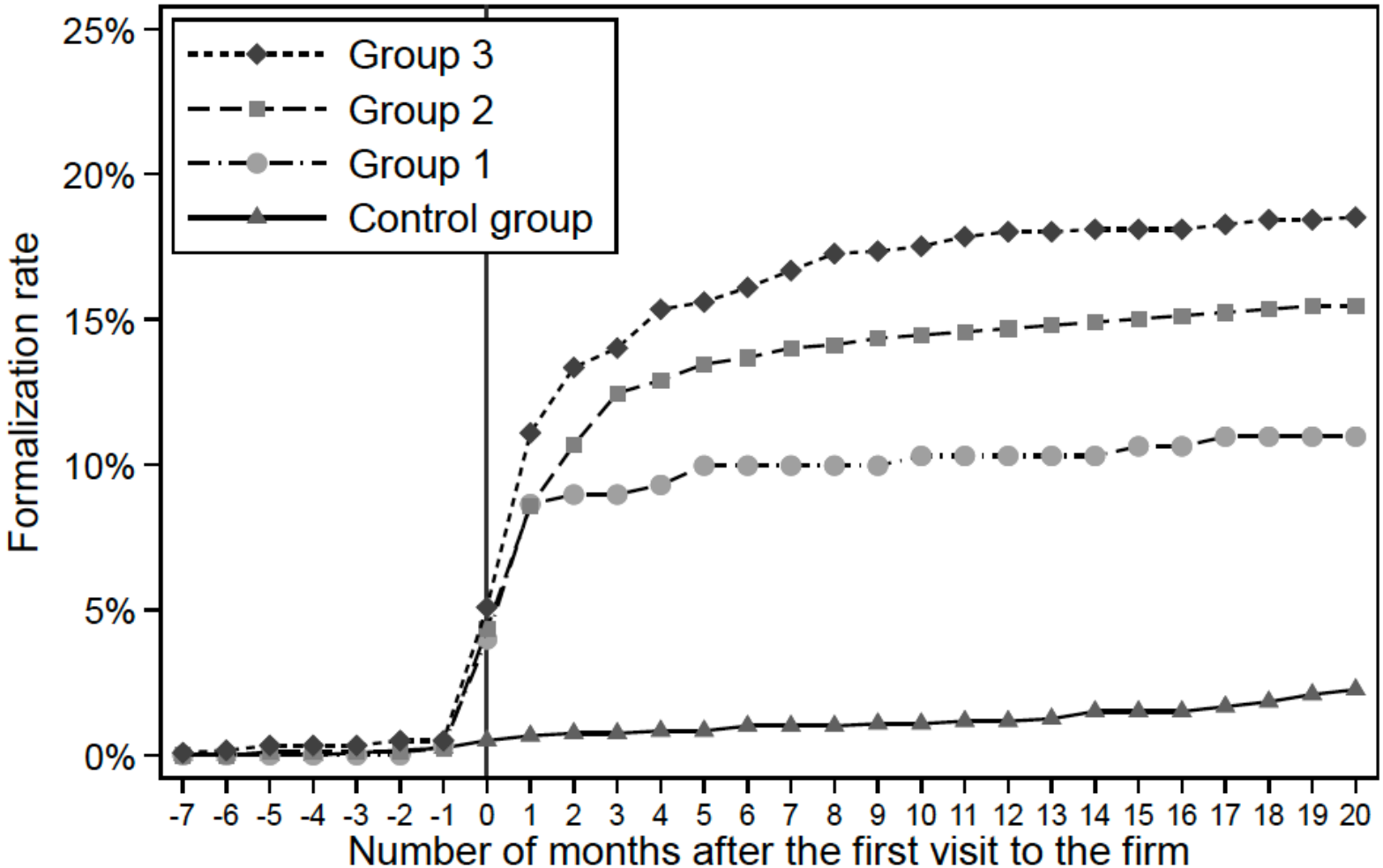
1. Information and assistance to register.
   - 1.1 Send advisors (MA & experience) to explain benefits, leave leaflets.
   - 1.2 Help at the office when registering
2. Treatment 1 + business training workshops, help opening a bank account.
3. Treatment 2 + mediation and tax counseling.
4. Control

Benhassine et al (2018): Experimental Design



Benhassine et al (2018): Formalization

Figure 1: Formalization Rates over Time



Notes: N=3,596
For the control group, date of visit 1 is set at the mode of the visit 1 date for other firms (3 months after program start)

Benhassine et al (2018): Formalization

Table 3: Impact on Formalization

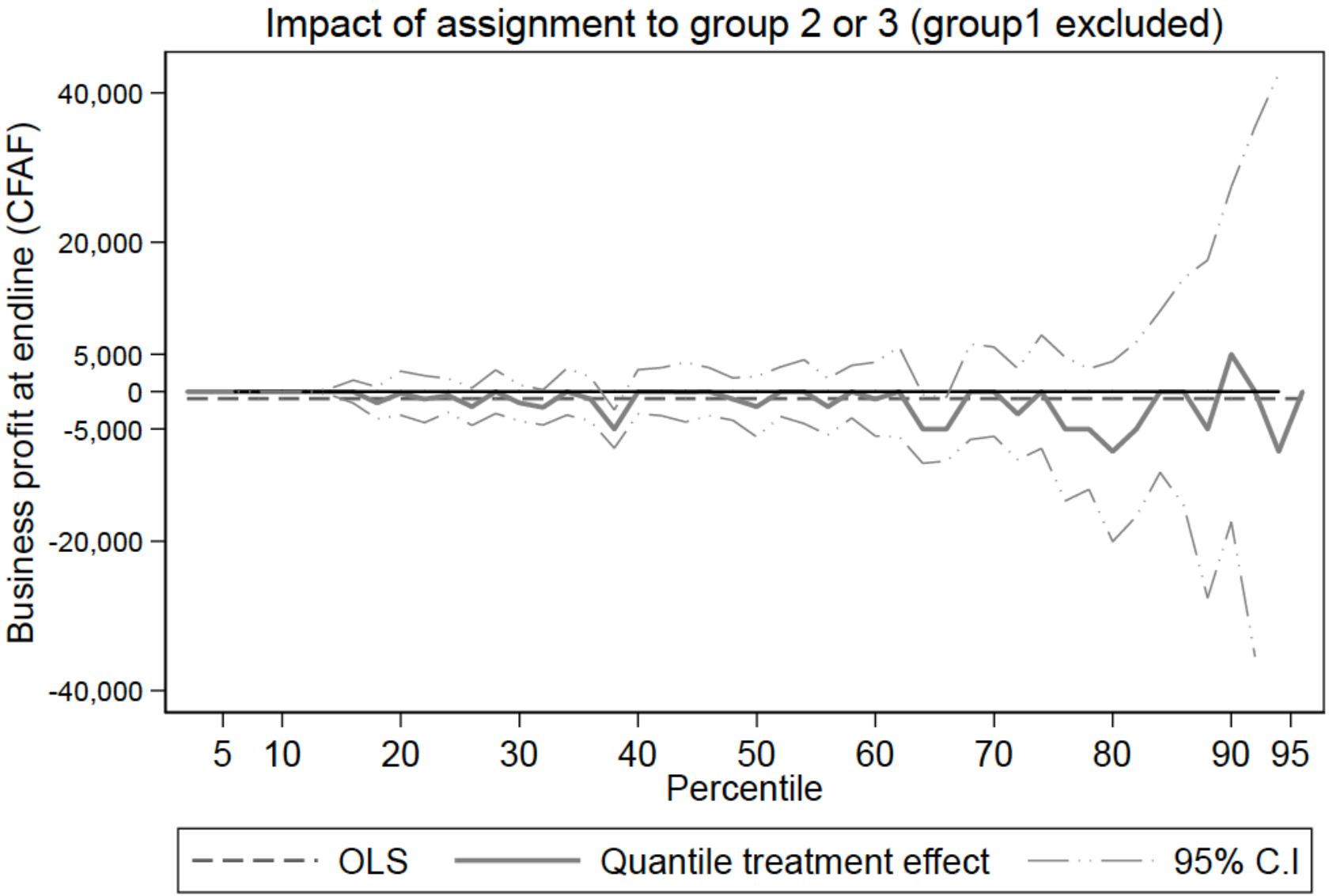
Dependent variables:	(1) Admin. Data (GUFE)	(2) Declared that the business is formal	(3) Showed a document	(4) Declared formality or found in admin. data	(5) Showed a document or found in admin. data
Group 1	0.096***	0.066**	0.069***	0.107***	0.130***
	(0.023)	(0.026)	(0.024)	(0.029)	(0.029)
Group 2	0.130***	0.108***	0.093***	0.143***	0.146***
	(0.014)	(0.017)	(0.015)	(0.018)	(0.018)
Group 3	0.163***	0.128***	0.120***	0.176***	0.181***
	(0.013)	(0.015)	(0.013)	(0.016)	(0.016)
Observations	3,596	3,061	2,929	3,061	2,929
R-squared	0.392	0.436	0.453	0.446	0.464
Adjusted R-squared	0.086	0.072	0.075	0.090	0.094
Mean dependent variable in Control	0.023	0.052	0.026	0.059	0.040
Pvalue Test Group1=Group2	0.175	0.153	0.353	0.257	0.602
Pvalue Test Group1=Group3	0.003	0.017	0.028	0.015	0.075
Pvalue Test Group2=Group3	0.022	0.211	0.066	0.068	0.057
Pvalue Test Group1=Group2=Group3	0.002	0.037	0.026	0.016	0.049
Pvalue Test Group1=Group2=Group3=0	0.000	0.000	0.000	0.000	0.000

Benhassine et al (2018): Firm Performance

Table 5 : Impact on Firm Performances

	(1) Total sales in the last day$^{\alpha\beta}$ (CFAF)	(2) Total sales in the last week$^{\alpha\beta}$ (CFAF)	(3) Last month profit$^{\alpha\beta}$ (CFAF)	(4) Summary index of sales and profit$^{\alpha\beta}$	(5) Total number of employees$^{\alpha}$	(6) Any tax paid for business activity in 2015^{B}	(7) Sum of all taxes paid in 2015^{B} (CFAF)
1st stage: impact of treatment allocation:							
Group1 X year1 (b1)	2,228	12,496	-8,053*	0.008	-0.22**	0.013	-19
	(2,754)	(14,029)	(4,798)	(0.057)	(0.10)	(0.030)	(1,747)
Group2 X year1 (b2)	540	-7,376	-3,016	-0.052*	-0.06	0.048***	-51
	(1,451)	(7,312)	(3,021)	(0.031)	(0.09)	(0.018)	(1,091)
Group3 X year1 (b3)	-114	-1,224	-3,106	-0.010	-0.11	0.005	-2,041**
	(1,384)	(6,399)	(2,858)	(0.030)	(0.08)	(0.016)	(949)
Group1 X year2 (c1)	602	12,192	470	0.041	-0.09	-0.066**	-3,308**
	(2,930)	(14,243)	(5,742)	(0.060)	(0.10)	(0.030)	(1,678)
Group2 X year2 (c2)	1,246	-5,235	-874	-0.007	0.05	-0.055***	-3,413***
	(1,832)	(8,010)	(3,377)	(0.036)	(0.07)	(0.018)	(1,047)
Group3 X year2 (c3)	1,847	3,998	242	0.026	0.08	-0.067***	-5,967***
	(1,669)	(7,911)	(3,233)	(0.035)	(0.07)	(0.017)	(869)

Benhassine et al (2018): Firm Performance



Notes: Data source: Endline surveys 2016, N=2905

Benhassine et al (2018): Total Costs

Table 6: Cost Effectiveness Analysis

	In CFAF			In USD		
	Group 1	**Group 2**	**Group 3**	**Group 1**	**Group 2**	**Group 3**
Program costs:						
Total Program costs	**21,304,850**	**154,397,653**	**195,493,401**	**35,746**	**259,056**	**328,009**
Costs by intervention:						
One-stop-shop for formalization	6,325,293	18,975,879	25,301,172	10,613	31,839	42,452
Interventions to increase take up	14,979,557	135,421,774	170,192,229	25,133	227,218	285,557
Costs by types:						
Total set up costs	5,728,222	36,001,489	45,733,290	9,611	60,405	76,734
Total variable costs	15,576,628	118,396,164	149,760,111	26,135	198,651	251,275

Benhassine et al (2018): Cost-Effectiveness

Cost per formalization						
Number of businesses	301	899	1199	301	899	1199
Program impact:						
Impact on formalization (in pp)	9.6%	13.0%	16.3%	9.6%	13.0%	16.3%
Number of firms which formalized because of the program	29	117	195	29	117	195
Total costs…						
… per business included in treatment	70,780	171,744	163,047	119	288	274
… per formalization	737,294	1,321,106	1,000,289	1,237	2,217	1,678
Variable costs…						
… per business included in treatment	51,750	131,698	124,904	87	221	210
… per formalization	539,058	1,013,059	766,283	904	1,700	1,286
Cost effectiveness						
Expected increase in tax revenue (see appendix 5 for more details)	27,185	27,185	27,185	46	46	46
Number of years before tax revenue are greater than cost per formalization[α]	19	35	29	19	35	29

Benhassine et al (2018): Heterogeneous Treatment Effects

Table 7: Heterogeneous Impact on Formalization by Baseline Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables:	**Formalized: GUFE data**							
Variable for heterogeneous analysis:	Female owner	Operates in Dantokpa market	Trader	Doesn't look like formal species	Index of business size below median	Does not have secondary education	One visit or fewer from tax inspectors	Female owner (sample restricted[α])
Impact in group [...] for heterogeneous variable=0								
Group1	0.134***	0.105***	0.144***	0.125**	0.085***	0.140***	0.124**	0.168***
	(0.035)	(0.026)	(0.032)	(0.055)	(0.032)	(0.036)	(0.054)	(0.045)
Group2	0.192***	0.151***	0.178***	0.224***	0.139***	0.175***	0.176***	0.232***
	(0.024)	(0.016)	(0.021)	(0.035)	(0.020)	(0.024)	(0.036)	(0.031)
Group3	0.206***	0.179***	0.195***	0.231***	0.151***	0.218***	0.214***	0.216***
	(0.021)	(0.014)	(0.019)	(0.032)	(0.018)	(0.022)	(0.033)	(0.027)
Additional impact in group [...] for heterogeneous variable=1								
Group1 x Heterogenous variable (int1)	-0.063	-0.048	-0.089**	-0.036	0.022	-0.074	-0.035	-0.068
	(0.046)	(0.054)	(0.045)	(0.061)	(0.046)	(0.049)	(0.061)	(0.072)
Group2 x Heterogenous variable (int2)	-0.096***	-0.100***	-0.086***	-0.115***	-0.017	-0.073**	-0.056	-0.125***
	(0.029)	(0.034)	(0.028)	(0.039)	(0.029)	(0.033)	(0.041)	(0.047)
Group3 x Heterogenous variable (int3)	-0.070***	-0.080***	-0.058**	-0.083**	0.022	-0.096***	-0.064*	-0.052
	(0.026)	(0.031)	(0.025)	(0.036)	(0.026)	(0.031)	(0.038)	(0.042)
Observations	3,596	3,596	3,596	3,596	3,596	3,596	3,596	1,619

