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Dipartimento di Economia e Management

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Dipartimento di Economia e Management

Does the tax administration play an unfair gamble with taxpayers? Evidence from survey data

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Cyclical **Tax Enforcement**

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Tax Enforcement (I)

- Most **people dislike paying taxes**, although they enjoy public goods (or some of them)....

- The best strategy of rational individuals is behaving as **free-riders**. Thus, it is not a matter of bad or good guys, but of smart guys=rational individuals!... well, maybe you can call them immoral guys, ok (role of *tax morale*).

- Being that the best individual strategy does not mean it is the optimal **collective action** (Nash eq. is suboptimal)... Social welfare can be improved by means of forcing the payment of taxes

Tax Enforcement (II)

- Note, though, matters would be relatively easy if governments were able to tax individuals according to their ability-to-pay: **lump-sum taxes**

- However, such a characteristic is not observable or verifiable, since individuals do not have the right incentives to reveal it

- That is why, the public sector has to base taxes on **proxies of the ability-to-pay**: consumption, wealth... and the most important one, income

Tax Enforcement (III)

- The problem of this alternative (to lump-sum taxes) is that **taxpayers might react**:
  - **Real responses**: e.g., decreasing labor supply or savings
  - **Evasion**/Avoidance: cheating the tax administration breaking (estimation: real challenge) or not the law

Most of current empirical literature concludes non-real responses are the most important ones (https://equitablegrowth.org/in-conversation-with-emmanuel-saez/)

Tax Enforcement (IV)

- If this is so, maybe governments should focus more on closing tax loopholes (as a source of avoidance) or... increase **tax enforcement** as a way to reduce evasion (and check the legality of avoidance).
- Obviously, there are **limits** as tax enforcement is costly, while some loopholes are needed to adjust the definition of the tax base to tax capacity, but also to promote certain welfare-enhancing behaviors

(<u>Open question 1</u>: would it be ok having a tax amnesty “regularly”?)

Tax Enforcement (V)

- We are going to take as granted the tax administration (so, no longer the public sector or the government in general) is in charge of **enforcing tax compliance**

- The main instrument in hands of the tax administration is the **audit probability**, p.

- Allingham and Sandmo (1972) were the first authors analyzing how individuals react to changes in p. Basically, they set an analogy between **evasion** and **a gamble.**

Tax Enforcement (VI)

- This means that taxpayers will bet (see whether they can certainly skip paying taxes) as long as their expected benefits are greater than expected costs. That is, **if evasion is a fair gamble to the taxpayer**:

$$\text{tax-rate} > p(\text{tax\_rate} + \text{fine}) > 0$$

That is, they will evade if the expected benefits (LHS) are larger than expected costs (RHS).

(Open question 2: how could tax evasion be fully and easily avoided?)

Tax Enforcement (VII)

- If tax-payers are risk-neutral, and as long as evasion is a fair gamble, tax compliance will be null.

- However, this is not what we might expect: individuals tend to be **risk-averse**. That is, from the model above, the conclusion is that in equilibrium tax compliance will be an interior solution (0,1).

- Still, such a model has a problem… in fact, we economists when we realize the predictions of theory do not match with reality, call it a **paradox** (dividend, voting… and now, evasion).

Tax Enforcement (& VIII)

- Here, the paradox consists of the fact that the level of evasion predicted by the model (based on numerical simulations) is much larger than what we observe in reality.

- Main **explanations**:

    - Tax morality
    - Withholding taxes, or even
    - Patriotism

Final thought: technology might help in the medium term to reduce or to fully eliminate the extent of evasion. Will see!

How all this connects with the rest of the seminar

- In the previous model, we took *p* as given… here we will set a model to obtain the **"optimal" *p***

- On top of that, the running model of AS (1972) is a static model: this is the key difference with our model, which empirical relevance we also test. Hence, we analyze the role of tax enforcement along time, and in particular along the **economic cycle**…

Cyclical Tax Enforcement

Does the tax administration play an unfair gamble with taxpayers? Evidence from survey data

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Motivation

- The economic downturn associated with the global financial crisis caused an important fall in tax revenues in many countries.
- Tax enforcement is an additional instrument to collect revenues (Slemrod and Gilitzer, 2014).
- The role of tax administrations is particularly salient in times of crisis: for example, according to The Economist (2012), talking about attempts to fight against tax havens, "... [governments] are strapped for cash and hungrily hunt every penny in tax revenue"
- In the case of Spain, according to the 2019 draft of the State Public Budget: "The fight against fraud has been key in the process of fiscal consolidation and recovery of tax revenue losses" (p. 225, Yellow book).

