Tax avoidance and evasion in a dynamic setting

Duccio Gamannossi degl'Innocenti[1]
Rosella Levaggi[2]
Francesco Menoncin[2]

[1]Università Cattolica del Sacro Cuore, Milano, Italy

[2]Università di Brescia, Brescia, Italy

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Intro

Introduction

- Tax avoidance and evasion alter effective tax rates
- Tax systems differentiate between (legal) avoidance and (illegal) evasion but they both reduce revenues collected
- Evasion leads to sizeable revenue losses: 20% of GDP in Europe (Murphy 2019) (13% in Italy, Albarea et al. 2020) under-reporting is $\approx$ 18% in US with a tax gap of 500 billion
- Avoidance also significant: 4% of GDP in Europe (EPRS, 2015), latest IRS and Treasury claim figures up to 500 billion
- We develop a model to study the optimal evasion and avoidance decision in an inter-temporal setting

Related Literature

- Contributions in a static framework (joint avoidance/evasion):
    - Cross and Shaw (1981; 1982) point out importance of joint analysis of avoidance-evasion
    - Alm (1988) and Alm and McCallin (1990) study the case of risk-less and risky avoidance
    - Cowell (1990) investigates distributional impacts
    - Neck (1990) studies interactions with labour supply
    - Gamannossi and Rablen (2016;2017) explore the cases of bounded rationality and optimal enforcement
- Contributions in a dynamic framework (only evasion):
    - Wen-Zhung and Yang (2001) and Dzhumashev and Gahramanov (2011) first models considering just evasion
    - Levaggi and Menoncin (2012; 2013) identify determinants of Yitzhaki puzzle
    - Bernasconi et al. (2015; 2019) study roles of uncertainty and habit

Research Goals

- Characterize optimal avoidance and evasion
- Analyze how deterrence instruments affect compliance and revenues
- Characterize optimal fiscal parameters for the government under various objectives
  - minimizing evasion
  - minimizing non-compliance
  - maximizing revenues
  - maximizing growth

Model

Modelling features and assumptions

Avoidance and evasion differ in their level of sophistication

- **Evasion is cost-less** and carries a fine η if detected
- **Avoidance costs** $f(a)$ but entails a reduced fine $\eta(1-\beta)$ if detected
    - $f(a)$ increasing, convex and $f(0) = 0$
    - We call the fine reduction β the avoidance premium

Both f and β depend on the fiscal and tax administration specifics

- High avoidance cost and low avoidance premium when:
    - Tax code is simpler and less-ambiguous
    - Legal/investigatory resources of tax authorities are higher
    - Courts have higher effectiveness

Avoidance and evasion are **both correctly detected** upon audit

The agent suffers from **fiscal illusion**

- The effect of compliance on revenues is overlooked

Consumer's preferences

The agent's utility increases in the consumption of a **privately produced** good c_t and a **publicly produced** good g_t

The agent utility function is:

$$U = \frac{(c_t - c_m)^{1-\delta}}{1-\delta} + v(g_t)$$

- c_m is a minimum consumption level
- δ drives concavity of utility from c_t
- $v(\bullet)$ is an increasing and concave function

Absolute risk-aversion $\frac{\delta}{c_t - c_m}$

- Lower risk aversion when c_t is higher (DARA)
- Higher risk aversion when either δ or c_m is higher

Capital Accumulation

The capital accumulated dk_t is equal to production minus expenses:

$$dk_t = \left[y_t - c_t - \tau y_t \left(1 - e_t - a_t\right) - f\left(a_t\right) y_t\right] dt - \eta \tau y_t \left[e_t + \left(1 - \beta\right) a_t\right] \, d\Pi_t$$

Production, y_t

- Deterministic function $y_t = Ak_t$, $0 < A < 1$ TFP

Expenses:

- Consumption, c_t
- Linear taxes on declared income $\tau y_t \left(1 - e_t - a_t\right)$
  - Share of income avoided a_t and evaded e_t
- Avoidance costs $f(a_t)$
- Fine costs
  - Fine in case of detection is $\eta \tau y_t \left[e_t + \left(1 - \beta\right) a_t\right]$
  - Audits follow a Poisson jump process $d\Pi_t$ with frequency λ

The optimization problem

$$\max_{\{c_t, e_t, a_t\}_{t\in[t_0,\infty[}} \mathbb{E}_{t_0}\left[\int_{t_0}^{\infty} \frac{(c_t - c_m)^{1-\delta}}{1-\delta} e^{-\rho(t-t_0)} dt\right]$$

under the capital dynamics:

$$dk_t = [y_t - c_t - \tau y_t (1 - e_t - a_t) - f(a_t) y_t] dt -$$

$$\eta\tau y_t [e_t + (1-\beta) a_t] \, d\Pi_t$$

.