Outline

Taxation in Developing Countries: Big Picture

Tax Evasion: Theory and Evidence from Rich Countries

Taxation in Low- and Middle-Income Countries

International Taxation and Developing Countries

Outline

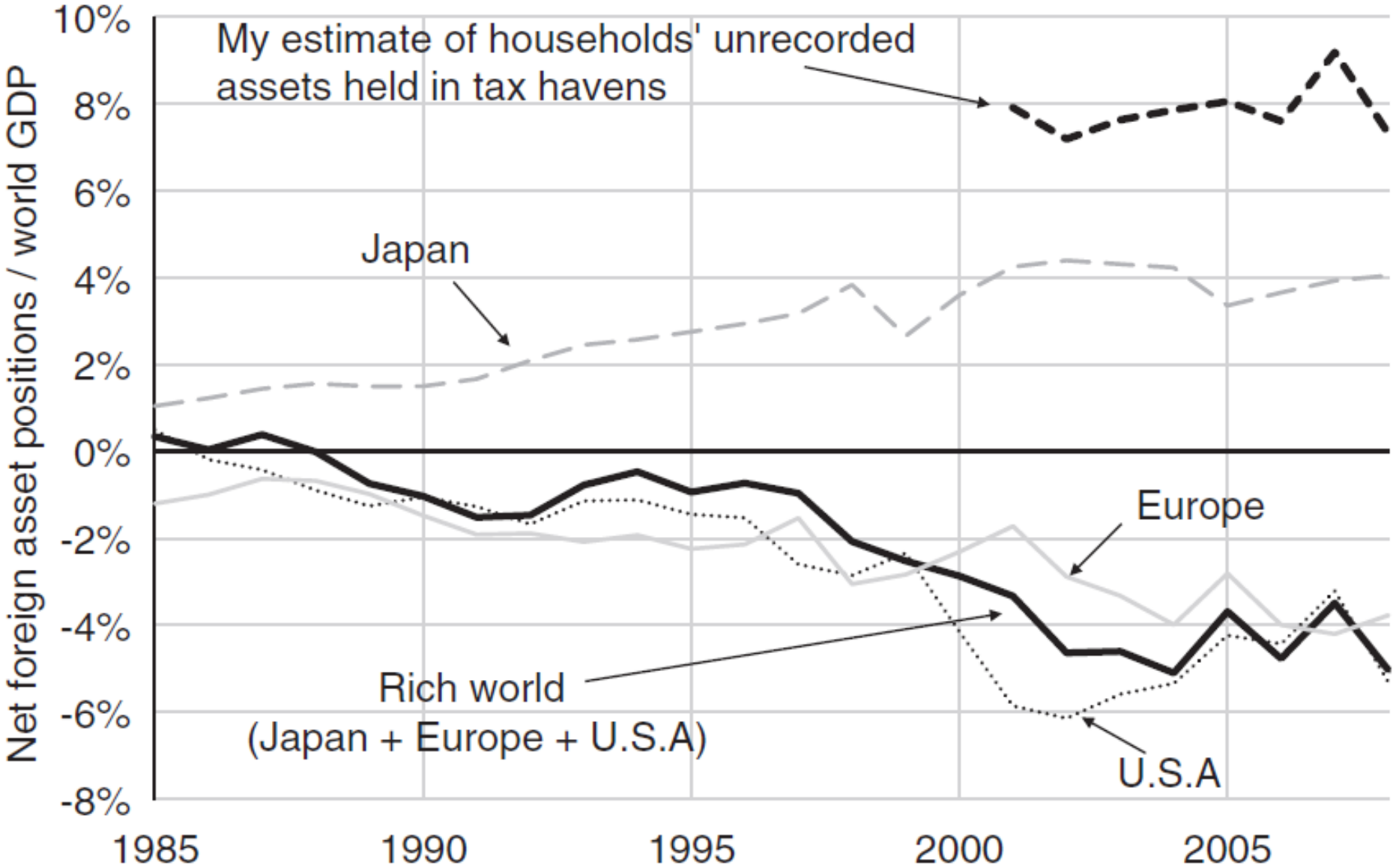
International Taxation and Developing Countries

- Zucman (QJE 2013) *The Missing Wealth of Nations: Are Europe and the US Net Debtors or Net Creditors?*
- Tørsløv, Wier & Zucman (2018) *The Missing Profits of Nations*
- Bustos, Pomeranz, Suárez Serrato, Vila-Belda & Zucman (2022) *The Race Between Tax Enforcement and Tax Planning: Evidence From a Natural Experiment in Chile*
- Fisman & Wei (JPE 2004) *Tax Rates and Tax Evasion: Evidence from "Missing Imports" in China*
- Sequeira (AER 2016) *Corruption, Trade Costs, and Gains from Tariff Liberalization: Evidence from Southern Africa*

Zucman (2013): Overview

- At the global level, liabilities > assets. The world is a net debtor!
- Capital seems to be moving away from the rich world, EU and US net debtors. “China owns the world”
- Zucman: This is a statistical illusion. Accounting for offshore wealth properly $\rightarrow$ EU and US are net creditors.

Zucman (2013): Overview



Zucman (2013): Definitions

- Each country's International Investment Position (IIP) shows its foreign assets and liabilities.

TABLE I

SECURITIES FORM THE BULK OF CROSS-BORDER WEALTH

	Trillions of current US$	% of world GDP
Securities	40.1	65
Bonds	26.4	43
Equities (including mutual fund shares)	13.7	22
Foreign direct investment	17.7	29
Other (loans, deposits, etc.)	32.0	52
Total cross-border wealth	89.9	146

Notes. World GDP (2008) = US$61.4 trillion. Values are as of end of 2008. Securities include all "portfolio investments" and the fraction of "reserve assets" invested in equities and bonds. In international investment statistics, all mutual fund shares are classified as equities (irrespective of whether the funds invest in equities or bonds). Derivatives are excluded because they are not measured yet in all leading economies. *Source*. IMF Balance of Payments Statistics and the updated and extended version of the External Wealth of Nations database constructed by Lane and Milesi-Ferretti (2007).

Zucman (2013): Definitions

- Denote by A_{ij} the amount of securities issued by country j and owned by residents of country i
- Covered agents: Large banks etc, report directly a_{ij}. Others (households) indirectly $\tilde{a}_{ij}$
- Securities are entrusted to a bank somewhere for custody, in country k

$$A_{ij} = \sum_k A_{ij}^k = \sum_k \left(a_{ij}^k + \tilde{a}_{ij}^k \right) =$$

$$\underbrace{\left[a_{ij}^i + \tilde{a}_{ij}^i \right]}_{\text{onshore}} + \underbrace{\sum_{k \neq i} \left(a_{ij}^k + \tilde{a}_{ij}^k \right)}_{\text{offshore}}$$

- The problem: The $\tilde{a}_{ij}^k$ aren't recorded in i or k
- The trick: The $\tilde{a}_{ij}^k$ are liabilities in j

Zucman (2013): Swiss Case Study

TABLE II

LARGE PORTFOLIOS OF SECURITIES ARE HELD IN SWISS BANKS BY FOREIGNERS

	Belonging to foreigners	Belonging to Swiss residents
Foreign securities	1,545	810
Bonds	540	484
Equities	1,005	326
(of which: mutual fund shares)	767	196
Fiduciary bank deposits	478	45
Total	2,022	855

Notes. Values are in billions of current U.S. dollars, as of end 2008. *Source*. Securities: Swiss National Bank's *Monthly Statistical Bulletin* (http://www.snb.ch/en/iabout/stat/statpub/statmon/stats/statmon), series $D5_1$, $D5_{1a}$, $D5_1$, $D5_{1b}$, $D5_2$, and $D5_{2b}$ and *Banks in Switzerland* (http://www.snb.ch/en/iabout/stat/statpub/bchpub/stats/bankench), series 38a, 38b, 38c. Fiduciary deposits: *Monthly Statistical Bulletin*, series $D4$, $D4_{1a}$, $D4_{2a}$, and *Banks in Switzerland* series 36, 37, 38.

Zucman (2013): Swiss Case Study

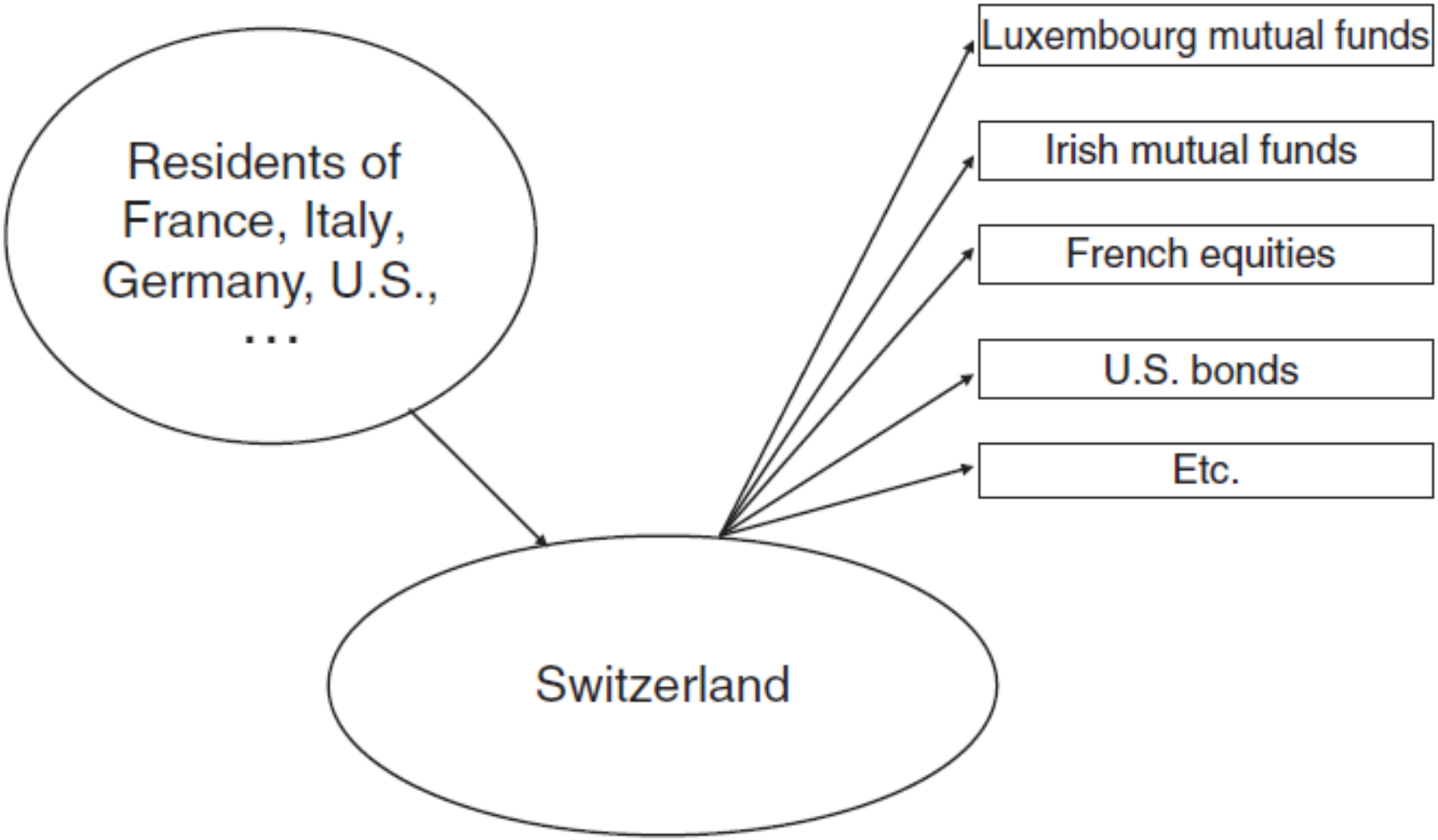


FIGURE II

Through Their Swiss Accounts, Foreigners Mostly Invest in Mutual Funds

Zucman (2013): Swiss Case Study

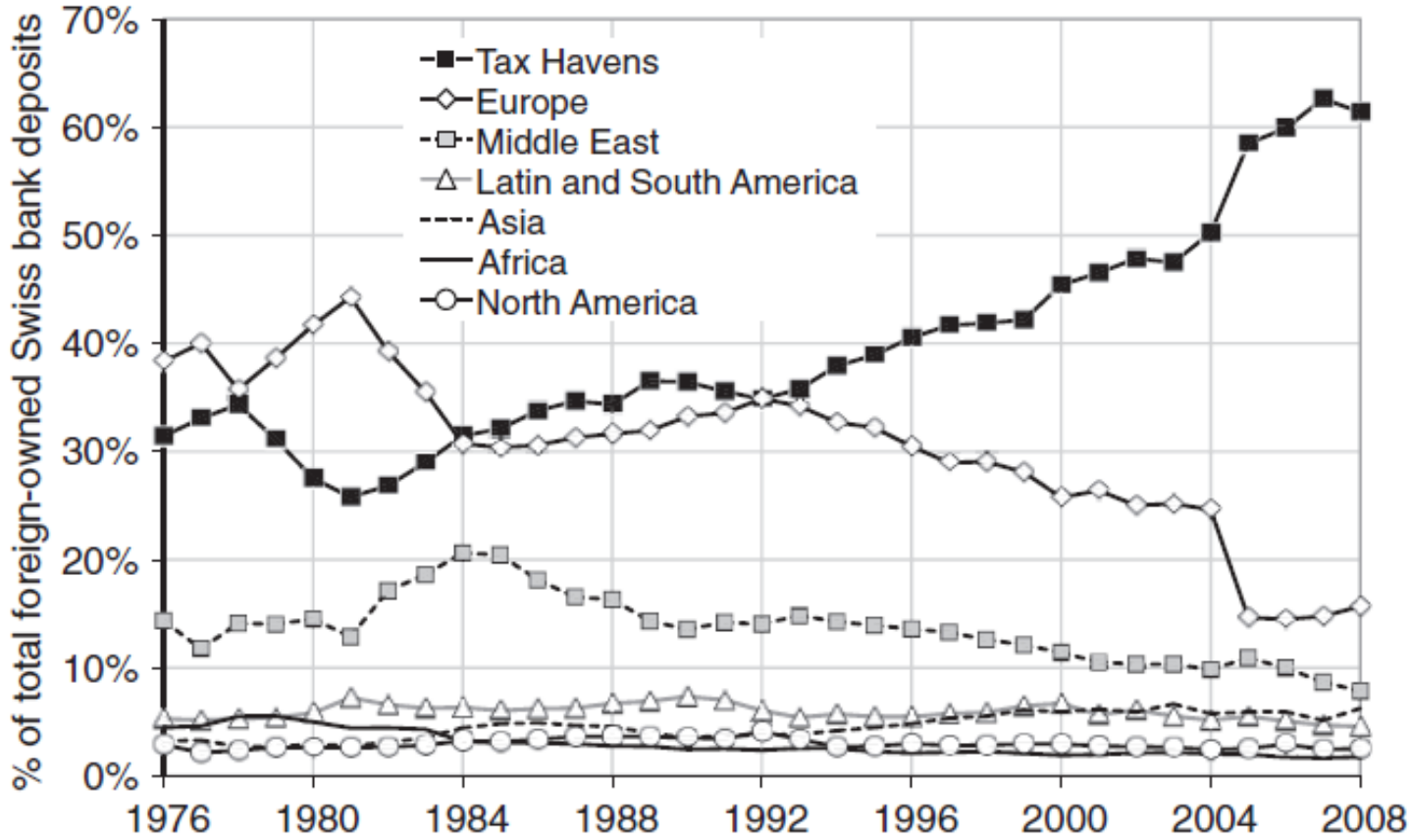


FIGURE III

Most Swiss Accounts Probably Belong to Europeans

This figure shows which countries' residents own Swiss fiduciary bank deposits, as reported by the Swiss National Bank (SNB). The SNB does not see through the sham corporations with addresses in such places as Panama or the British Virgin Islands used by European, U.S., and other rich countries' households as nominal owners of their accounts. This explains the high share of deposits assigned to tax havens. *Source*: Online Appendix Table A25.

Zucman (2013): Estimating Total Offshore Wealth

- e.g. French hh holds Luxembourg asset through Swiss bank.
  - no French record
  - Switzerland records nothing
  - Luxembourg records liability
- Generalize: L_j= liabilities of country j A_{ij} true assets i holds on j. $\hat{A}_{ij}$ statistical estimate of A_{ij}

$$\sum_j L_j > \sum_j \sum_i A_{ij}$$

- As a result, more dividends and interest will be paid than received too.