Objective

- Therefore, one would expect tax enforcement to be counter-cyclical: in times of crisis, higher enforcement levels. This would be in accordance with a fiscal capacity argument.
- However, taxpayers may also be liquidity constrained. As long as the tax administration internalizes this situation, tax enforcement might become pro-cyclical.
- Our main objectives are:
  - (i) by means of a theoretical model based on Andreoni (1992), identify when it is optimal for enforcement to be counter-cyclical/pro-cyclical;
  - (ii) test that behaviour using Spanish data.

Literature Review (I)

- **Allingham and Sandmo (1972)** characterize the decision to evade as a gamble under a static context (i.e., evasion occurs today and has consequences today).
- According to that context, there will be a positive level of evasion (no full evasion as long as individuals are risk-averse), as long as such **a gamble is fair**, that is, the expected net benefit from evading (saved taxes minus expected penalty) is positive.
- This is not necessarily longer the case when dynamics is taken into account. In that case, even if such a gamble is **unfair** (negative net benefit), taxpayers might evade (**Andreoni, 1992**).

- Under a dynamic context, taxpayer might be willing to accept such an unfair gamble as long as this allows her to smooth consumption along time: the tax administration is a **loan shark**, where the (implicit) high interest rate is the expected net *cost* from evading taxes today. **Alm *et al.* (2018)** provide empirical evidence on this behaviour by firms.

- Following such a theoretical framework, we will show that under a recession the tax administration might certainly follow a pro-cyclical enforcement policy, as suggested by **Brondolo (2009)**.

- However, there is a lack of theoretical and empirical analysis on this. Most of the literature focuses on the **fiscal capacity argument (Besley and Persson, 2009)**, which – in our context – should be interpreted as counter-cyclical tax enforcement.

- Similarly, **Chen (2017)** suggests that in presence of negative structural shocks on tax revenues (in his case, the abolition of a local tax) the tax administration sets tougher tax enforcement.

Theoretical Framework (I): Individuals

Two periods:

- **Period 1:** the taxpayer earns income (W_1), can save (S_1), has to pay taxes, but might evade ($X_1 = W_1 - W_1^r$); **Period 2:** she might be audited (p), and with certainty she obtains a given untaxed bequest (W_2).

  $U = u(C_1) + (1-p)u(C_2^{NA}) + pu(C_2^{A})$
  $C_1 = \overline{W} + \tau X_1 - S_1; \;\; C_2^{NA} = W_2 + S_1; \;\;\; C_2^{A} = W_2 + S_1 - (\tau + \gamma)X_1$

- Liquidity constraints arise as long as such an unobservable bequest (period 2) is larger than the net income under full tax compliance (period 1) $\Rightarrow \;\; W_2 > \overline{W} = W_1(1-\tau)$.

- In absence of loans from the financial sector, the taxpayer might be willing to evade to smooth consumption even if evasion is an unfair gamble, i.e. if the expected net financial return of evasion is negative. $\mu := \tau - p(\tau + \gamma) < 0$

- In particular, evasion will be optimal when the following condition holds:

$$m > 1 - \frac{\mu}{\tau}$$

- where m is the marginal rate of substitution between current and future consumption.

- Non-financially constrained individuals: $m \leq 1 \Leftrightarrow W_2 \leq \bar{W}$, evasion is only optimal when it is a fair gamble ($\mu > 0$);

- Financially constrained individuals: $m > 1$ (i.e., the marginal utility of today's consumption is larger than tomorrow's marginal utility of consumption) $\Leftrightarrow W_2 > \bar{W}$, and so evasion is compatible with negative values of μ.

