Tax avoidance and evasion in a dynamic setting

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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 ($\approx$800B)in Europe (Murphy 2019) under-reporting is 18% in US (tax gap of $\approx$500B)
- Avoidance also significant: 4% of GDP in Europe (EPRS, 2015), latest IRS and Treasury claim figures up to 500 billion
- Tax Evasion and Avoidance tend to be stable in time, so consumption and saving decisions are likely to take non-compliance into account
- 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
  - Evasion is **correctly detected** upon audit
- **Avoidance costs** $f(a)$ but might be successful with probability β
  - $f(a)$ increasing, convex and $f(0) = 0$
  - Successful avoidance is not fined upon audit
  - Successful avoidance $\leftrightarrow$ undetected/unchallenged/deemed legitimate

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

- Low vulnerability to avoidance (high f, low β) when:
  - Tax code is simpler and less-ambiguous
  - Legal/investigative resources of tax authorities are higher
  - Courts have higher effectiveness

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

Expected capital variation is equal to production minus expenses:

$$\mathbb{E}_t\left[dk_t\right] = \left[y_t - c_t - \tau y_t\left(1 - e_t - a_t\right) - f\left(a_t\right)y_t\right]dt -$$

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

Production, y_t

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

Expenses:

- Consumption, c_t
- Linear tax 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
  - Expected cost of 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:

$$\mathbb{E}_t [dk_t] = [y_t - c_t - \tau y_t (1 - e_t - a_t) - f(a_t) y_t] dt -$$

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

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

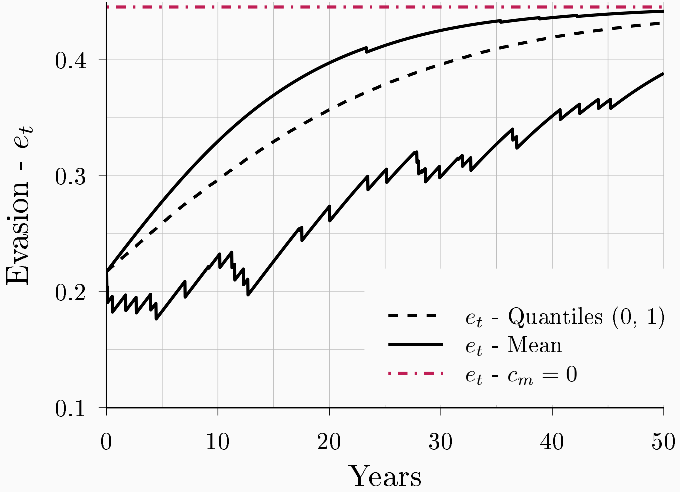
Optimal Avoidance and evasion

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

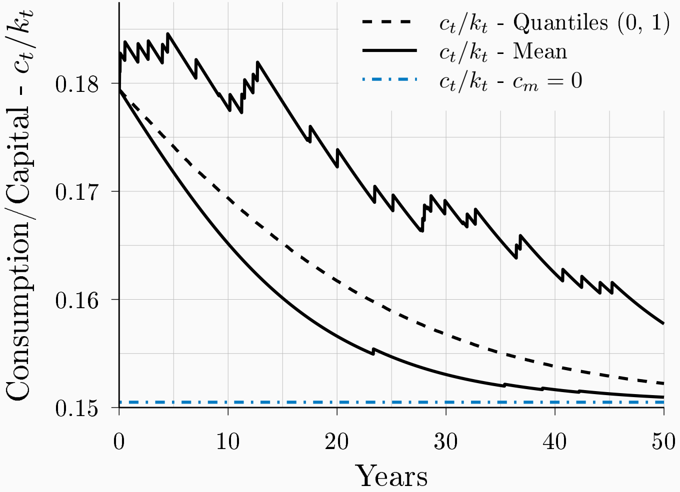
$$e_t^* = \frac{k_t - H}{\tau\eta A k_t} \left[1 - (\lambda\eta)^{\frac{1}{\delta}}\right] - (1-\beta)\, a^*.$$