Zucman (2013): Estimating Total Offshore Wealth

- This applies in flows too: e.g. a US individual uses Bahamian account to buy a UK equity.
- $\Rightarrow$ if offshore account holders are net buyers of securities, more securities sold than purchased globally.
- To measure assets assume:
  1. direct reporters and onshore household assets measured correctly
  2. global portfolio liabilities accurately recorded
- Then difference between liabilities and assets captures tax haven wealth.

$$\Omega = \sum_i L_i - \sum_i \hat{A}_i$$

Zucman (2013): Results

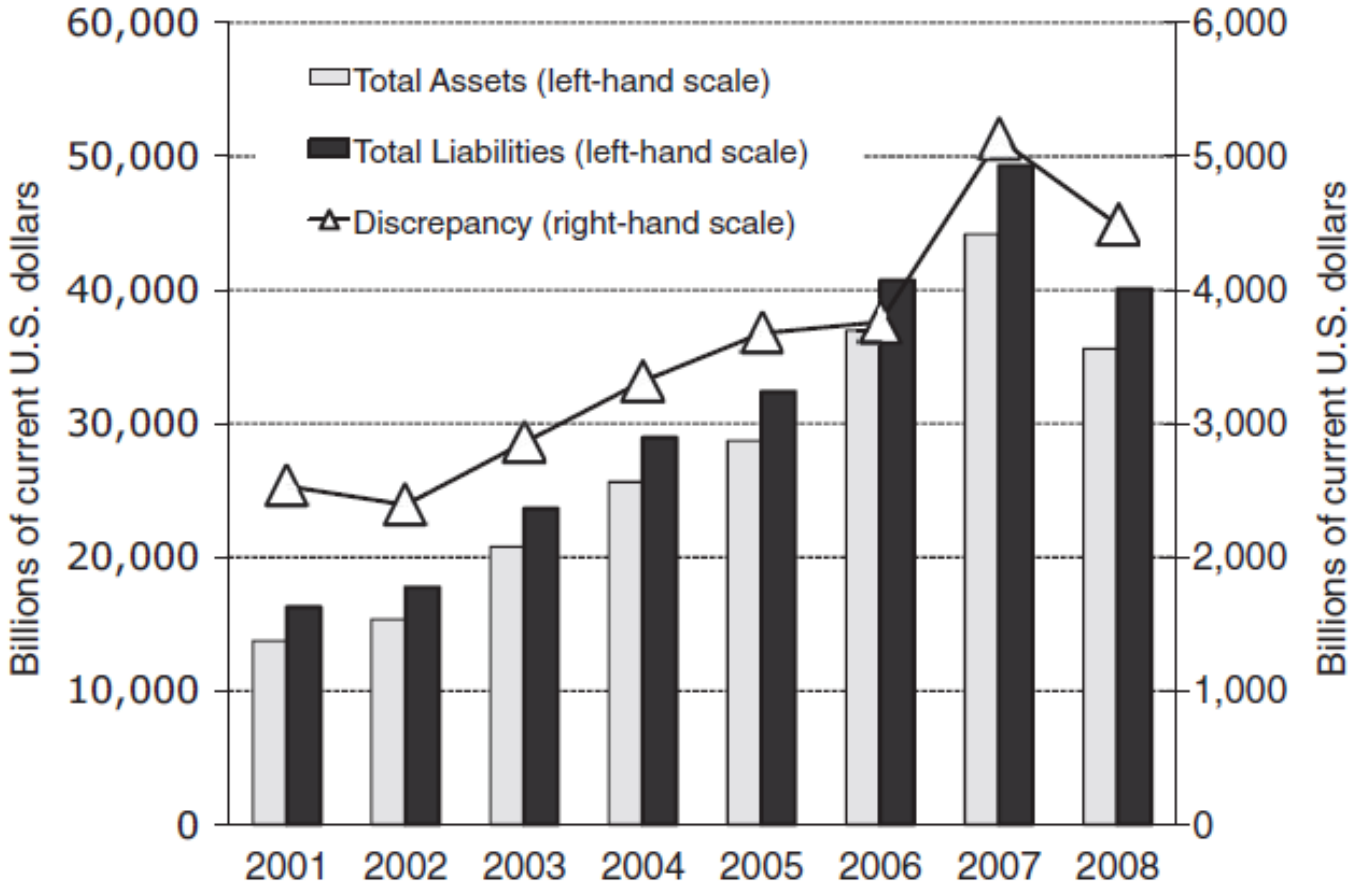


FIGURE IV

Each Year, Less Securities Assets Are Recorded Than Liabilities

This figure charts the securities assets and liabilities identifiable worldwide. Securities include all equities and bonds classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations. *Source*: Online Appendix Table A3.

Zucman (2013): Results

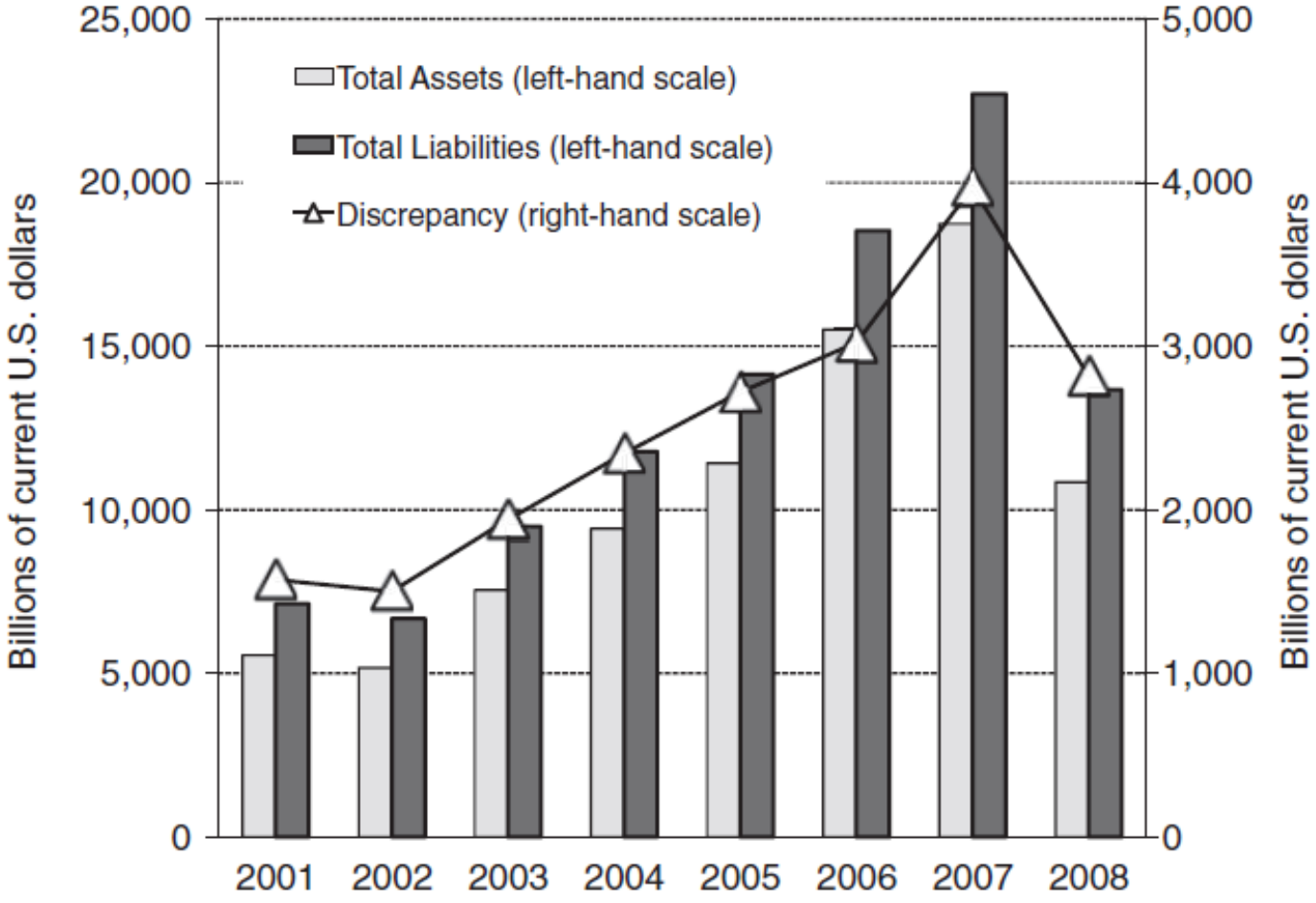


FIGURE V

Each Year, Less Equity Assets Are Recorded Than Liabilities

This figure charts the equity assets and liabilities identifiable worldwide. Equities include all equities classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations. *Source*: Online Appendix Table A3.

Zucman (2013): Results

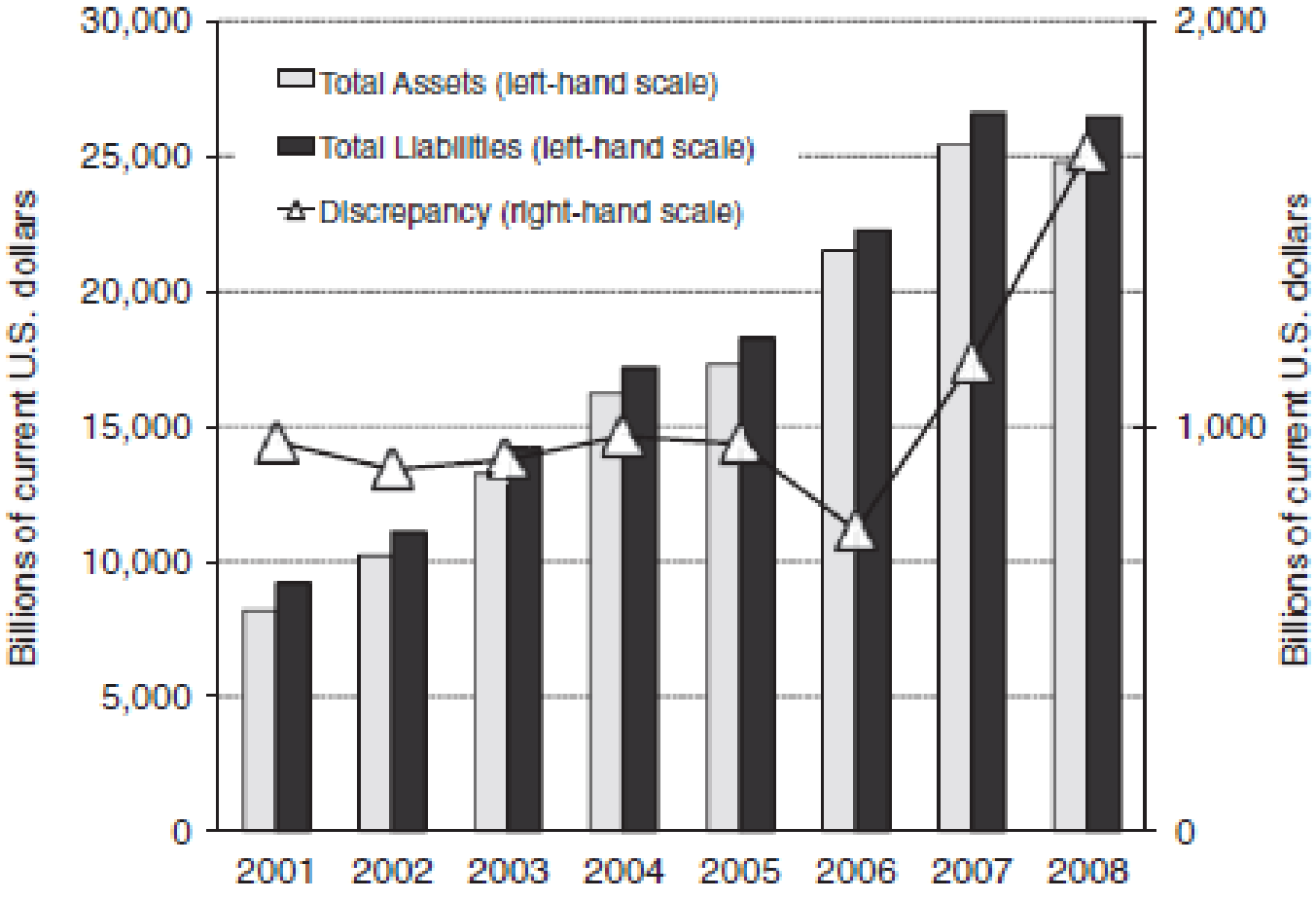


FIGURE VI

Each Year, Less Bond Assets Are Recorded Than Liabilities

This figure charts the bond assets and liabilities identifiable worldwide. Bonds include all debt securities classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations. *Source*: Online Appendix Table A3.

Zucman (2013): Results

TABLE III

ESTIMATED OFFSHORE WEALTH, WORLD AND SWITZERLAND

	World	Switzerland
Offshore securities	4,490	1,545
Bonds	37%	35%
Equities	63%	65%
(Of which: mutual fund shares)	48%	50%
Offshore bank deposits	1,388	478
Total offshore financial wealth	5,878	2,022

Zucman (2013): Results

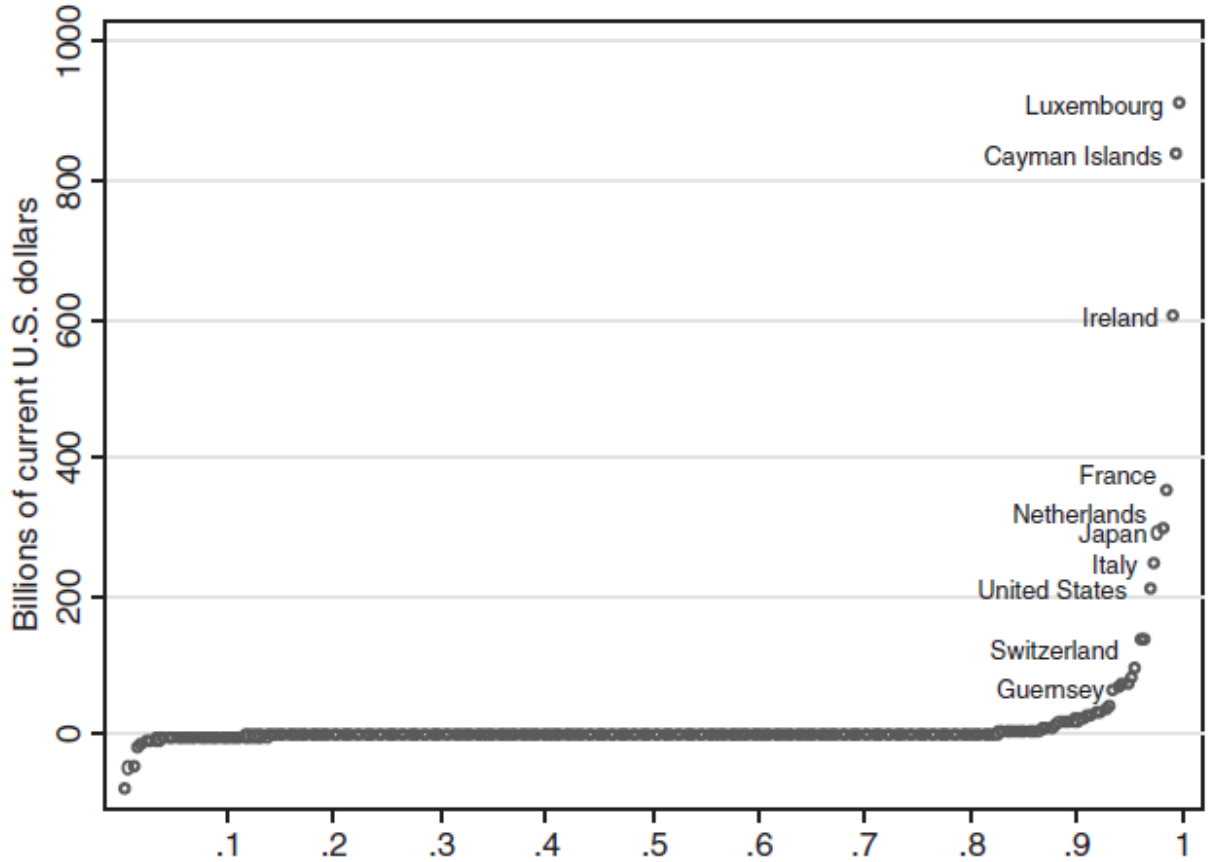


FIGURE VII

Many Mutual Fund Shares Have no Readily Identifiable Owners in the Official Statistics

Each dot represents a country j and is equal to the difference between the securities liabilities reported in 2008 by j (L_j) and the sum of the securities assets on j held by 236 countries i and international organizations ($\sum_i \hat{A}_{ij}$). The securities issued by Luxembourg, the Cayman Islands, and Ireland are mostly mutual fund shares. *Source*: Online Appendix Tables A13 and A14.