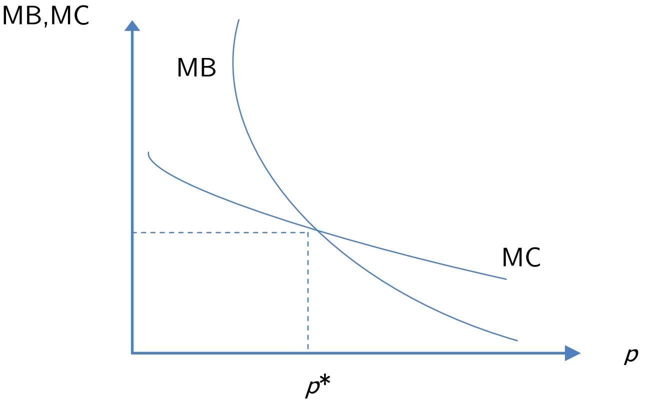
Theoretical Framework (III): The tax administration

- From now on, we focus on the case where $\boldsymbol{m} > \mathbf{1}$; at the aggregate level, optimal tax enforcement in times of crisis.

- We assume the tax administration maximizes the representative individual's indirect utility function subject to an intertemporal budget constraint. The FOC is:

$$MC = V(C_2^{NA}) - V(C_2^{A}) = \lambda\left\{(\tau+\gamma)X_1 - \frac{\partial X_1}{\partial p}\mu\right\} = MB > 0$$

Theoretical Framework (IV): The Equilibrium



- The optimal level of tax enforcement equals marginal cost (MC) of tax enforcement with the marginal benefit (MB).
- In Andreoni's (1992) model, the optimal μ is negative (only care for <u>tax revenue collected</u>). As we follow a <u>welfarist approach</u>, this is not necessarily the case.

Theoretical Framework (V): Optimal tax enforcement along the economic cycle

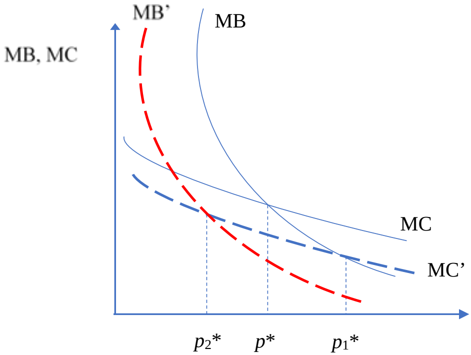
- Our objective is to identify how the tax administration reacts in front of a negative shock on the taxpayer's side ($W_2\uparrow$) $\Rightarrow$ comparative static exercise

- In front of stronger liquidity constraints ($W_2\uparrow$), the MC of tax enforcement decreases, while the impact on the MB is uncertain:

$$\frac{\partial MB}{\partial W_2} = \lambda \Bigg[\underbrace{(\tau+\gamma)\frac{dX_1}{dW_2}}_{\text{IE}} \underbrace{- \frac{\partial}{\partial W_2}\left(\frac{dX_1}{dp}\right)\mu}_{\text{SE}} \Bigg] \gtrless 0$$

- $\mu \geq 0 \Longrightarrow \quad \frac{\partial MB}{\partial W_2} > 0 \Longrightarrow \boxed{W_2 \uparrow \Longrightarrow p^* \uparrow} \Longrightarrow$ countercyclical p^*
- $\mu < 0 \Longrightarrow \begin{cases} \frac{\partial MB}{\partial W_2} > 0 \Leftrightarrow |IE| \geq |SE| \Longrightarrow \text{countercyclical } p^* \\ \frac{\partial MB}{\partial W_2} < 0 \Leftrightarrow |IE| < |SE| \Longrightarrow \text{counter or procyclical } p^* \\ \qquad \text{depending on how much MC}\downarrow \text{ wrt MB} \end{cases}$

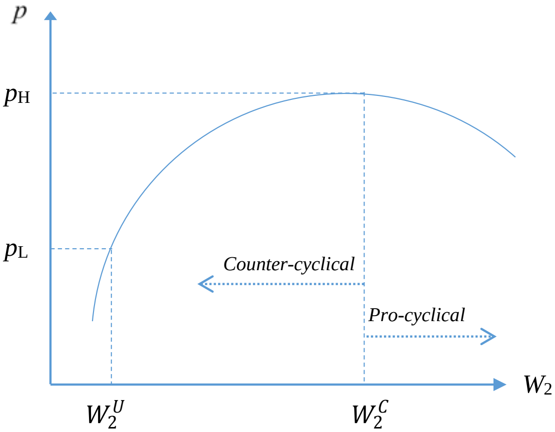
Theoretical Framework (VI): Example of pro-cyclical tax enforcement



- From p^*, there is a shock: relocation to p_1^* (MC decreases); and finally we are at p_2^* (MB also decreases, necessary condition: severely constrained individuals).
- It is possible to show that under severe financial constraints (c) tax enforcement is at least less counter-cyclical than in an unconstrained situation:

$$\frac{dp^c}{dW_2} - \frac{dp^u}{dW_2} < 0$$

Theoretical Framework (VII): From counter-cyclical pro-cyclical tax enforcement (example)



In our <u>empirical analysis</u>, we will test whether the reaction of <u>tax enforcement</u> to shocks is <u>milder when taxpayers are under severe financial constraints</u>. Is the tax administration aware of the advantages of "playing" an unfair gamble to taxpayers?