- Avoidance balances marginal costs/benefits relative to evasion
- Two risks: to be audited and avoidance to be (un)successful
- Risk to be audited affects equally a_t and e_t
    - Optimal risk management uses the tool with higher correlation
    - Avoidance costs are independent of audit $\rightarrow$ lower correlation
    - Evasion is used for managing the risk to be audited
- Optimal avoidance manages just its risk of being unsuccessful

Evasion dynamics



Consumption dynamics



Comparative Statics

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

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

Where:

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

are expected revenues collected:

- Revenues from declaration
- Expected revenues from enforcement

Comparative Statics - Remarks on $\frac{\partial e_t^*}{\partial \beta}$

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:

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

- If the semi-elasticity $\frac{\partial a^*}{\partial \beta}\frac{1}{a^*}$ is high, e is decreasing in β
  - The semi-elasticity $\frac{\partial a^*}{\partial \beta}\frac{1}{a^*}$ is higher when β is bigger
- **In countries where avoidance is more successful, reducing vulnerability to avoidance leads to more evasion**

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

Comparative Statics - Remarks on $\frac{1}{dt}\frac{\partial \mathbb{E}_t[dT_t]}{\partial \tau}$

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

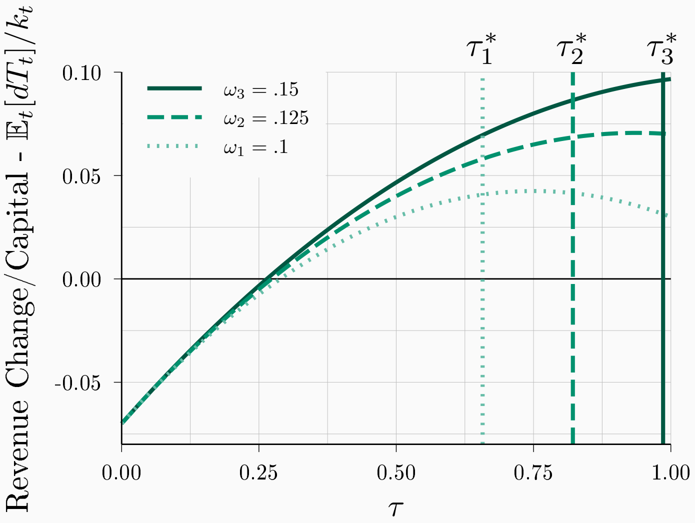
$$\frac{1}{dt}\frac{\partial \mathbb{E}_t\left[dT_t\right]}{\partial \tau} \gtreqless 0 \iff \tau \lesseqgtr \frac{1-\beta a_t^*}{\beta \frac{\partial a_t^*}{\partial \tau}}.$$

Tax revenues display a Laffer curve behaviour

- When τ is low, raising τ increases revenues
- When τ is high, raising τ decreases revenues
- An increase of τ has three impacts on revenues:
  1. Positive - Marginal tax increase
  2. Positive - Reduction of evasion
  3. Negative - Increase in avoidance
- The higher the β, the lower the revenue-maximizing tax rate

In countries where avoidance is more successful, the revenue-maximizing tax rate (and revenues) are lower

The Avoidance Laffer Curve



Ratio of expected revenues collected to capital by τ and $f(a_t) = \omega a_t^\gamma$

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 f and β

- 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 β**:
   - 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 τ**:
   Decreasing τ reduces avoidance but the increasing effect on evasion eventually lowers compliance and revenues

Concluding Remarks

We develop the first dynamic model with joint avoidance/evasion

Interaction of avoidance and evasion is of crucial importance:

- Leads to the emergence of a Laffer curve
- Provides 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)
- Reduction of τ

Avoidance deterrence might entail an increase of evasion

Thank you!

Questions?