Zucman (2013): Results

TABLE V

ACCOUNTING FOR THE WEALTH IN TAX HAVENS CAN TURN THE EUROZONE INTO A NET CREDITOR

Share (%) of offshore portfolios in Switzerland belonging to eurozone residents	Share (%) of offshore portfolios in havens other than Switzerland belonging to eurozone residents			
	0	25	50	75
0	−11	−6	0	6
40	−6	0	5	11
50	−5	1	7	12
60	−3	2	8	13

Notes. The official eurozone's net foreign asset position/GDP ratio averaged −11% over the 2001–2008 period. If eurozone residents owned 40% of the unrecorded assets held through Switzerland and 50% of those held through the other tax havens, the true net foreign asset position/GDP ratio of the eurozone averaged +5%. *Source*. Online Appendix Table A28.

Zucman (2013): Results

TABLE VI

ACCOUNTING FOR THE WEALTH IN TAX HAVENS IMPROVES THE U.S. NET FOREIGN ASSET POSITION

Share (%) of offshore portfolios in Switzerland belonging to U.S. residents	Share (%) of offshore portfolios in havens other than Switzerland belonging to U.S. residents			
	0	25	50	75
0	−18	−13	−9	−5
5	−17	−13	−8	−4
15	−16	−12	−7	−3

Notes. The official U.S. net foreign asset position/GDP ratio averaged −18% over the 2001–2008 period. If U.S. residents owned 15% of the unrecorded assets held through Switzerland and 25% of those held through the other tax havens, the true net foreign asset position/GDP ratio of the U.S. averaged −12%. *Source*. Online Appendix Table A29.

Outline

International Taxation and Developing Countries

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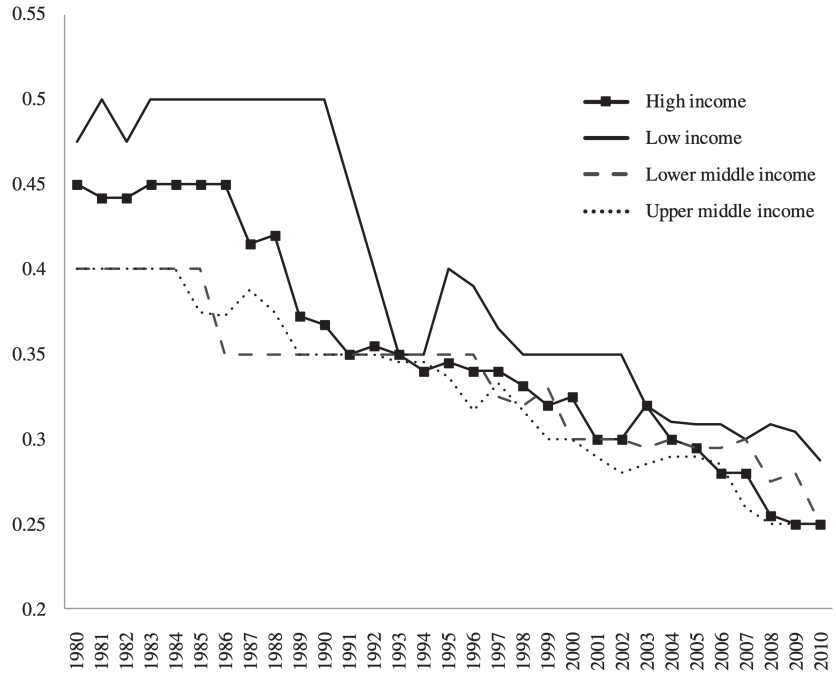
- Fisman & Wei (JPE 2004) *Tax Rates and Tax Evasion: Evidence from "Missing Imports" in China*
- Sequeira (AER 2016) *Corruption, Trade Costs, and Gains from Tariff Liberalization: Evidence from Southern Africa*

Tørsløv, Wier & Zucman (2018): Overview

- Corporate tax rates have been falling globally (Keen & Konrad, 2013)



- How much are profits shifted across borders in response to differences in corporate tax rates?
- How much would reported profits in US/EU LMICs increase if there was tax harmonization?

Tørsløv, Wier & Zucman (2018): Overview

- Use new macroeconomic data "Foreign Affiliates Statistics". Break down national accounts into foreign-owned vs local firms
- Find that foreign firms are systematically more profitable than local firms in tax haven countries, but not in other countries.
- Due mostly to above-normal returns to capital not to shifting of capital across countries.
- Calculate that around 40% of profits earned outside of parent country are shifted to tax havens.
- EU countries are the primary losers. Implies rise in capital share actually about twice what the statistics report.
- US companies do this the most aggressively
- Tax haven countries are gaining lots of revenue (increase in tax base larger than loss from low rates)

Tørsløv, Wier & Zucman (2018): Profit Ratios

- Interested in the ratio of pre-tax corporate profits to wages: π
- Corporate output is divided between workers and capital owners: $Y = F(K, AL) = rK + wL$
- Define capital share as $\alpha = rK/Y$, then ratio of operating surplus to wages is $\alpha/(1-\alpha)$
- Corporations pay a share p of operating surplus in interest, so $\pi = (1-p) \cdot \alpha/(1-\alpha)$
- All numbers net of depreciation since it's tax deductible.
- Calculate these numbers separately for foreign π_f and local π_l firms
- $\Rightarrow$ \$11.5 trillion of corporate profits. 15% (\$1.7tn) made in affiliates of foreign firms. Of this, 36% (\$600bn) shifter to tax havens.

Tørsløv, Wier & Zucman (2018): Tangible Capital vs Shifting

- High π_f can come about because
  1. Paper profits are being shifted
  2. Capital share is high and elasticity of substitution between K and L is high
- Profit shifting =
  - transfer pricing (sell goods and services within the multinational at tax-advantageous prices)
  - tax-advantageous borrowing within the firm (hi tax borrows from low tax affiliate)
  - Locating intangible capital in low tax jurisdictions that then receive royalties/interest/revenues)

Tørsløv, Wier & Zucman (2018): Tangible Capital vs Shifting

- $d\pi/d\left(K/AL\right)$ depends on the elasticity of substitution between capital and labor σ.
  - If $\sigma > 1$ then high capital $\rightarrow$ high π
  - But if $\sigma < 1$ then high capital makes MPK low and $\rightarrow$ low π

$$\pi_f = \left(\frac{K}{wL}\right)_f \cdot r_f \cdot (1 - p_f)$$

- r_f is the measured return to capital. Includes both marginal product and excess returns (including profit shifting). Under assumptions about σ can decompose.
- Specifically, assume:
  - π_l not affected by profit shifting.
  - $\sigma = 1$
  - α varies across countries

  $\Rightarrow$ difference betwen π_f and π_l within a given country measures inward profit shifting

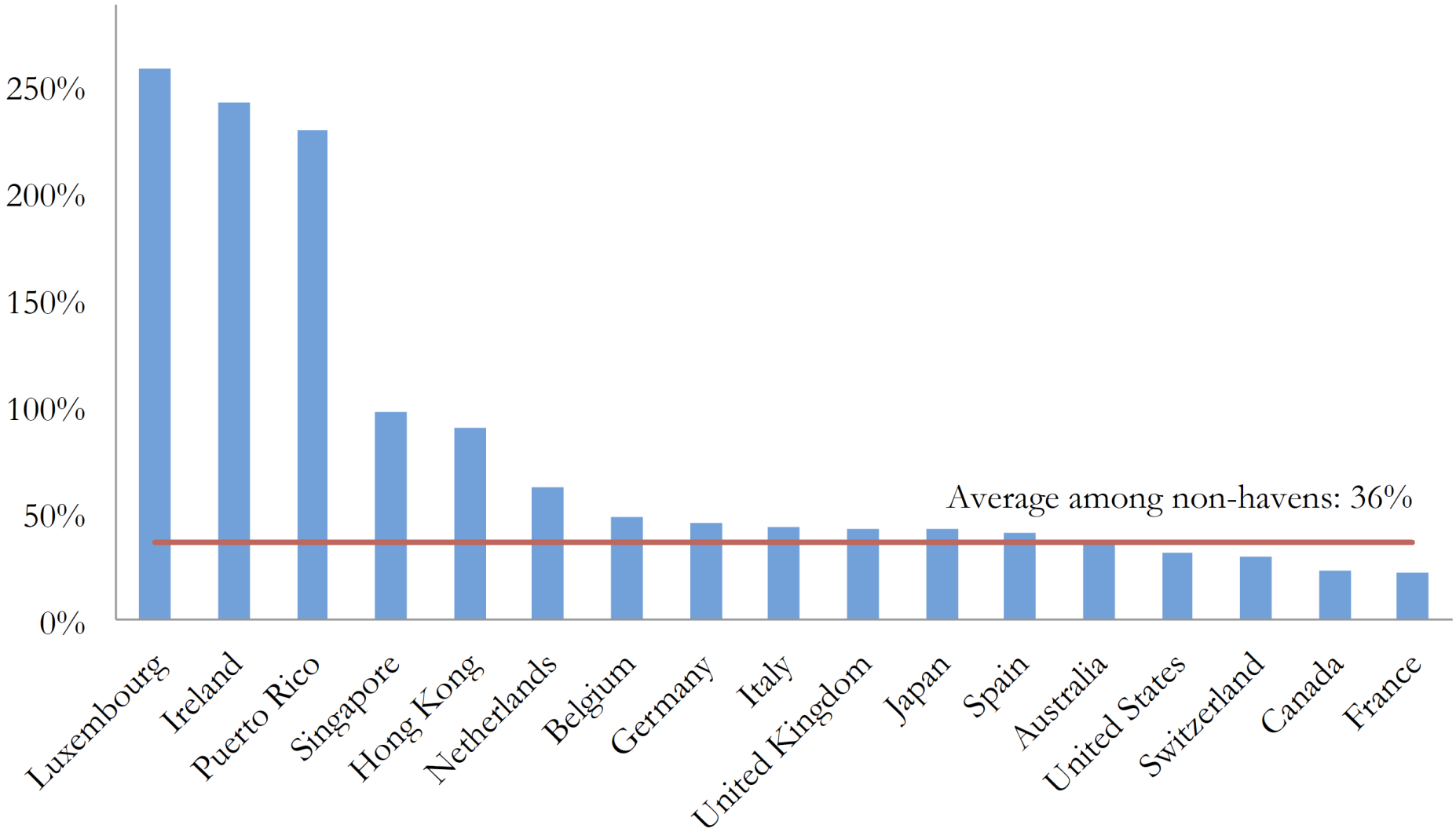
Tørsløv, Wier & Zucman (2018): Reallocating Shifted Profits

- If all countries had the same tax rate, where would all the profits be?
- Allocate shifted profits proportionally to
  - *bilateral* service exports (focus on intellectual property rights, HQ services, financial services)
  - intra-group interest receipts

  reported in the balance of payments of tax haven countries.
- Since 2009 balance of payments is available bilaterally, permitting this exercise.

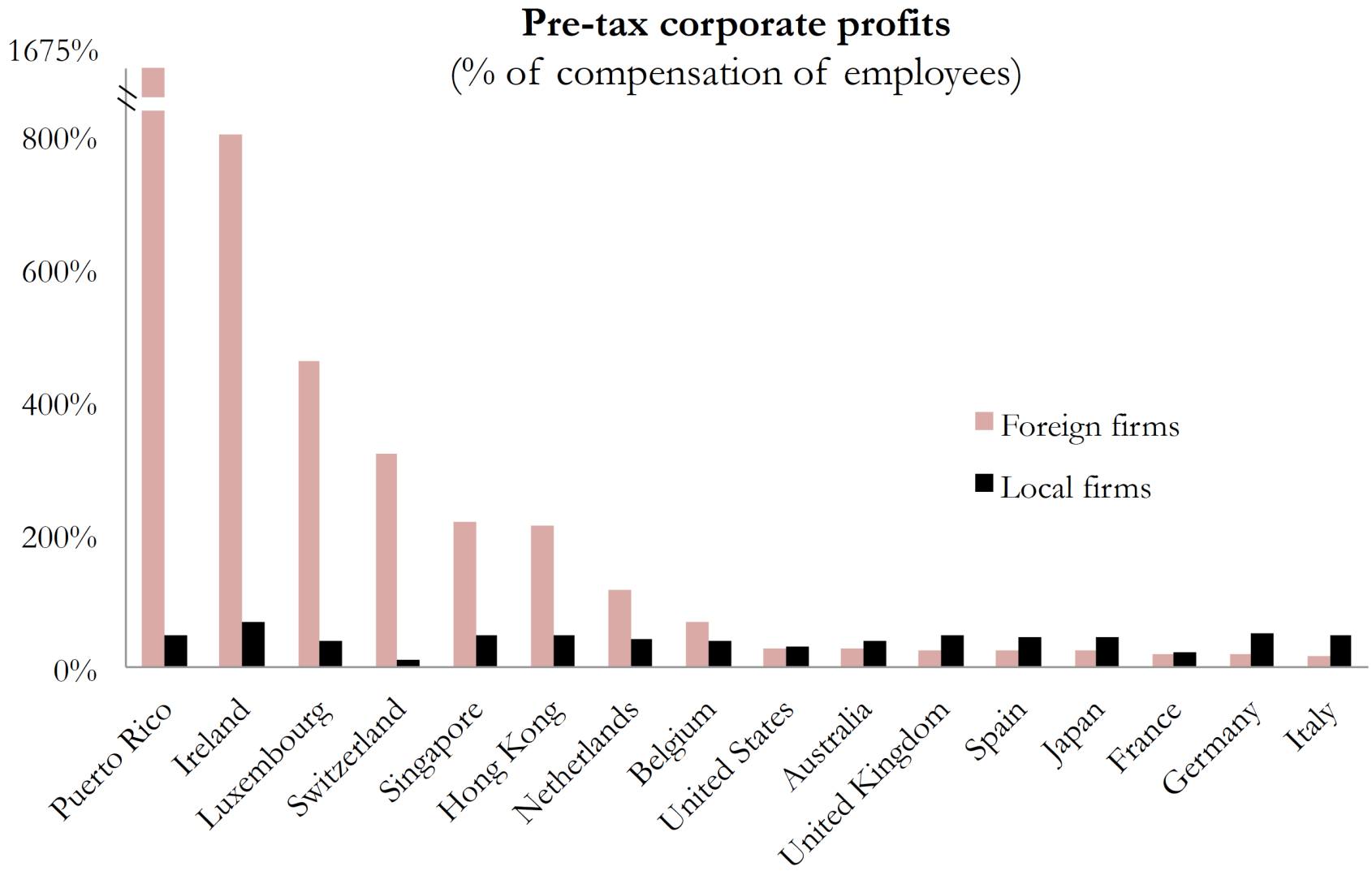
Tørsløv, Wier & Zucman (2018): Results: Profitability

Figure 3: Pre-tax Corporate Profits (% Compensation of Employees)

