

Taxing Cash to Fight Collaborative Tax Evasion?

G. Immordino and F.F. Russo

U. Salerno and CSEF; U. Naples Federico II and CSEF

Capri, June 2014

Background

100 with the receipt or 80 without?

- 80 Without: Collaborative Tax Evasion

In this paper:

- We build a (bargaining) model of collaborative tax evasion
- We study the effect of 2 policy instruments on tax evasion, revenue and welfare:
 - Tax rebates for the buyers that keep the receipt (many countries)
 - TCW=Tax on Cash Withdrawals (India and Pakistan)

Main results tax deduction

- A small tax deduction is effective at reducing tax evasion and increasing revenue and welfare
- The deduction must be higher the higher the evasion rate in the country and the statutory tax rates
- Simple intuition: A tax rebate is a transfer from the government to the (already) honest taxpayers

▶ Effect of tax deduction

Main results TCW

- The TCW is effective at reducing evasion only at high rates
- The TCW must be higher the higher the evasion rate in the country and the higher the mass of individuals using cash
- Intuition:
 - (1) The TCW makes collaborative tax evasion more attractive for individuals with high costs of using non cash payment instruments: a collaborative buyer pays the TCW on the price of the good net of the discount, while a non collaborative buyer pays it on the full price
 - (2) The higher the TCW, the smaller the percentage of those individuals that prefer to use cash
- The first effect prevails for a small rate of the TCW, while the second for high rates

▶ effect of TCW

Related Literature

• Collaborative Tax Evasion

- Gordon (1990); Boadway, Marceau and Mongrain (2002); Chang and Lai (2004).
- Different policy instruments: tax rebate and TCW.

• Tax on Currency

- The idea of a tax on currency first appeared in Gesell (1916) and it has been discussed by Goodfriend (2000), Buitier and Panigirtzoglou (2003), Buitier (2009), Mankiw (2009) and Rogoff (2014).
- Different goal: Limit the customers' incentive to pay cash rather than improving monetary policy.

• Optimal Taxation and Inflation Tax

- Friedman (1969); Phelps (1973); Chamley (1985); Woodford (1990).
- Tax on the hidden economy: Nicolini (1998); Koreshkova (2006).

Model ingredients

- The economy is composed by price taking, risk neutral (S)ellers, risk neutral (B)uyers and the (G)ovt.
- Single transaction between S and B .
- Tax evasion possible if B pays cash and does not ask for the receipt.
- S can offer a price discount in exchange of collaboration.
- G curbs tax evasion, maximizes welfare or net revenue committing to a policy $\mathcal{P} = \{t_s, t_b, \tau, \vartheta\}$.
- After observing \mathcal{P} one B and one S are randomly matched and there is Nash bargaining over a price discount and (if successful) evasion.

Model ingredients cont.

- S heterogeneity: tax morale.
- B heterogeneity: i) tax morale; ii) cost of payment instruments different from cash.
 - Cognitive costs (elderly, less financially educated): electronic payments have greater adoption rates among young adults (Humphrey et al. 2003).
 - Psychological costs (loss of privacy): some consumers are ready to pay a price for an anonymous payment (Garcia Swartz et al. 2006).

Sellers

- **Evasion** (if cooperation):

$$v_s^1 = (1 - \pi) [p(1 - t_s) + pt_s - d - v] + \pi [p(1 - t_s) - d - pt_s f_s - v]$$

p Price

d Discount if cooperation

t_s Income Tax rate

π Audit probability

f_s Fine if audit

$v \sim g_v$ Cost of evasion (Tax Morale)

- **Non Evasion:**

$$v_s^0 = p(1 - t_s)$$

- Assumption: $1 - \pi(1 + f_s) > 0$ (otherwise no evasion)

Buyers

- **Cooperation** (accept the discount and pay cash):

$$v_b^1 = u - (p - d)(1 + \vartheta) - \pi p t_b (1 + f_b) - s$$

u Utility from good or service

ϑ Tax on cash withdrawals (TCW)

t_b Sale Tax

$s \sim g_s$ Cost of Evasion (Tax Morale)

- **Non Cooperation** (ask receipt and choose the payment method):