Analysis

Optimal solution

$$a^* = (f')^{-1}\tau\beta,$$

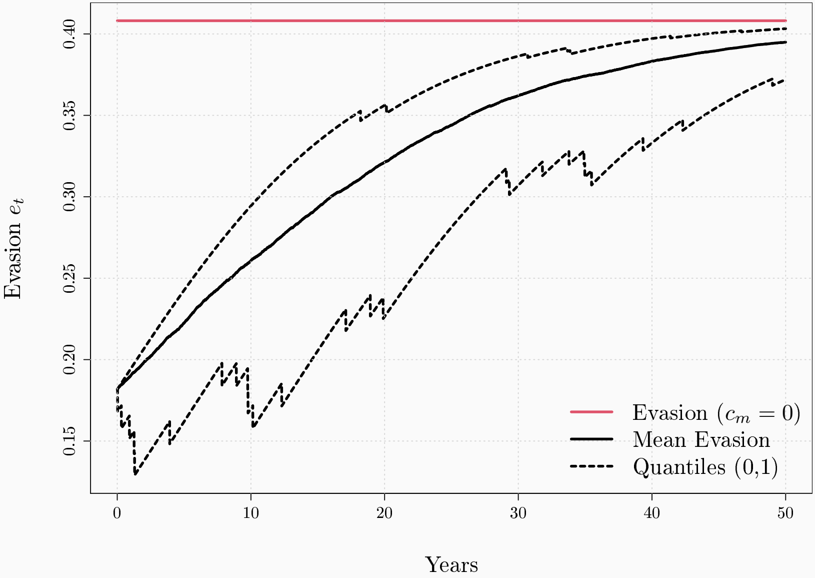
$$e_t^* = \frac{k_t - H}{\tau\eta A k_t}\left[1-(\lambda\eta)^{\frac{1}{\delta}}\right]-(1-\beta)\,a^*,$$

$$c_t^* = c_m + (k_t - H)\left(\frac{\rho+\lambda}{\delta}+\frac{\delta-1}{\delta}\left\{\frac{1}{\eta}+A\left[(1-\tau)+\tau\beta a^*-f(a^*)\right]\right\}-\frac{1}{\eta}(\lambda\eta)^{\frac{1}{\delta}}\right)$$

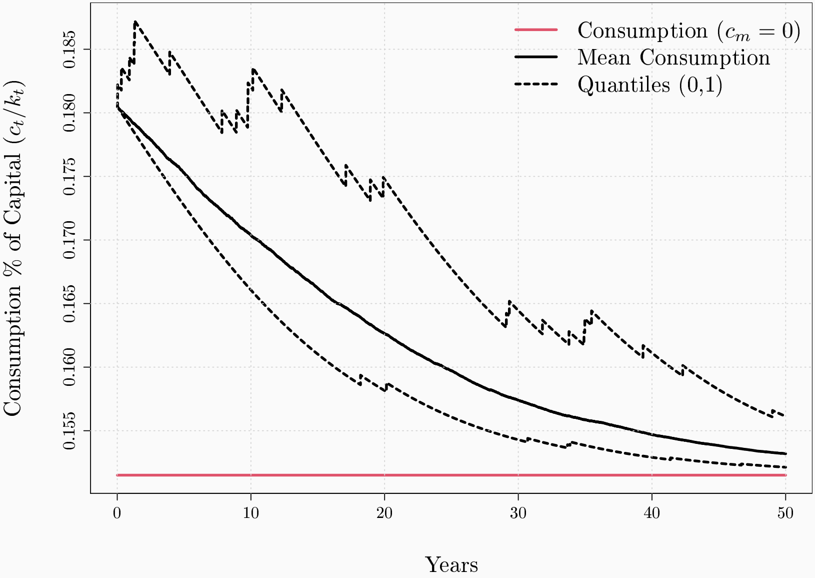
Where:

$(f')^{-1}$	Inverse of the marginal cost of avoidance
$H := \frac{c_m}{A[\tau\beta a^* - f(a^*)+(1-\tau)]}$	PDV of future c_m discounted by TFP corrected by tax and avoidance