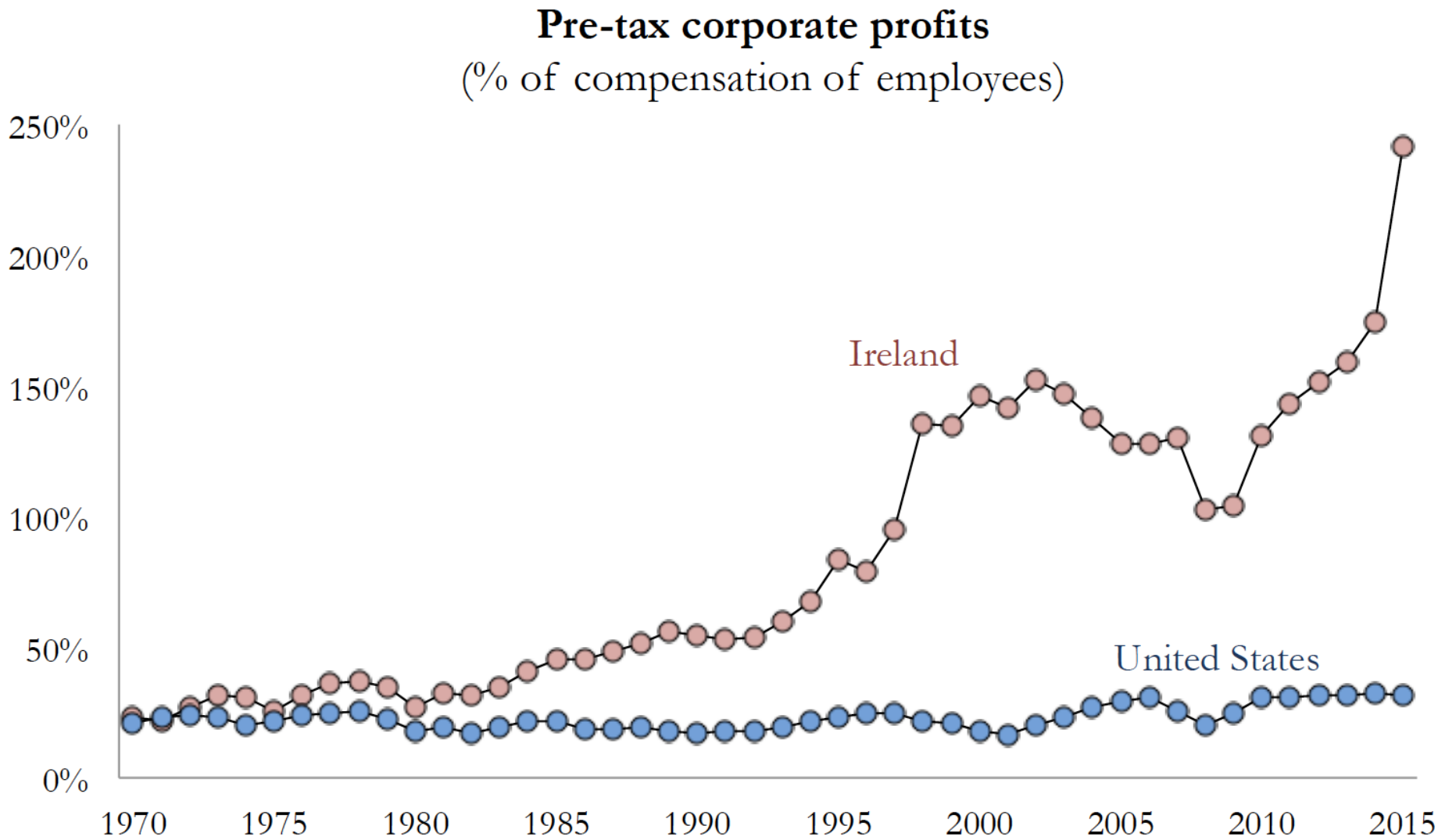


Tørsløv, Wier & Zucman (2018): Results: Profitability

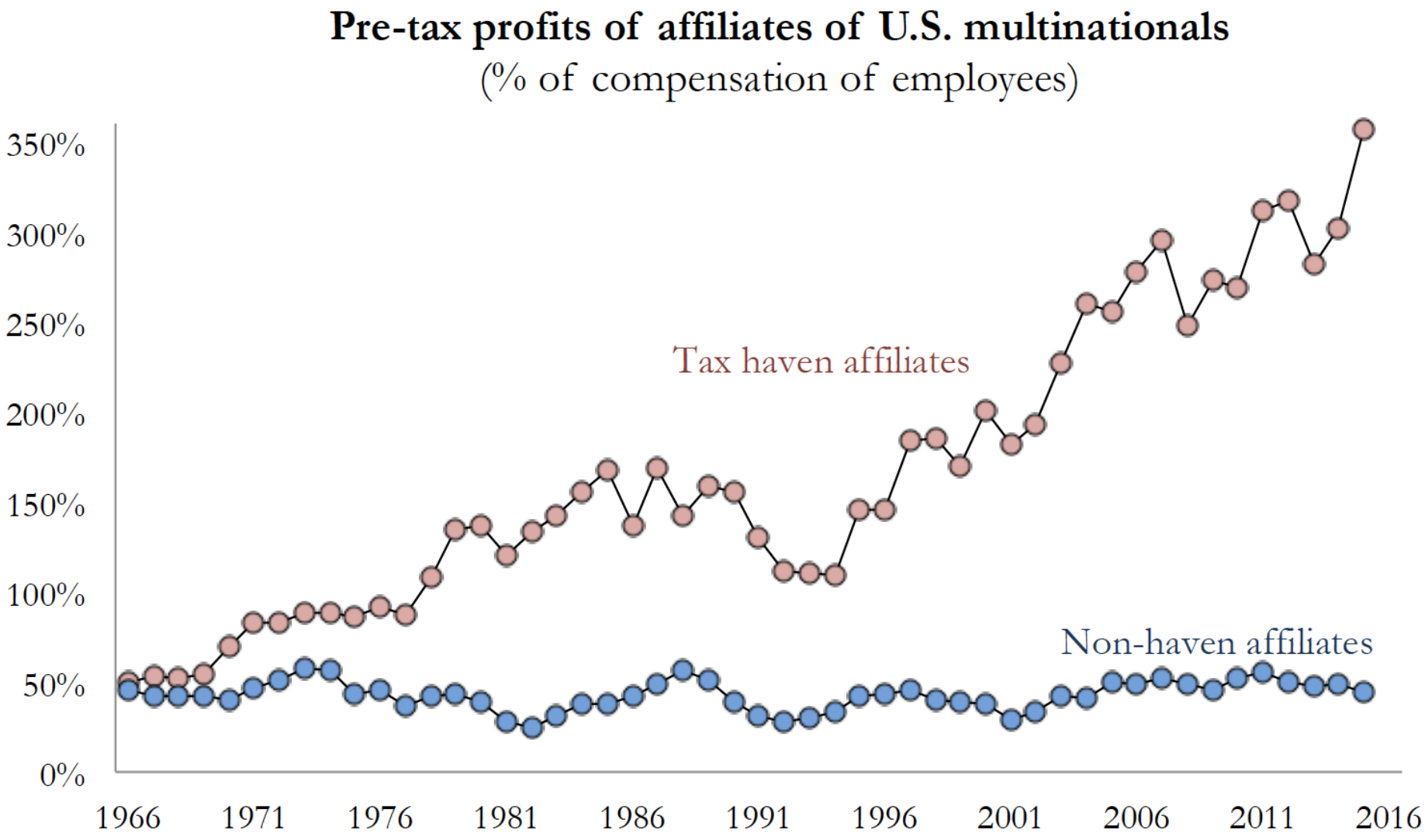
Figure 4: Profitability in Foreign vs. Local Firms



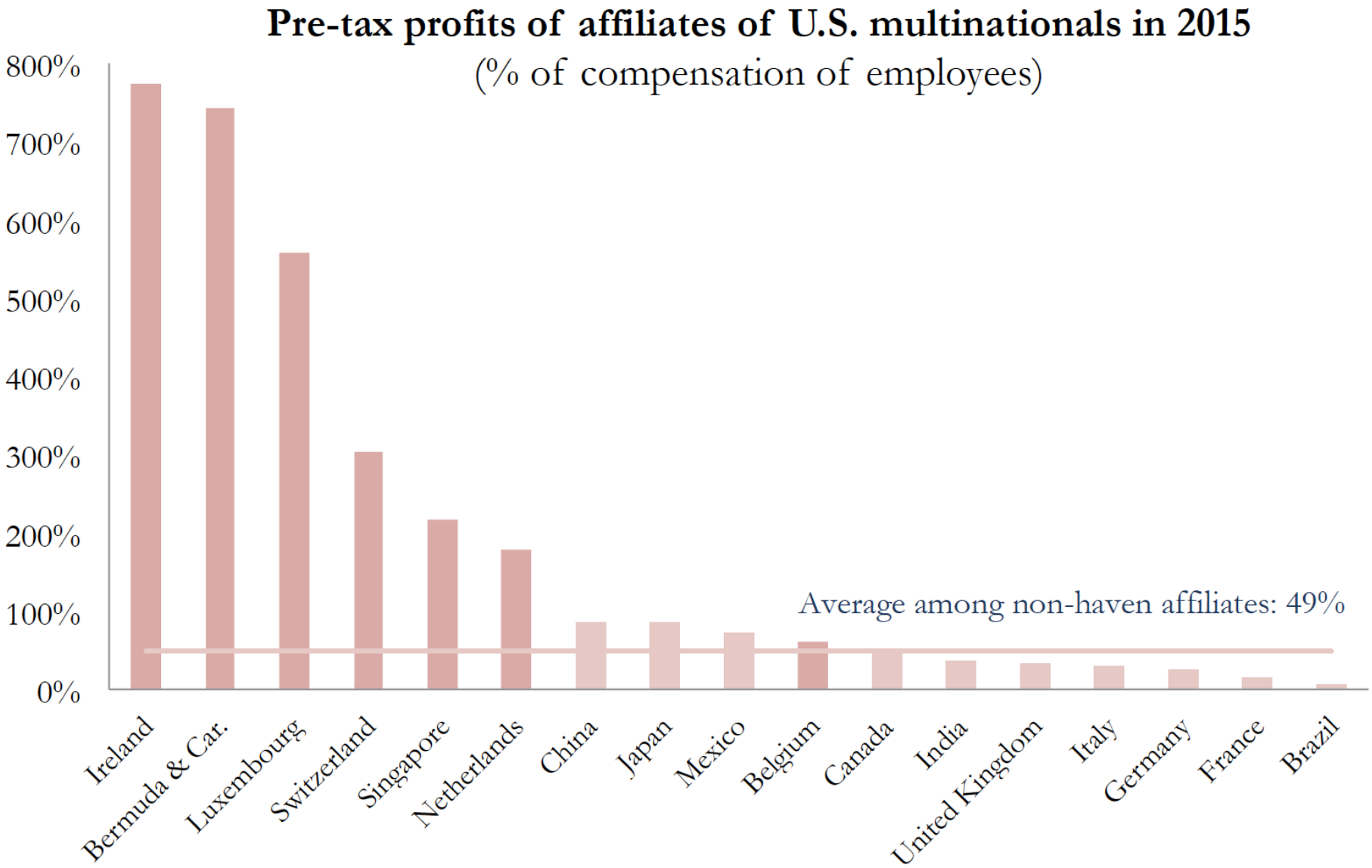
Tørsløv, Wier & Zucman (2018): Results: Profitability



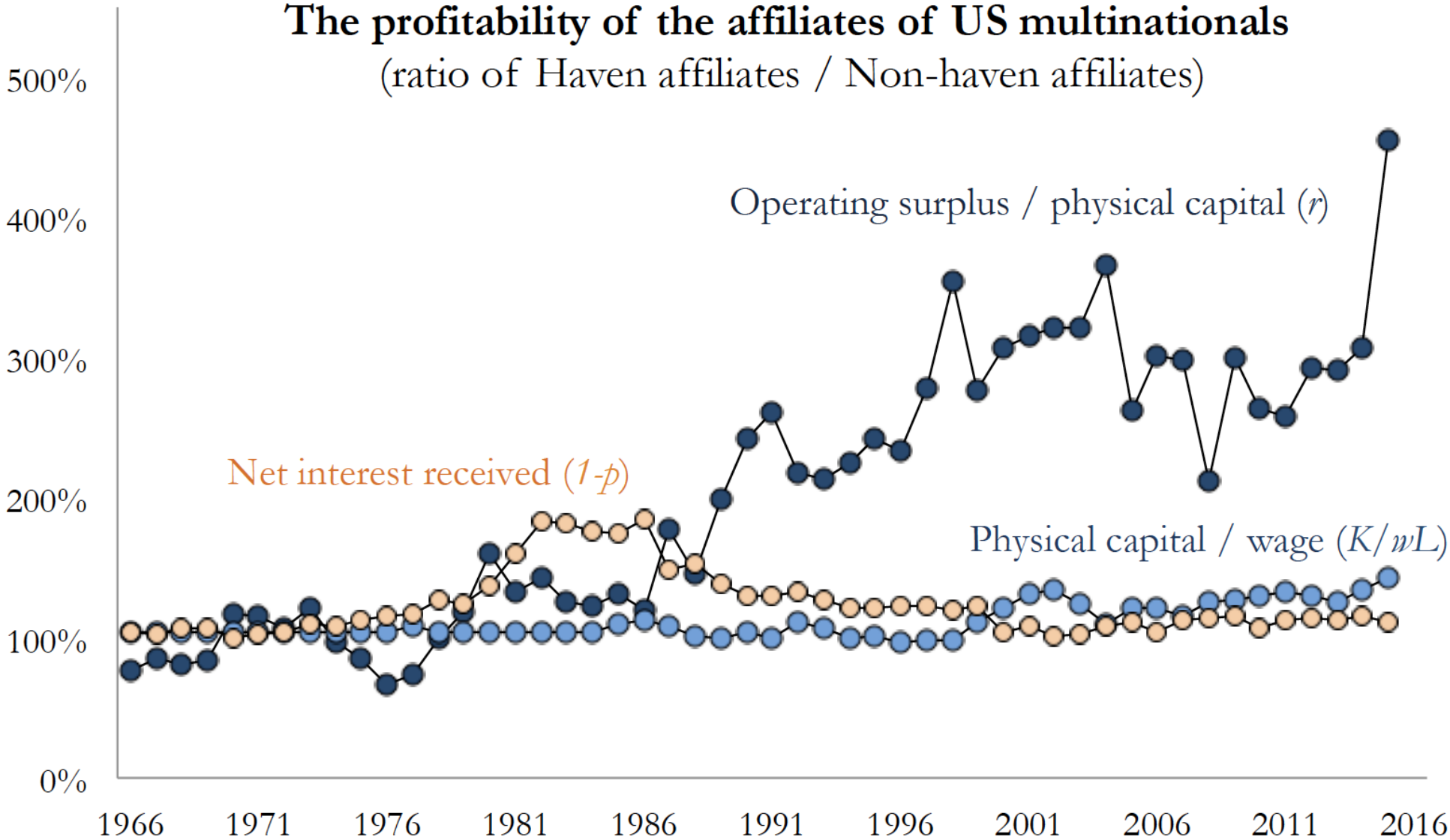
Tørsløv, Wier & Zucman (2018): Results: Profitability



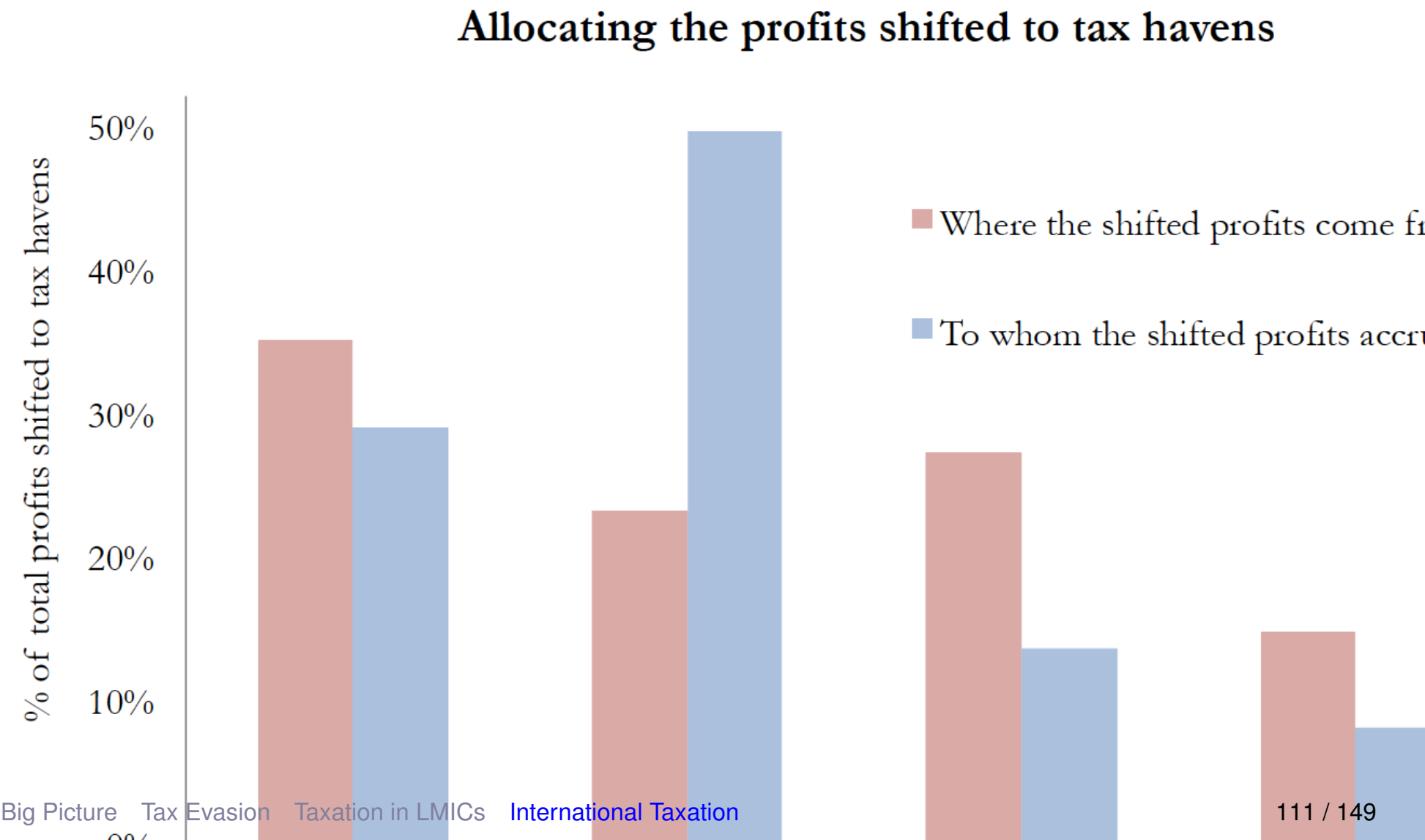
Tørsløv, Wier & Zucman (2018): Results: Profitability