Empirical Strategy (I): the endogenous variable

- We measure the productivity of tax enforcement by means of the "Perceived Tax Enforcement" (from the surveys "Public opinion and fiscal policy" – CIS, 1994-2015)

- "Do you think that the tax administration is currently taking many/quite a few/a few/very few steps in its efforts to fight against tax evasion?"

$$p_{ijt} = \{1,2,3,4\}$$

- By defining as an ordinal dependent variable measuring the unobservable actual perceived tax enforcement of individuals, we can design ordered response models.

Empirical Strategy (II): Ordered Probit Model

$$p^*_{ijt} = \beta EC_{jt} + \boldsymbol{Y_{ijt}\psi} + \boldsymbol{X_{jt}\alpha} + \vartheta_j + \tau_t + \varepsilon_{ijt}$$

$$p_{ijt} = \begin{cases} 1 & \text{if } \; p^*_{ijt} \leq \omega_1 \\ 2 & \text{if } \; \omega_1 \leq p^*_{ijt} \leq \omega_2 \\ 3 & \text{if } \; \omega_2 \leq p^*_{ijt} \leq \omega_3 \\ 4 & \text{if } \; p^*_{ijt} \geq \omega_3 \end{cases}$$

- EC_{jt} is a proxy of the AC-specific economic cycle at time t. We alternatively employ GDP_{jt} or $Unemployment_{jt}$.
- $\boldsymbol{Y_{ijt}}$ controls for personal characteristics
- $\boldsymbol{X_{jt}}$ controls for other AC-specific relevant variables.
- Finally, we account for fixed effects (ϑ_j), time effects (τ_t) and ε_{ijt} is the error term.

Empirical Strategy (III): Ordered Probit Model

- In our theoretical framework, we parameterise a negative financial shock to the economy by an increase in W_2 with respect to W_1.
- Here, we can coherently interpret W_2 as the potential or the long run GDP expected in period t and W_1 as the effective GDP at that time.
- Thus, a lower value of GDP_{jt} with respect to its expected long run level implies an economic downturn.
- Therefore, we identify a counter-cyclical tax enforcement with a negative sign when EC_{jt} is proxied by GDP_{jt} (Similarly, the sign is positive when it is proxied by $Unemployment_{jt}$).

Empirical Strategy (IV): endogenous variable & Identification issues

$$p^*_{ijt} = p^{ACTUAL}_{STRUCTURAL} + p^{ACTUAL}_{COMM.CYCLE} + \boldsymbol{p^{ACTUAL}_{AC-CYCLE}} + p^{INDIVIDUAL}_{STRUCTURAL} + p^{INDIVIDUAL}_{COMM.CYCLE} + p^{INDIVIDUAL}_{AC-CYCLE}$$

This perception depends on:

The actual policy:

- Structural component (FE or 5 years fixed effects instead of FE, and AC-specific contextual variables)
- Common cyclical component (TE)
- **AC cyclical component (what we want to identify)**

The individual component (preferences/demand):

- Structural component (individual characteristics - IC)
- Common cyclical component (TE, Interaction IC*TE, not significant difference)
- AC cyclical component (separate regression for 2 clusters of individuals with different risk perception along the economic cycle – not significant difference)

Results (I): pooled model

	(1)	(2)	(3)	(4)	(5)	(6)
GDP (CA)	*-0.311***	*-0.794***	*-0.778***			
	(-3.027)	*(-3.898)*	*(-3.666)*			
Unemployment (CA)				*0.157***	*0.201***	*0.201***
				(3.939)	*(3.349)*	*(3.114)*
Observations	*28384*	*28384*	*28384*	*28384*	*28384*	*28384*
Log-likelihood	*-32878.452*	*-32793.464*	*-32554.842*	*-32875.319*	*-32796.059*	*-32557.085*
Control variables	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Fixed Effects	*YES*	*NO*	*NO*	*YES*	*NO*	*NO*
Time Effects	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
FE×5years TE	*NO*	*YES*	*YES*	*NO*	*YES*	*YES*
Individual˙Var.s×TE	*NO*	*NO*	*YES*	*NO*	*NO*	*YES*