- Pay cash:

$$v_b^0(\text{cash}) = u - p[1 + t_b - \tau + (1 + t_b)\vartheta]$$

τ Tax rebate

- Non Cash Payment (credit, debit, bank transfer etc.):

$$v_b^0(\text{card}) = u - p(1 + t_b - \tau) - c$$

$c \sim g_c$ cost of electronic payment

- Cash preferred iff $c \geq p(1 + t_b)\vartheta = \Upsilon$

$$v_b^0 = u - p(1 + t_b - \tau) - \min\{\Upsilon, c\}$$

Solution

- Nash Bargaining

$$d^* = \arg \max_d (v_s^1 - v_s^0)^\beta (v_b^1 - v_b^0)^{1-\beta}$$

$$s.t. \quad v_s^1 \geq v_s^0, v_b^1 \geq v_b^0$$

- Equilibrium Discount

$$d^*(v, s, c) = \beta \frac{p(\tau + \vartheta - t_b) + \pi p t_b (1 + f_b) + s - \min \{\Upsilon, c\}}{1 + \vartheta} + (1 - \beta) \{p t_s [1 - \pi (1 + f_s)] - v\}$$

$$v \leq p t_s [1 - \pi (1 + f_s)] - d^*(v, s, c)$$

$$s \leq d^*(v, s, c)(1 + \vartheta) - p(\tau + \vartheta - t_b) - \pi p t_b (1 + f_b) + \min \{\Upsilon, c\}$$

Solution

Evasion

$$E = \int_0^{\Upsilon} E_c(c) g_c dc + [1 - G_c(\Upsilon)] E^c$$

- $E_c(c) = \int_0^{\tilde{v}_1} (\int_0^{\tilde{s}_1(v,c)} g_s ds) g_v dv$ is the mass of evaders with low c .
- $E^c = \int_0^{\tilde{v}_2} (\int_0^{\tilde{s}_2(v)} g_s ds) g_v dv$ is the mass of evaders with high c .

▶ Analytical Results

Solution

Welfare

$$\begin{aligned}
 W = & \int_0^{\Upsilon} \left\{ (v_s^0 + v_b^0)(1 - E_c(c)) + \int_0^{\tilde{v}_1} \int_0^{\tilde{s}_1(v,c)} (v_s^1 + v_b^1) g_s ds g_v dv \right\} g_c dc + \\
 & [1 - G_c(\Upsilon)] \left\{ (v_s^0 + v_b^0)(1 - E^c) + \int_0^{\tilde{v}_2} \int_0^{\tilde{s}_2(v)} (v_s^1 + v_b^1) g_s ds g_v dv \right\}
 \end{aligned}$$

▶ Analytical Results

Solution

Government Revenue

$$G = \int_0^{\Upsilon} \{ [p\pi(t_s(1+f_s) + t_b(1+f_b)) + (p - d^*(v, s, c))\vartheta] E_c(c) + p(t_s + t_b - \tau)(1 - E_c(c)) \} g_c dc \\ + [1 - G_c(\Upsilon)] \{ [p\pi(t_s(1+f_s) + t_b(1+f_b)) + (p - d^*(v, s))\vartheta] E^c + (p(t_s + t_b - \tau) + \Upsilon)(1 - E^c) \}$$

Net Government Revenue: introducing the TCW imposes a cost also on those honest buyers who opt for non cash payments. This cost is not a transfer, but a loss for society as a whole.

$$G_n = G - \int_0^{\Upsilon} c(1 - E_c(c))g_c dc$$

▶ Analytical Results

Prototype Economy

- Tax rates $t_s = 30\%$ and $t_b = 10\%$
- Enforcement $\pi = 1\%$ Fine $f = 50\%$
- $\beta = 0.5$ (same bargaining power)
- Distribution of the cost of using cards

$$g_c(x, \lambda) = \begin{cases} 0 & \text{Prob } \lambda \\ \lambda e^{-x\lambda} & \text{Prob } 1 - \lambda \end{cases}$$

- Mass of individuals with zero cost
 - Exponentially declining cost
 - $\lambda = 0.2$ benchmark
- Price $p = 10$ Utility $u = 1.5 * p$
(Just scalings)

Prototype Economy

Distribution of Tax Morale (Kumaraswamy)

$$g(x; a, b, \bar{x}) = \frac{ab}{\bar{x}} \left(\frac{x}{\bar{x}}\right)^{a-1} \left[1 - \left(\frac{x}{\bar{x}}\right)^a\right]^{b-1} \quad 0 < x < \bar{x}$$

- Assume the same distribution for sellers and buyers $x = s, v$

Calibration Procedure [▶ Calibration Details](#)

- Parameters: $a, b, \bar{s} = \bar{v}$
- Targets: tax evasion level (30%) and the shape of the distribution of tax morale from the World Value Survey-average over all countries (Question: Do you consider justifiable cheating on taxes?)