Tørsløv, Wier & Zucman (2018): Capital vs Shifting



Tørsløv, Wier & Zucman (2018): Results: Reallocating Shifted Profits



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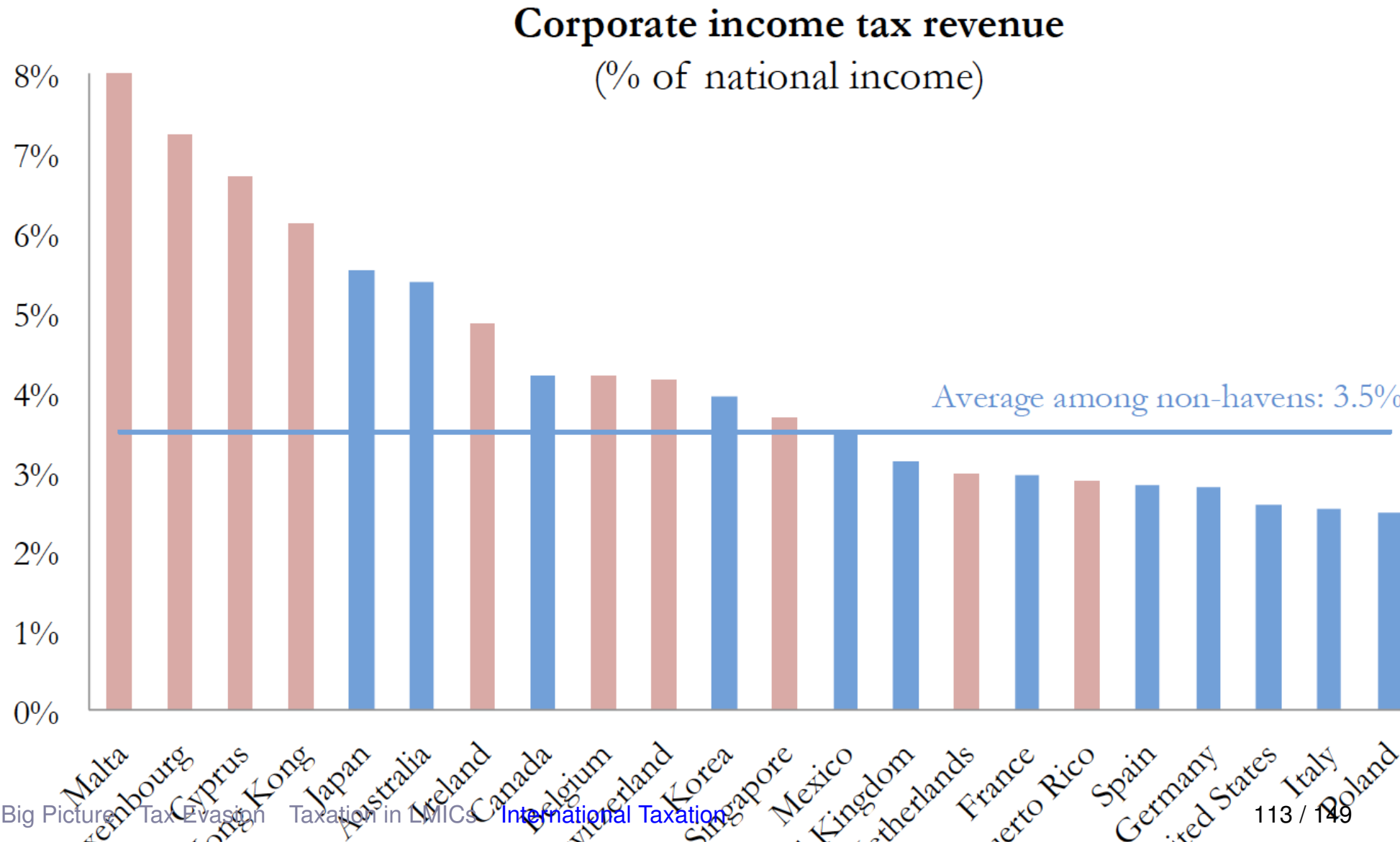
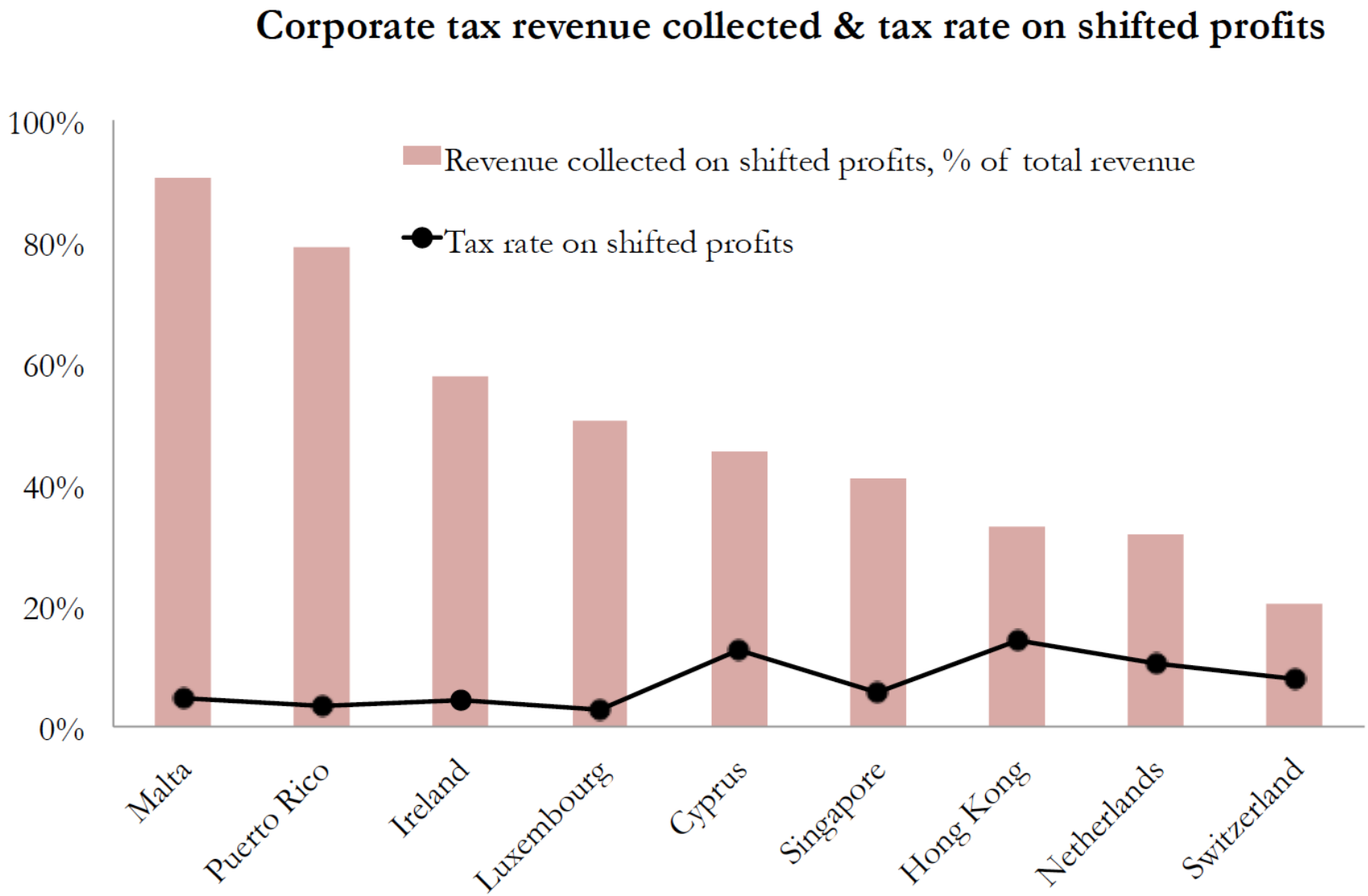


Tørsløv, Wier & Zucman (2018): Results: Reallocating Shifted Profits



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Bustos et al (2022): Overview

- As we just saw, profit shifting is quantitatively important.
- Profit shifting enabled by withingroup transactions at non-market (non “arms-length”) prices.
- Fundamental problem: few or no benchmarks exist among actual third parties for most of these transactions
- How can governments respond? Extensive reporting requirements to justify prices used is a common tool.
- Does it work? Exploit reform in Chile in 2011 that brings reporting requirements up to OECD standards in difference in differences design.

Bustos et al (2022): Model

- Assume a Chilean firm has affiliates in J countries. Production in country j is $f_j(K_j)$ (with $f' > 0$ and $f'' < 0$).
- Firms have a nondeductible cost of capital ρ so without profit shifting global after-tax profits are

$$\sum_j \left[(1 - t_j) f_j(K_j) - \rho K_j\right]$$

- Monitoring has two types: Compliance requirements F_1 (reporting on intra-group payments) and Enforcement F_2 (governs cost of misreporting).
- Compliance costs are $\theta_1 F_1$.
- True profitability in country j is $\bar{f}_j = f_j(K_j)/K_j$ but report r_j at expected cost

$$\frac{F_2}{\theta_2} \frac{K_j \left(r_j - \bar{f}_j\right)^2}{2}$$

Bustos et al (2022): Model

- Fixing the costs θ_1, θ_2 and the capital allocation $\{K_j\}$ firms solve

$$\max_{\{r_j\}} \sum_j K_j \left[(1 - t_j) r_j - \rho - \frac{F_2}{\theta_2} \frac{\left(r_j - \bar{f}_j\right)^2}{2} \right] - \theta_1 F_1 \quad s.t. \sum_j \bar{f}_j K_j = \sum$$

  note assumption that global profits aren't misreported

- Solution is to report profits

$$r_j = \bar{f}_j + \frac{\theta_2}{F_2} \left(\tilde{t} - t_j \right)$$

  where $\tilde{t} = \sum_j t_j K_j / \sum_j K_j$ is capital-weighted average tax rate

Bustos et al (2022): Model

- Given this, we work backwards: Firms allcate capital to solve

$$\Pi\left(\theta_1, \theta_2, F_1, F_2\right) = \max_{\{K_j\}} \underbrace{\sum_j \left[\left(1 - t_j\right) f_j K_j - \rho K_j\right]}_{\text{Real Profits } \pi(\theta_2, F_2)} - \theta_1 F_1$$

$$+ \frac{\theta_2}{F_2} \underbrace{\sum_j K_j \left[\left(1 - t_j\right)\left(\tilde{t} - t_j\right) - \frac{\left(\tilde{t} - t_j\right)^2}{2}\right]}_{\text{Profit Shifting } \psi(\theta_2, F_2)}$$

- Substituting in, investment satisfies

$$\left(1 - t_j\right) f_j'\left(K_j\right) = \rho - \frac{\theta_2}{F_2} \frac{\left(\tilde{t} - t_j\right)^2}{2}$$

Bustos et al (2022): Model

- A continuum of firms i can either have in-house accountants (I) or hire a consultant (C). Tax consultants help firms:
  - Compliance is cheaper $\theta_1^C < \theta_1^I$
  - Tax planning is easier $\theta_2^C > \theta_2^I$ (For simplicity assume $\theta_2^I \approx 0$.)
- Firms hire the consultant if benefits are larger than idiosyncratic cot $\theta_{0,i}^C \sim G(\cdot)$

$$\Delta\Pi = \underbrace{\left[\pi\left(\theta_2^C, F_2\right) - \theta_1^C F_1 + \frac{\theta_2^C}{F_2}\psi\left(\theta_2^C, F_2\right)\right]}_{\Pi^C} - \underbrace{\left[\pi\left(0, F_2\right) - \theta_1^I F_1\right]}_{\Pi^I} > \theta_{0,i}^C$$

- Increasing compliance increases the share of firms using consultants:

$$\frac{\partial N^C}{\partial F_1} = g\left(\Delta\Pi\right)\left(\theta_1^I - \theta_1^C\right) > 0$$

- Increasing enforcement penalties F_2 lwers the benefits from profit shifting

$$\frac{\partial N^C}{\partial F_2} = -g\left(\Delta\Pi\right)\frac{\theta_2^C}{F_2}\psi\left(\theta_2^C, F_2\right) < 0$$

Bustos et al (2022): Model

- Use the Keen & Slemrod (2017) setup again to think about welfare.
- Impose that $F_1 = \gamma F_2$ so that the two instruments move together. Government's problem is then

$$\max_{F_2} \Pi \quad s.t.\ t_1 \left(N^C \tilde{\pi}^C + \left(1 - N^C\right) \tilde{\pi}^I \right) - a\left(F_1, F_2\right) > R$$

- Now welfare effect of increasing F_2 has 5 components:

$$\underbrace{-\gamma \bar{\theta}_1 - \frac{\theta_2^C}{F_2} \psi\left(\theta_2^C, F_2\right) N^C}_{\text{(1) Effect on profits}<0} - \underbrace{\lambda \left[\gamma \frac{\partial a}{\partial F_1} + \frac{\partial a}{\partial F_2} \right]}_{\text{(2) Administrative Costs}>0}$$

$$+ \underbrace{\lambda t_1 N^C \frac{\partial \tilde{\pi}}{\partial F_2}}_{\text{(3) Effect on reported profits}>0} \underbrace{-\lambda \left[\gamma \frac{\partial N^C}{\partial F_1} + \frac{\partial N^C}{\partial F_2} \right]}_{\text{(4) Effect on accounting choice}} \underbrace{t \Delta \tilde{\pi}}_{\text{(5) } \Delta \text{ Reported profits}>0}$$

Bustos et al (2022): Data

- Admin data on universe of internationally active firms in Chile 2007–2015
  - sales, payroll, tax payments from corporate income tax filings
  - accompanying affidavits on payments to foreign entities
- Customs data on univorse of imports and exports of goods at transaction lavel
- Tax rates of foriegn countries from Centre for Business Taxation Tax Database
- Qualitative interviews with transfer pricing consultants in Chile

Bustos et al (2022): Summary Statistics

Panel A. Income Tax Data
(Full Sample)

	Domestic firms	Multinational firms
Domestic sales	5,509	35,443
	(15,537)	(63,234)
	[1,824]	[8,883]
Payroll	881	4,577
	(2,355)	(7,521)
	[306]	[1,495]
Assets	10,834	121,904
	(48,272)	(262,342)
	[2,115]	[17,940]
EBIT	610	5,657
	(2,746)	(13,201)
	[169]	[770]
Taxes	64	420
	(219)	(1,028)
	[18]	[40]
Taxes/Payroll	0.162	0.163
	(0.330)	(0.395)
	[0.064]	[0.036]
Number of firms	11,333	2,755

Panel B. International Payments
(Sample with Total Payments > 0)

	(1) Domestic firms	(2) Multinational firms
Total payments	199	1,446
	(554)	(5,977)
	[49]	[110]
Royalties	95	435
	(278)	(1,673)
	[0]	[0]
Interests	30	512
	(356)	(4,669)
	[0]	[0]
Services	57	330
	(191)	(1,065)
	[1]	[6]
Other	16	169
	(200)	(2,038)
	[0]	[0]
Number of firms	283	1,136

Bustos et al (2022): Empirical Strategy

- Look at the impact of tax reforms in *other countries* on payments by Chilean firms to firms/affiliates in those countries

$$\ln(Y_{ijat}+1) = \beta_1 \text{Tax Rate}_{jt} + \beta_2 \text{Tax Rate}_{jt} \times \text{Affiliate}_a + \beta_3 \ln(\text{GDPpc})_j$$

  where Y_{ijat} is payment by firm i to firms in country j in year t. a denotes whether payments made to an affiliated company. Affiliate_a indicates payments to affiliates and Tax Rate_{jt} is the statutory corporate tax rate of country j in year t.
- Control for ln GDP/capita, firm-year effects u_{it}, firm-affiliate effects α_{ia} and destination-country effects μ_j
- Identification comes from within-firm comparisons across destination countries.
- Expect $\beta_1 + \beta_2 < 0$ since profit shifting incentive increases with tax rate differeential, but $\beta_1 = 0$ since no profit shifting motive to non-affiliated companies.