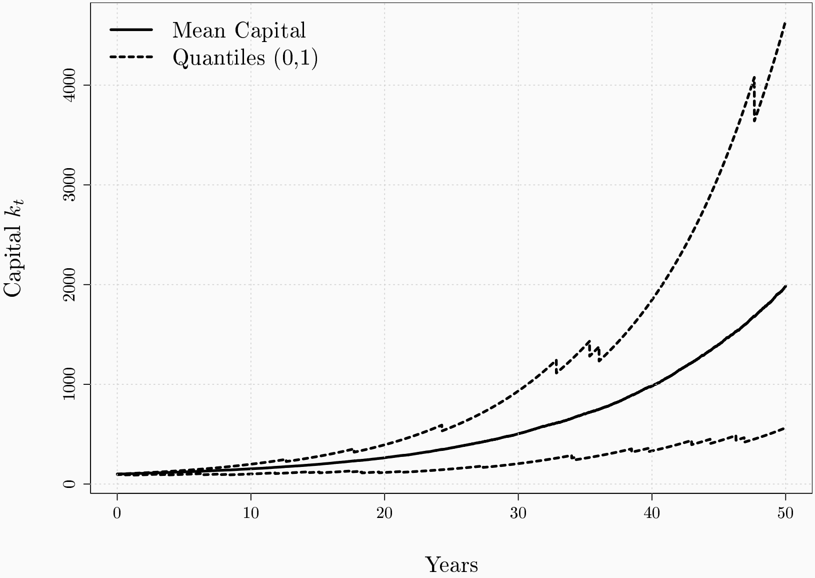
Evasion dynamics



Consumption dynamics



Capital dynamics



Comparative Statics

	a^*	e_t^*	$E_t^* = a^* + e_t^*$	$\mathbb{E}[dT_t]$
λ	0	$-$	$-$	$+$
η	0	$-$	$-$	$+$
β	$+$	$+/-$	$+$	$-$
τ	$+$	$-$	$+/-$	$+/-$

$\frac{\partial \text{Col}}{\partial \text{Row}}$ Derivatives of column with respect to row

Where:

$$\mathbb{E}[dT_t] = \tau y_t (1 - e_t^* - a_t^*)\, dt + \lambda \eta \tau y_t [e_t^* + (1-\beta) a_t^*]\, dt$$

are expected revenues collected:

- Revenues from declaration
- Expected revenues from enforcement

Comparative Statics - Remarks on β

The sign of $\frac{\partial e_t^*}{\partial \beta}$ is complex to study when $c_m > 0$

The case $c_m = 0$ offers some insights:

$$\frac{\partial e_t^*}{\partial \beta} \gtreqless 0 \iff \frac{\partial a^*}{\partial \beta}\frac{1}{a^*} \lesseqgtr \frac{1}{1-\beta}.$$

- The sign of the derivative depends on the semi-elasticity $\frac{\partial a^*}{\partial \beta}\frac{1}{a^*}$
    - If the semi-elasticity is higher than a threshold, e is decreasing in β
- The semi-elasticity is higher when β is bigger

Avoidance deterrence increases evasion in economies with higher avoidance premium

- When $c_m > 0$ the increase in evasion is more likely than if $c_m = 0$

Comparative Statics - Remarks on τ

Also for the sign of $\frac{1}{dt}\frac{\partial \mathbb{E}_t[dT_t]}{\partial \tau}$ assuming $c_m = 0$ provides some insights:

$$\frac{1}{dt}\frac{\partial \mathbb{E}_t\left[dT_t\right]}{\partial \tau} \gtreqless 0 \iff \tau \lesseqgtr \frac{1-\beta a_t^*}{\beta \frac{\partial a_t^*}{\partial \tau}}.$$

Tax revenues display a Laffer curve behaviour

- When τ is low, raising τ increases revenues
- When τ is high, raising τ decreases revenues
- The higher the β, the lower the revenue-maximizing tax rate

An increase of τ has three impacts on revenues:

1. Positive - Marginal tax increase
2. Positive - Reduction of evasion
3. Negative - Increase in avoidance

Conclusion

Tax avoidance deterrence

Fines and audits are ineffective against tax avoidance $\Rightarrow$ focus on f, β, τ

Avoidance costs f

- Increasing both f' and f lowers avoidance and evasion
- Two components of avoidance costs:
    - **Knowledge costs**: Effort/Expertise to identify the “loophole” to exploit
    - **Set-up costs**: To meet law requirements (e.g., creation of legal entities)
        - Cannot be told apart from those of ”intended” economic activities

  Avoidance deterrence need to focus on knowledge costs alone

Measures to deter avoidance through β and f

- Simplifying the tax system
    - Reducing the extent of variation of tax treatments
        - deductions, exemptions and preferential treatments
- Increasing the litigation budget of the tax administration
- Implementing anti-avoidance reforms at (multi)national level

Tax avoidance deterrence

Avoidance deterrence might increase evasion:

1. Avoidance premium:
   - Decreasing a low β reduces both avoidance and evasion
   - Decreasing a high β entails an increase of evasion
   - Evasion increase is more likely when $c_m > 0$
2. Tax rate:
   Decreasing τ reduces avoidance but the increasing effect on evasion eventually lowers compliance and revenues

Negative effects can be sterilized using audit probability or fines

$$a^* = (f')^{-1} \tau\beta,$$

$$e_t^* = \frac{k_t - H}{\tau\eta A k_t}\left[1 - (\lambda\eta)^{\frac{1}{\delta}}\right] - (1-\beta)\, a^*.$$

Concluding Remarks

We develop the first dynamic model with joint avoidance/evasion

Interaction of avoidance and evasion is of crucial importance:

- Lead to the emergence of a Laffer curve
- Provide a possible interpretation for the Yitzhaki puzzle

Avoidance deterrence requires specific policies:

- Reduction of β or increase of f
    - Long-run: Fiscal/judiciary reforms
    - Short-run: Increase of tax administration resources (legal)
        - Recent investments in data collection/analytics likely effective on evasion
        - Reduction of evasion might bolster avoidance
        - Need to balance deterrence activities
- Reduction of τ

Avoidance deterrence might entail unintended consequences

Thank you!

Questions?