Note: t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Empirical Strategy (V): Linear SPLINE

$$p^*_{ijt} = f(EC_{jt}) + \boldsymbol{Y_{ijt}\psi} + \boldsymbol{X_{jt}\alpha} + \vartheta_j + \tau_t + \varepsilon_{ijt}$$

$$f(EC_{jt}) = \begin{cases} \beta_1 EC_{jt} + a_1 & \text{if } \; EC_{jt} \leq knot_1 \\ \beta_2 EC_{jt} + a_2 & \text{if } \; knot_1 \leq EC_{jt} \leq knot_2 \\ \beta_3 EC_{jt} + a_3 & \text{if } \; EC_{jt} \geq knot_2 \end{cases}$$

$$p_{ijt} = \begin{cases} 1 & \text{if } \; p^*_{ijt} \leq \omega_1 \\ 2 & \text{if } \; \omega_1 \leq p^*_{ijt} \leq \omega_2 \\ 3 & \text{if } \; \omega_2 \leq p^*_{ijt} \leq \omega_3 \\ 4 & \text{if } \; p^*_{ijt} \geq \omega_3 \end{cases}$$

Results (II): spline model

	(1)	(2)	(3)	(4)
	Linear spline with knots equally spaced		Linear spline with knots at specified points	
			(1^{st} & 5^{th} pctls)	(95^{th} & 99^{th} pctls)
GDP $(CA)_1$	-0.947***		11.017*	
	(-2.949)		(1.662)	
GDP $(CA)_2$	-0.235*		-3.204	
	(-1.773)		(-0.934)	
GDP $(CA)_2$	-0.430***		-0.321***	
	(-3.842)		(-3.093)	
Unemployment $(CA)_1$		-0.168		0.190*
		(-1.023)		(1.779)
Unemployment $(CA)_2$		0.380***		0.507**
		(2.847)		(2.244)
Unemployment $(CA)_3$		-0.026		-4.940***
		(-0.163)		(-2.730)
Observations	28384	28384	28384	28384
Log-likelihood	-32874.364	-32791.823	-32876.756	-32791.934

Note: *t* statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Baseline models are models 2 and 5 of previous table.

Conclusions

- According to our estimations, the <u>tax administration reacts to the state of the economy</u>; and the nature of the reaction – as expected by our theoretical model – depends on the <u>severity of the crisis</u>.

- On average, tax authorities set a <u>counter-cyclical tax enforcement policy</u> confirming that, as theory suggests, in most of cases this is the optimal response of tax authorities to economic shocks.

- Nevertheless, when the <u>economic downturn is particularly severe</u>, the tax administration prefers to waive additional tax revenues that could raise strengthening the tax enforcement and start to set a more <u>pro-cyclical enforcement policy</u>.

Separate regressions by Unemployment Risk type

- We estimate UR_{ijt}, we define $lowUR_{ijt} = 1$ if $UR_{ijt} < \overline{UR}_{ijt}$
- Rationale: the lower the UR_{ijt}, the lower the exposure to EC) individuals with $lowUR_{ijt} = 1$ are less likely to change their perception/demand of tax enforcement along the EC ⇒ more likely to correctly estimate β.

	(1) Low UR	(2) High UR	(3) Low UR	(4) High UR
GDP (CA)	-0.779***	-0.837**		
	(-3.031)	(-2.421)		
Unemployment (CA)			0.171**	0.243**
			(2.296)	(2.330)
Observations	17371	11013	17371	11013
Log-likelihood	-20002.350	-12706.730	-20004.587	-12707.245
Fixed Effects	NO	NO	NO	NO
Time Effects	YES	YES	YES	YES
FE×5years TE	YES	YES	YES	YES
Individual˙Var.s×TE	NO	NO	NO	NO

Note: t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Baseline models are models 2 and 5 of 1st table.

- We test whether $\hat{\beta}_{lowUR} \neq \hat{\beta}_{highUR}$ and find that they is not statistically significant difference between these coefficients, thus we employ the pooled model.