Comparative Statics

- The higher the baseline tax evasion, the higher the optimal tax rebate and TCW that maximize net revenue.
- Higher mass of Credit Card Users ($\lambda = 0.5$): smaller TCW to prevent cooperation. [▶ picture](#)
- Higher enforcement probability ($\pi = 0.3$): smaller t , τ and ϑ . Enforcement is a substitute for all instruments.
- Risk Aversion: the evaded amount is decreasing in t . Now the intensive margin (decreased evasion amount) goes in the opposite direction of the extensive margin (increased number of evaders). The result is an inverse u shape relationship. All other results still hold.

Does a TCW reduce the volume of trade?

- Seller: a TCW decreases the seller's utility from tax evasion v_s^e through the discount leaving the payoff from not engaging in tax evasion (v_s^0) unaffected.
- Buyer: conversely, the policy does affect the buyer's gains from trade, both in case of collaborative tax evasion (v_b^e) and, more importantly, in case he does not collaborate (v_b^0). To guarantee that the buyer has always an incentive to trade a sufficient condition is

$$\vartheta(1 + t_b) \leq \tau \quad (1)$$

- Next we also look at the optimal policies that satisfy this constraint.

Optimal policy

- Objective 1: maximization of total welfare subject to keeping revenue above a certain threshold.
- Objective 2: maximization of net government revenue conditional on the reduction of tax evasion below a threshold.
- For all exercises: i) we stress the gain in gross government revenue with respect to the benchmark, to give an idea of the possibility to compensate honest taxpayers for the side effects of the TCW; ii) we consider the optimal policies that entail no loss of efficiency.

▶ Optimal Policy: Italy

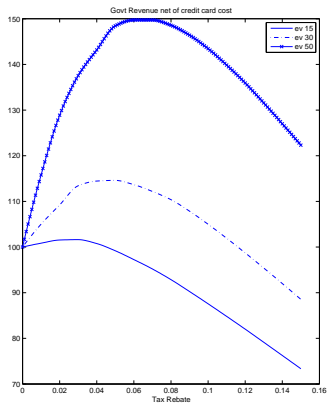
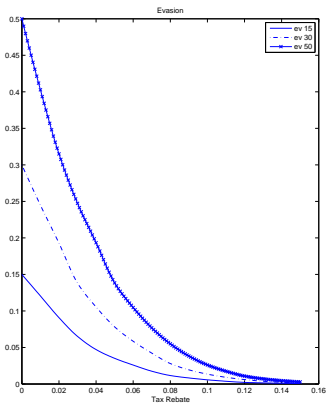
The TCW is problematic

- Parallel cash economy (incentive for evaders to accept and hoard cash)
 - Keep the rate small
 - Tax also the deposits
 - Ban the purchase of financial instruments in cash (reduce the possibility to use cash to save)
 - Ban the use of cash for purchases above a threshold
- If the tax is announced and then implemented a bank run might take place
- Compensate honest taxpayers
 - Compensate the buyers using the extra revenue
 - How to design the compensation scheme?
- Currency Areas
 - Similar rate to avoid arbitrage

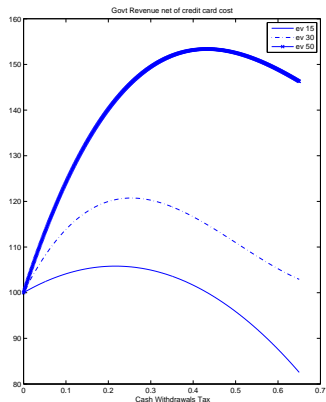
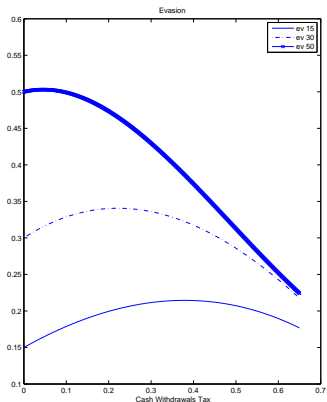
Alternatives to TCW