Bustos et al (2022): Empirical Strategy

- To look at the impact of the 2011 reform, do a triple-difference before and after the reform:

$$\begin{aligned}\ln\left(Y_{ijat}+1\right) = \beta_1 \text{Tax Rate}_{jt} + \beta_2 \text{Tax Rate}_{jt} \times \text{Affiliate}_a \\ + \beta_3 \text{Tax Rate}_{jt} \times \text{Affiliate}_a \times \text{Post}_t + \beta_4 \text{Post}_t + \beta_5 \text{Tax} \\ + \beta_6 \text{Affiliate}_a \times \text{Post}_t + \beta_8 \ln\left(\text{GDPpc}\right)_{jt} + u_{it} + \alpha_{ia} + \end{aligned}$$

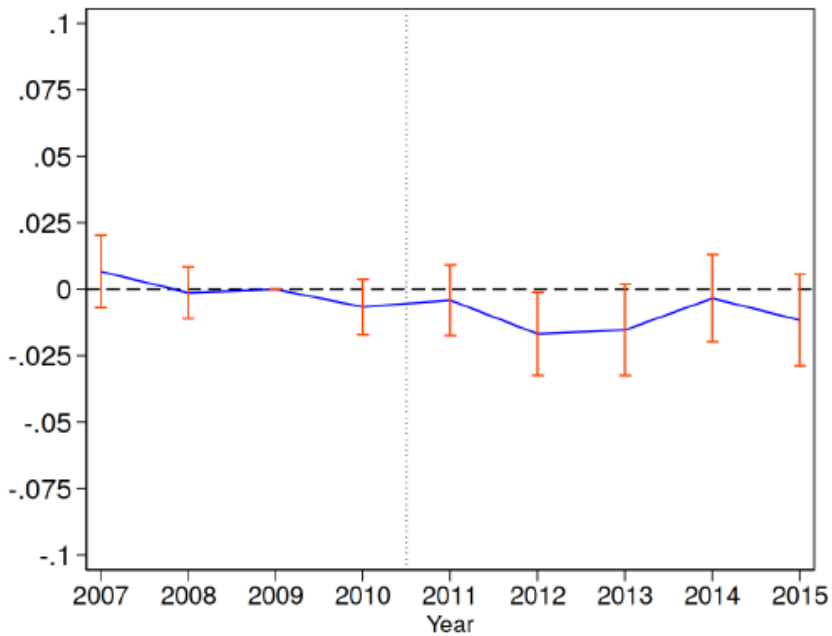
- Now we're looking at β_3: Does the semi-elasticity for affiliates change after the reform?
- For other outcomes at the firm level estimate

$$\frac{Y_{it}}{\text{Payroll}_{it}} = \alpha_0 + \beta_1 \text{Multinational}_i + \beta_2 \text{Post}_t + \beta_3 \text{Multinational}_i \times \text{Post}_t + \beta_4$$

Bustos et al (2022): Results

(a) Services

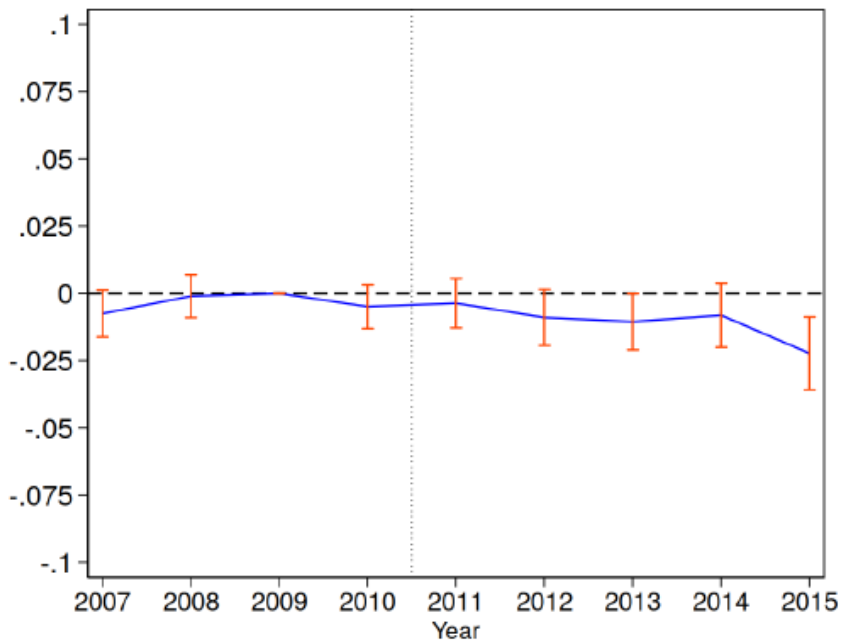
(b) Royalties



Bustos et al (2022): Results

(c) Interests

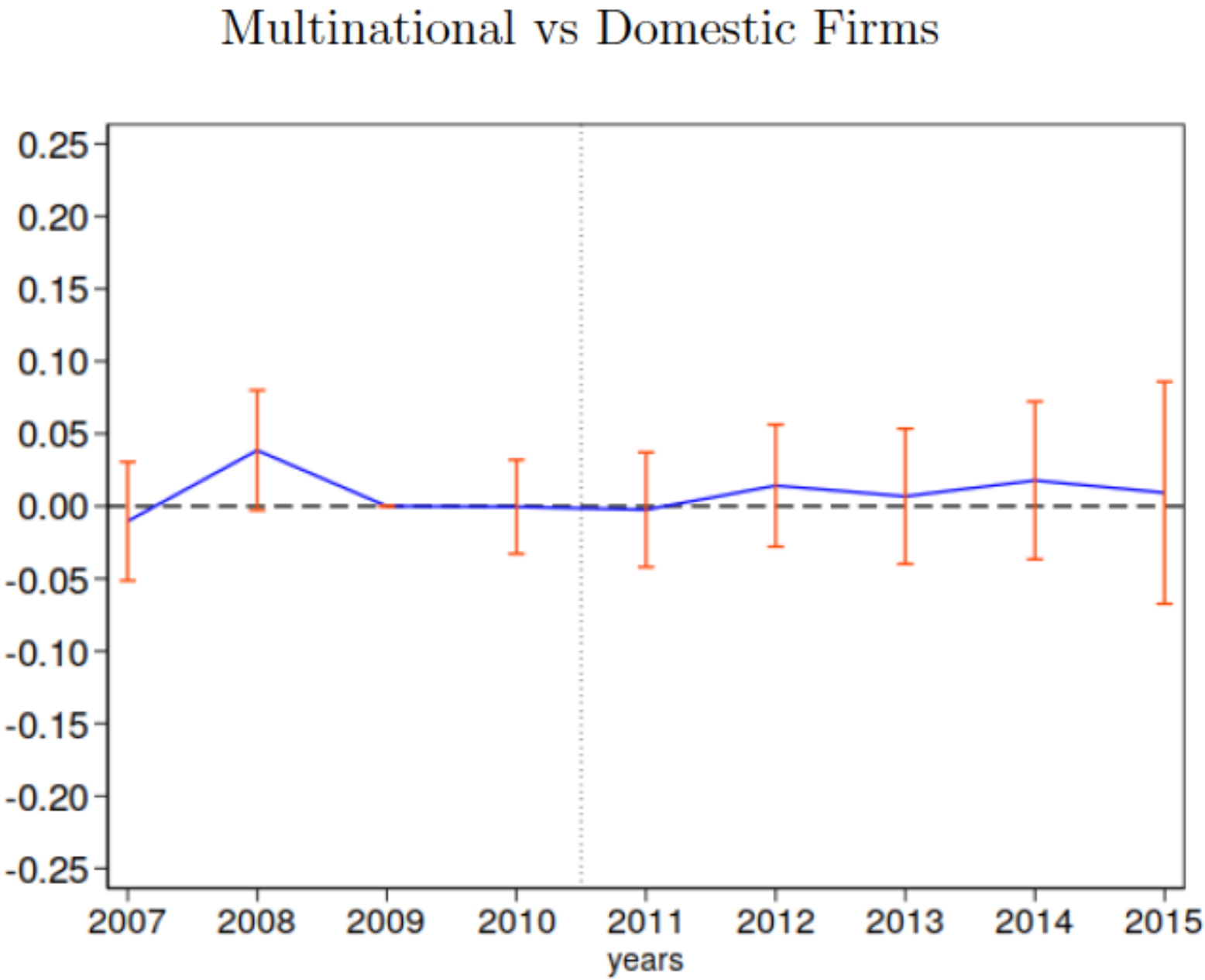
(d) Other



Bustos et al (2022): Results

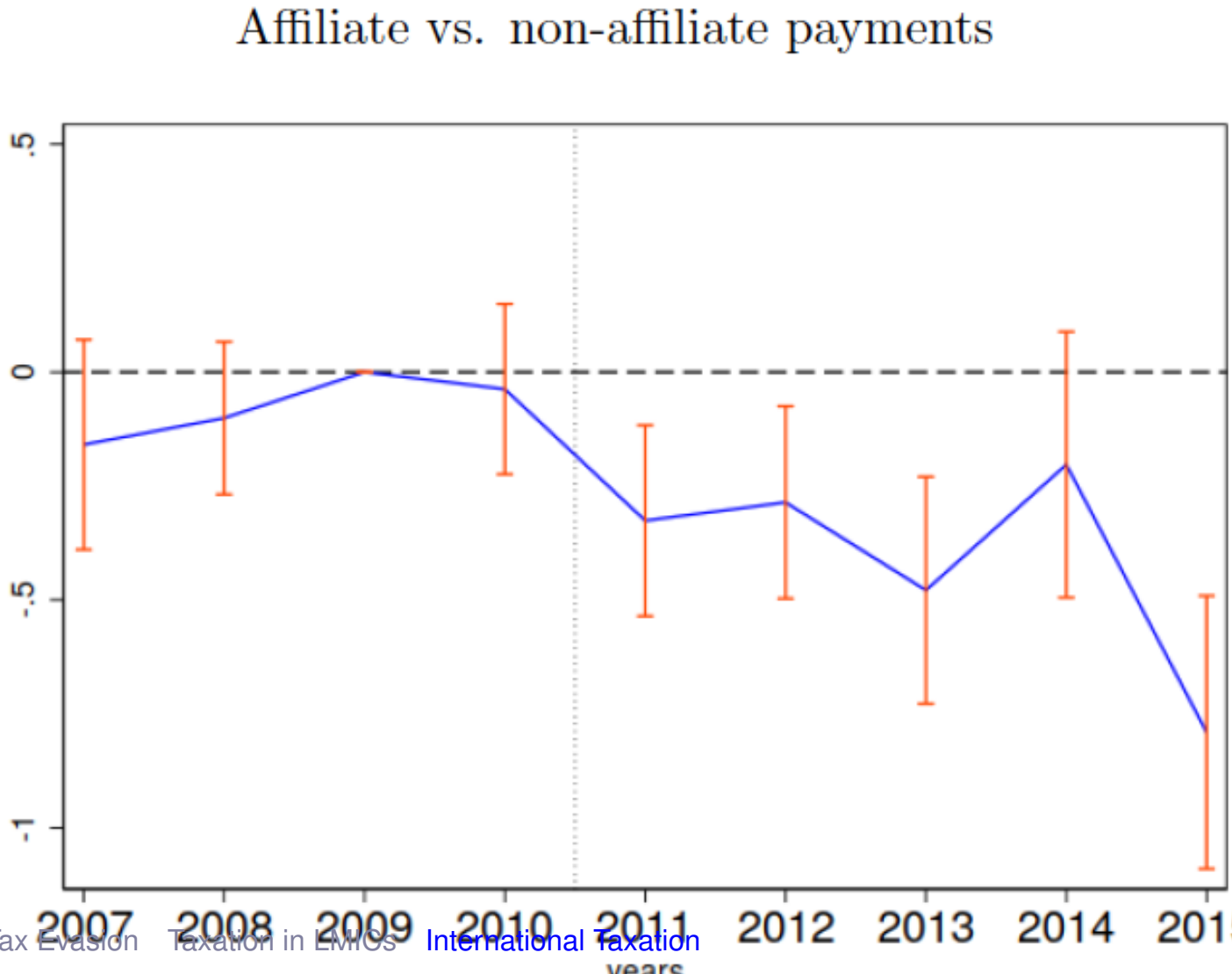
	(1) All	(2) Royalties	(3) Services	(4) Interests	(5) Others
Panel A: Up to 2013					
Tax rate × affiliate × post	-0.013	-0.011*	-0.004	-0.001	-0.004
	(0.010)	(0.007)	(0.008)	(0.004)	(0.004)
Tax rate × affiliate	-0.049***	-0.022***	-0.028***	-0.009*	-0.003
	(0.013)	(0.008)	(0.010)	(0.005)	(0.003)
Observations	45,248	45,248	45,248	45,248	45,248
Adjusted-R2	0.266	0.189	0.224	0.285	0.186

Bustos et al (2022): Results



Bustos et al (2022): Results

Figure 8: Countries with Affiliates to Which Firms Make Payments



Bustos et al (2022): Results

Table 6: Countries with Affiliates to Which Firms Make Payments

	(1) All	(2) Tax havens	(3) Non tax havens	(4) Copyrights	(5) Interests	(6) Services	(7) Others
Panel A: Up to 2013							
Post × affiliate	-0.290***	0.003	-0.293***	-0.024	0.006	-0.156**	-0.063**
	(0.106)	(0.011)	(0.101)	(0.053)	(0.021)	(0.075)	(0.027)
Affiliate	-0.891***	-0.036***	-0.855***	-0.185***	-0.016	-0.856***	0.001
	(0.179)	(0.013)	(0.171)	(0.058)	(0.036)	(0.163)	(0.019)
Observations	8,060	8,060	8,060	8,060	8,060	8,060	8,060
Adjusted-R2	-0.072	-0.161	-0.072	-0.075	-0.144	-0.104	0.094

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Fisman & Wei (2004): Overview

- How does tax evasion respond to tax rates?
  - Theoretically ambiguous (e.g. Allingham-Sandmo dependence on risk preferences)
  - Hard to measure evasion directly
- Here: Direct (noisy) measure of evasion: Difference between amount exported to China from Hong Kong (reported by HK) and the amount imported to China from Hong Kong (reported by China).
  - Correlate evasion gap with tax rates in China
  - Diff in Diff around reforms to tariffs in China in 1997
- Conclusion: Evasion very sensitive to tax rates.