- A ban on cash transactions below a threshold
 - Many drawbacks: i) enforcement; ii) privacy; iii) efficiency loss
 - TCW can be seen as putting a price on privacy and transaction ease
- Subsidize card use has same effect on evasion but costly
- Cost based pricing of payment instruments (Van Hove)
 - Cash is not free: printing, storage, transfer, insurance
 - Infrequent cash users subsidize heavy cash users
 - Complementary to TCW-same effect on evasion

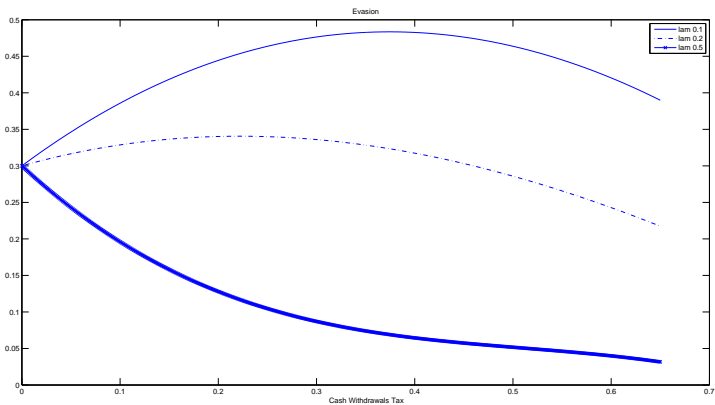
Tax Rebate



TCW Tax on Cash Withdrawals



TCW - different lambda



Results for tax evasion

i) Tax evasion is increasing in the tax rates t_s and t_b and ii) decreasing in the tax rebate τ . iii) The TCW ϑ is an effective tool to fight tax evasion only if set sufficiently high.

G1 Buyers with $c \geq \Upsilon$ prefer to use cash even if they do not cooperate. A buyer who cooperates pays ϑ over $(p - d)$, while not cooperating ϑ must be paid on the full amount p . Then, an increase in ϑ **makes cooperation relatively more attractive**.

G2 Conversely buyers with $c < \Upsilon$ who do not cooperate use cards. Then, an increase in ϑ **makes cooperation relatively less attractive**.

Finally, an increase in ϑ is more likely to decrease tax evasion the larger is the initial level of ϑ since it determines the size of the two previous groups of buyers in favor of G2.

▶ back

Results for welfare

- Total welfare is decreasing in the sale tax t_b and in the income tax t_s .
- Total welfare is increasing in the tax rebate τ .
- The effect of the TCW on total welfare is ambiguous.

▶ back

Results for government revenue

- There is a Laffer curve for the response of government revenue to the tax rates;
- The tax rebate τ can decrease the government revenue in case of a low tax rate or in case there are many honest individuals: an increased tax rebate is an increased transfer to the (already) honest taxpayers. Therefore, the cost of using the rebate to fight tax evasion is higher the smaller the tax evasion rate;
- The effect of the TCW on Government revenue is ambiguous.

▶ back

Calibration Details

Simple Grid Search Procedure

- Guess a value of the upper bound $\bar{s} = \bar{v}$
- Divide the interval between 0 and $\bar{s} = \bar{v}$ into 9 equally spaced subintervals.
- Consider the threshold values of these intervals as corresponding to the 1-10 scale of the answers of the WWS
- Guess a couple a, b
- Compute the value of the model-based distribution at the threshold values.
- Compute the sum of square distances between the model based distribution and the empirical distribution,
- Choose a, b and $\bar{s} = \bar{v}$ to minimize this sum of square residuals for the target calibrated level of tax evasion,

▶ back

Optimal Policy: Italy

● Calibration

- Tax rates $t_s = 35\%$ and $t_b = 20\%$
- Enforcement $\pi = 0.0067$ (GDF: total audits/economic units)
- Fine $f = 0.3$ (tax code)
- $\lambda = 0.127$ (sum of all credit and debit card transactions/consumption expenditure)
- $\beta = 0.5$ and to $p = 10$ and $u = 1.5p$
- Evasion: Eures $\sim 17\%$ and ISTAT $\sim 12.5\%$ -Take average 15%

- Calibration: $b = 1$, $a = 5.87$ and $\bar{s} = \bar{v} = 3.451$.

- Result: The optimal welfare maximizing policy that raises 10% more revenue and satisfies the efficiency constraint is $t_s = 35\%$, $t_b = 22.5\%$, $\tau = 16\%$ and $\vartheta = 12\%$, with a 1.7% total welfare gain and a 19% non evaders welfare gain

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