Fisman & Wei (2004): Data

- Data on trade flows from WB World Integrated Trade Solution (WITS) database.
- Trade flows (Value and quantity) at 6-digit-product-origin-destination-year level.
- gap_value=$\log$ (export_value)-$\log$ (import_value)
- Focus on variation *within* 4-digit HS-codes in tariff rates.
- Add in Chinese VAT rates

Fisman & Wei (2004): Basic Results

$$\log(\text{export\_value}_k) - \log(\text{import\_value}_k) = \alpha + \beta \text{tax}_k + e_k$$

TABLE 5
EFFECT OF TAX RATES ON EVASION (Measured in Value)

	REGRESSION						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tax rate	2.93	2.46	3.21	3.57	2.98	2.61	3.4
	(.74)	(.67)	(.87)	(.89)	(.81)	(.79)	(.96)
Constant	−1.31	−1.04	−1.31	−1.48	−1.29	−1.12	−1.46
	(.29)	(.23)	(.30)	(.31)	(.29)	(.27)	(.34)
Excluding outliers?	no	yes	no	no	yes	yes	yes
Excluding products lacking tax on similar products?	no	no	yes	no	no	yes	yes
Excluding products lacking observations on quantities?	no	no	no	yes	yes	no	yes
Observations	1,663	1,639	1,470	1,102	1,087	1,450	968
R^2	.020	.017	.022	.031	.025	.017	.029

NOTE.—The dependent variable is log(value of exports from Hong Kong to China) − log(value of imports to China from Hong Kong). Robust standard errors are in parentheses, accounting for clustering of standard errors by four-digit HS.

Fisman & Wei (2004): Substitution

- Stronger incentives to misclassify items if similar products face higher rates. $\rightarrow$ Include avg (tax_o), average of other products in same 4-dig group.

INCORPORATING THE AVERAGE TAX ON SIMILAR PRODUCTS
Dependent Variable: Log(Value of Exports from Hong Kong to China) − Log(Value of Imports to China from Hong Kong)

	Regression				
	(1)	(2)	(3)	(4)	(5)
Tax rate		6.07	5.31	8.32	7.46
		(1.37)	(1.25)	(1.56)	(1.42)
Tax on similar products	2.62	−3.16	−2.98	−4.65	−4.45
	(.90)	(1.39)	(1.33)	(1.58)	(1.53)
Constant	−1.09	−1.20	−1.02	−1.56	−1.33
	(.034)	(.31)	(.28)	(.38)	(.35)
Excluding outliers?	no	no	yes	no	yes
Excluding products lacking observations on quantities?	no	no	no	yes	yes
Observations	1,470	1,470	1,450	981	968
R^2	.014	.025	.020	.041	.035

NOTE.—Robust standard errors are in parentheses, accounting for clustering of standard errors by four-digit HS.

Fisman & Wei (2004): Quantities v Values

- Replace LHS with quantities

EVASION IN PHYSICAL QUANTITIES
Dependent Variable: Log(Quantity of Exports from Hong Kong to China) − Log(Quantity of Imports to China from Hong Kong)

	REGRESSION					
	(1)	(2)	(3)	(4)	(5)	(6)
Tax rate	1.13	1.14	.69		8.37	8.12
	(.93)	(1.11)	(.83)		(2.20)	(1.77)
Tax on similar products				.08	−7.93	−8.31
				(1.13)	(2.23)	(1.84)
Constant	−1.05	−1.08	−.92	−.68	−.85	−.65
	(.33)	(.40)	(.30)	(.40)	(.40)	(.36)
Excluding products lacking observations on avg(tax_*o*)?	no	yes	no	yes	yes	yes
Excluding outliers?	no	no	yes	no	no	yes
Observations	1,102	981	1,082	981	981	962
R^2	.003	.002	.001	.000	.015	.019

NOTE.—Robust standard errors are in parentheses, accounting for clustering of standard errors by four-digit HS.

Fisman & Wei (2004): Diff in Diff

- Use changes in Chinese tariff rates in 1997

TABLE 10

TAX AND EVASION IN FIRST DIFFERENCES, 1997–98

	DEPENDENT VARIABLE: Change in Gap_Value between 1997 and 1998		DEPENDENT VARIA Change in Gap_ between 1997 and	
	(1)	(2)	(3)	(
Change in tax rate	1.71	5.60	1.88	5.
	(.85)	(1.92)	(1.48)	(2.
Change in tax on similar products		−3.97		−4.
		(2.30)		(3.
Constant	.036	.01	.11	.
	(.060)	(.063)	(.08)	(.
Observations	1,617	1,430	1,042	9
R^2	.004	.008	.002	.

NOTE.—Robust standard errors are in parentheses, accounting for clustering of standard errors by four-digit

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Sequeira (2016): Overview

- How does behavior (trade volumes) respond to taxes (tariffs)?
- Existing literature finds small effects. Puzzling.
- This paper:
  - When people are evading the tariffs, changing their levels doesn't matter that much.
  - However, tariff liberalization increases honest reporting and transfers (bribes) to public officials.

1. Trade-flow data yields elasticity of trade to tariffs of 0.1
2. Firm-level data confirms no impact on intensive or extensive margins
3. Bribe data shows bribes change when tariffs change.

Sequeira (2016): Aggregate Trade Flows

- Context: Trade between Mozambique and South Africa.
- Mozambique joined Southern African Development Community (SADC) in 1992. Implies big changes in tariffs up to 2015 to harmonize with trade bloc.
- Affects some products but not others.

TABLE 1—COMPARABILITY OF TRADE PATTERNS AND PRODUCT CHARACTERISTICS ACROSS TREATMENT AND CONTROL PRODUCTS, PRIOR TO THE 2008 TARIFF CHANGE

	Treatment products		Comparison products		Difference t-test/χ^2 p-value
	Mean	SD	Mean	SD	
Panel A. Patterns of trade ($N = 4{,}660$)					
Share of imports (quantities)	38.1	492.5	241.2	5244.4	0.20
Share of imports (value)	22.2	237.2	33.84	341.2	0.19
Unit value	4.82	53.7	6.21	83.3	0.51
Panel B. Product characteristics ($N = 265$)					
Shipment value per ton (USD)	44,027	179,869	410,508	2,959,621	0.25
Number of containers per shipment	7.99	2.606	7.4	3.173	0.10
Bulk cargo (non-containerized)					0.94
Rauch product classification					0.01

Sequeira (2016): Aggregate Trade Flows

- Diff in Diff across products/time to estimate trade elasticity.

$$\text{logImportShare}_{it} = \alpha_0 + \alpha_1 \text{logTariffRate}_{it} + \mu_t + \gamma_i + \epsilon_{it}$$

TABLE 2—TARIFF LIBERALIZATION AND IMPORT VOLUMES, 2006–2014: AGGREGATE IMPORT FLOWS

	log share import volumes			
	Fixed effects (1)	First differences (2)	Long differences (3)	Instrumental variable (4)
Panel A. 2 SLS Estimate				
log tariff rate	−0.016			−0.097
	(0.027)			(0.050)
Δ log tariff rate		−0.010	−0.076	
		(0.019)	(0.018)	
Panel B. First stage dep. var. log tariff rate				
Lagged log tariff rate (one period)				0.841
				(0.042)
Lagged log tariff rate (two periods)				−0.085
				(0.011)
Baseline tariff rate 2006				−0.040
				(0.002)
Kleibergen-Paap Wald *F*-statistic				207.09
Observations	21,520	16,353	13,022	15,326
Mean of dependent variable	1.094	1.051	1.055	1.130

Sequeira (2016): Firm-Level Responses

- Use panel of 190 firms in 2006 & 2010 (before after big reform in 2008)
- Extensive margin:

$$\text{D.ImportStatus}_k = \alpha_0 + \alpha_1 \text{D.Tariff}_k + \alpha_3 \mathbf{X}_k + \omega_i + \epsilon_k$$

  where $\text{D.ImportStatus}_k \in$
  $\{\text{Stop importing}, \text{continue domestic sourcing}, \text{begin importing}\}$,
  ω_i are industry FEs
- Intensive margin:

$$\text{D.PctgImportedInput}_k = \alpha_0 + \alpha_1 \text{D.Tariff}_k + \alpha_3 \mathbf{X}_k + \omega_i + \epsilon_k$$

TABLE 4—TARIFF LIBERALIZATION AND IMPORT VOLUMES, 2006–2010: FIRM-LEVEL DATA

	Extensive margin change in import status			Intensive margin change in pctg of imp. input		
	Ordered probit			Ordinary least squares		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ log tariff rate	−0.113	−0.106	−0.091	−0.738	0.689	1.681
	(0.079)	(0.136)	(0.160)	(2.306)	(3.927)	(4.936)
Firm size		0.539	0.534		10.127	9.355
		(0.229)	(0.238)		(7.212)	(7.154)
Ethnicity of owner		0.188	0.187		7.388	5.681
		(0.187)	(0.178)		(7.430)	(6.839)
Foreign firm		0.456	0.436		15.155	14.250
		(0.329)	(0.269)		(14.330)	(12.665)
Age of establishment		−0.016	−0.018		−0.400	−0.431
		(0.009)	(0.009)		(0.251)	(0.242)
log baseline tariff 2006		0.046	0.036		7.059	5.170
		(0.170)	(0.174)		(4.933)	(5.223)
Controls						
Industry fixed effects	No	No	Yes	No	No	Yes
Observations	160	117	117	160	117	117
p-value of joint significance of FE		0.000			0.000	

Sequeira (2016): Corruption-Trade Gaps

- Use similar strategy to Fisman & Wei (2004)

$$\text{logTradeGap}_{it} = \gamma_1 \text{TariffChangeCategory}_i \times \text{POST}_t + \mu_1 \text{POST}_t + \gamma_2 \text{TariffChangeCategory}_i + \beta_2 \text{BaselineTariff}_i + \epsilon_{it}$$

TABLE 5—TRADE GAPS AND TARIFF LEVELS, 2006–2014

	log trade gap					
	Quantity (1)	Value (2)	Unit value (3)	Quantity (4)	Value (5)	Unit value (6)
log tariff	0.201	0.055	−0.013			
	(0.042)	(0.035)	(0.010)			
Treated products × POST				−0.493	−0.083	0.022
				(0.097)	(0.077)	(0.031)
Treated products				0.308	−0.092	0.104
				(0.243)	(0.219)	(0.087)
POST				0.385	0.118	0.394
				(0.086)	(0.068)	(0.028)
log baseline tariff				0.245	0.271	−0.051
				(0.114)	(0.098)	(0.043)
Observations	21,884	21,884	21,861	21,884	21,884	21,861
Mean of dependent variable	0.273	0.213	2.176	0.273	0.213	2.178
R^2	0.187	0.165	0.675	0.170	0.155	0.422

Sequeira (2016): Corruption-Bribe Payments

- Random sample of >1,000 shipments at port of Maputo

	Pre-tariff change	Post-tariff change	
	2007	2008	2011–2012
Probability of paying a bribe (percent)	80	26	16
Avg bribe amount per ton (Metical 2007, CPI adjusted)	2,164 (7,800)	280 (963)	494 (2,746)
Primary bribe recipient	Customs (97%)	Customs (84%)	Customs (72%)
Primary reason for bribe payment	Tariff evasion (61%)	Congestion (59%)	Congestion (38%)
Ratio of bribe amount to tariff duties saved [0–1]*	0.07 (0.13)	0.028 (0.09)	0.008 (0.02)
Average clearing time for all shipments (days)	2.6 (2.2)	2.6 (1.3)	2.6 (3.6)
Average clearing time with the payment of a bribe (days)	2.6 (2.3)	2.2 (1.0)	2.4 (3.1)
Average clearing time without the payment of a bribe (days)	1.9 (1.2)	2.7 (1.4)	2.6 (3.7)
Average clearing time with bribe payment for tariff evasion (days)	2.7 (2.4)	2.4 (1.0)	2.4 (1.8)

Sequeira (2016): Corruption-Bribe Payments

TABLE 7—BRIBES BEFORE AND AFTER THE TARIFF CHANGE: BY SHIPPER AND PRODUCT CHARACTERISTICS

	Pre-tariff change	Post-tariff change	Difference *p*-value
Panel A. Probability of paying a bribe (percent)			
Large firm	96	16	0.000
Medium to small firm	67	18	0.000
Agricultural product	13	12	0.739
Differentiated product	77	18	0.000
Pre-inspected shipment	68	10	0.000
Panel B. Amount of bribe paid per ton (Mtn, CPI adjusted)			
Large firm	3,373	150	0.004
	(1,419)	(75)	
Medium to small firm	3,882	503	0.000
	(1,711)	(85)	
Agricultural product	1,404	615	0.144
	(922)	(143)	
Differentiated product	2,062	537	0.000
	(623)	(90)	
Pre-inspected shipment	2,597	661	0.000
	1,136	130	

TABLE 8—DIFFERENCE-IN-DIFFERENCES: DETERMINANTS OF THE PROBABILITY OF PAYING A BRIBE

	Probability of paying a bribe [0–1] linear probability model			
	(1)	(2)	(3)	(4)
Tariff change category × POST	−0.429	−0.296		
	(0.131)	(0.120)		
Tariff change category	0.448	0.357		
	(0.111)	(0.099)		
Tariff reduction × POST			−0.025	−0.021
			(0.008)	(0.007)
Tariff reduction			0.024	0.022
			(0.005)	(0.009)
POST	−0.089	−0.555	−0.111	−0.686
	(0.106)	(0.203)	(0.116)	(0.241)
Differentiated product	0.065	0.018	0.032	−0.076
	(0.078)	(0.102)	(0.071)	(0.109)
Agricultural product	0.026	−0.221	0.046	0.041
	(0.030)	(0.096)	(0.029)	(0.030)
Pre-shipment inspection	−0.010	0.061	0.003	0.087
	(0.010)	(0.061)	(0.020)	(0.07)
Perishable product	−0.047	0.260	−0.052	0.137
	(0.067)	(0.109)	(0.064)	(0.124)
Large firm	0.058	0.161	0.066	0.172
	(0.047)	(0.055)	(0.051)	(0.066)
log shipment value per ton	0.014	−0.035	0.017	−0.034
	(0.008)	(0.011)	(0.008)	(0.013)

	log bribe amount paid							
	Ordinary least squares				Hurdle model			
					logit	Negative binomial	logit	Negative binomial
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tariff change category × POST	−3.748	−2.928			−30.735	−0.079		
	(1.075)	(0.944)			(1.995)	(0.459)		
Tariff change category	3.632	3.156			30.704	−0.916		
	(0.953)	(0.803)			(1.898)	(0.436)		
Tariff reduction × POST			−0.225	−0.191			−2.996	−0.089
			(0.058)	(0.064)			(0.174)	(0.031)
Tariff reduction			0.200	0.191			2.969	−0.042
			(0.042)	(0.0478)			(0.171)	(0.0260)
POST	−0.678	−3.449	−0.864	−4.652	−0.392	−0.633	−0.371	−0.426
	(0.867)	(1.818)	(0.944)	(2.152)	(0.639)	(0.179)	(0.634)	(0.200)
Differentiated product	0.545	−0.121	0.303	−0.925	−0.0450	0.188	−0.104	0.304
	(0.648)	(0.849)	(0.603)	(0.876)	(0.660)	(0.423)	(0.643)	(0.427)
Agricultural product	0.161	−1.968	0.343	0.337	0.356	0.583	0.327	0.229
	(0.285)	(0.931)	(0.265)	(0.243)	(0.365)	(0.563)	(0.355)	(0.494)
Pre-shipment inspection	−0.227	0.376	−0.137	0.641	−0.122	−0.550	−0.102	−0.595
	(0.208)	(0.628)	(0.197)	(0.712)	(0.215)	(0.182)	(0.207)	(0.189)
Perishable product	−0.084	3.400	−0.119	2.299	−0.551	0.311	−0.711	0.768
	(0.616)	(0.845)	(0.586)	(0.949)	(1.147)	(0.787)	(1.167)	(0.748)
Large firm	0.600	1.593	0.662	1.708	1.137	0.270	1.198	0.277
	(0.389)	(0.486)	(0.431)	(0.585)	(0.610)	(0.391)	(0.618)	(0.393)
log shipment value per ton	0.130	−0.221	0.152	−0.217	0.160	−0.037	0.158	−0.035
	(0.074)	(0.079)	(0.073)	(0.095)	(0.088)	(0.079)	(0.088)	(0.077)