

Seminar "Tax Policy and Multinational Firms"

Countries Do Compete over Corporate Tax Rates while Keeping Revenues Stable

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M.Sc. in Economics @ LMU Munich
Second Semester

July 6, 2023

Overview

- 1 Leading Questions
- 2 Do countries compete over corporate tax rates?
Devereux et al. (2008) In *Journal of Public Economics*
- 3 Corporate tax revenues in OECD countries
Clausing (2007) In *International Tax and Public Finance*
- 4 Comparison and further discussion
- 5 Conclusions

Corporate Income Tax Rate

In the last few decades, the global landscape of corporate income taxation has witnessed a significant transformation characterized by a widespread **decline** in tax rates levied on corporate profits.

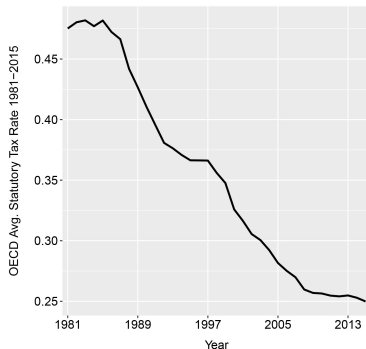


Figure: OECD Avg. Corp. Tax Rate 1981-2015, own work on OECD data

Corporate Income Tax Revenues

Understanding what is driving reductions in tax levels and the **effects** on government revenues is crucial for designing effective tax policies and ensuring sustainable fiscal frameworks.

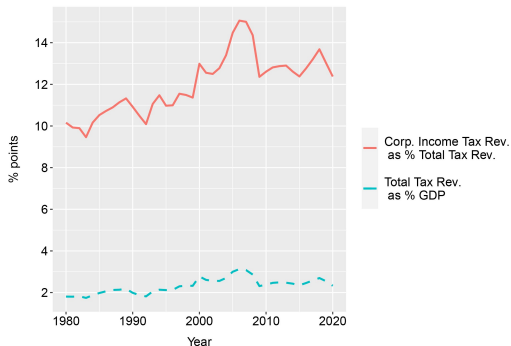


Figure: OECD Avg. Corp. Inc. Tax Rev. 1980-2022, own work on OECD data

(Why) Do We Need Corporate Taxation?

- Corporate income taxation serves as a **vital source** of tax revenues for governments. This is especially true for *developing countries*, where corporate tax revenues comprise a large part of the fiscal budget.
 - In 2021, in Colombia, corporate income tax revenues accounted for 23% of all tax revenues. Conversely, only 6% for Germany.
- Corporate income taxation acts as a **backstop** for personal income tax systems, Devereux et al. (2008) and Slemrod (2004).

Corporate income taxation still plays a central role in many different ways, and therefore downward tax rates must be carefully analyzed.

Overview

Lowering firm income tax rates is part of a **strategic game** in which countries have found themselves not to lose existing and potential capital after the surge of internationalization and trade.

In their paper, Devereux et al. (2008) model this interaction between states as a **competitive game**.

A model of corporate tax competition

In a tax-competitive setting with two countries, home and foreign, both have inhabitants and a multinational firm with its headquarters.

The **global after-tax profit** of the multinational with the parent in the home country is $\Pi = (1 - \tau)(f(k) - zrk - q) + (1 - \tau^*)(q - c)$

In their model, Zodrow and Mieszkowski (1986) only consider the tax on returns to capital as instrument at the government's disposal, here, Devereux et al. (2008) provide the government with the possibility to set a rate of allowance, and consequently influencing the **EMTR**, that is

$$z - 1 = \frac{(1 - a\tau)}{1 - \tau} - 1.$$

The players' perspective

FIRM: how to choose where to locate investments and corporate income?

$$\max_{q,k} \Pi - EF(i) \implies (i) \frac{\partial \Pi}{\partial q} = 0, q = c + \frac{\tau - \tau^*}{2\alpha}; (ii) \frac{\partial \Pi}{\partial k} = 0, f'(k) = zr$$

GOVT: how and whether to react when other countries change their tax rates?

$$\max_{\tau,z} W = r\kappa + \Pi - EF + v(g)$$

$$st. g = \tau(\pi(zr) - q) + (z - 1)rk(zr) + \tau(q^* - c)$$

In equilibrium, both countries choose the same rates, $(\tau, z) = (\tau^*, z^*)$.

In other words, a symmetric **Nash equilibrium** of the governments' choices is reached. Solving the optimization problem of the government at the symmetric Nash equilibrium, i.e. $(\tau = \tau^* = \hat{\tau}, z = z^* = \hat{z})$, and gives $\hat{\tau}$ and \hat{z} .

Equations for the reaction functions

Both the tax instruments of a government, τ and z , react to both τ^* and z^* , their **reaction functions** are $\tau = T(\tau^*, z^*)$, $z = Z(\tau^*, z^*)$.

- In both reaction functions, a vector \mathbf{X} of control variables is included.
- Considering n countries, the country's i reaction functions are $\tau_i = T_i(\tau_{-i}, z_{-i}, \mathbf{X}_i)$ and $z_i = Z_i(\tau_{-i}, z_{-i}, \mathbf{X}_i)$.

Therefore, a *linear approximation* of $\tau_{i,t}$ at the Nash equilibrium is:

$$\tau_{i,t} = \hat{\tau}_i + \sum_{j \neq i} \frac{\partial T_i}{\partial \tau_j} \tau_j + \sum_{j \neq i} \frac{\partial T_i}{\partial z_j} z_j + \eta'_1 \mathbf{X}_i \quad i = 1, \dots, n$$

After replacing $\frac{\partial T_i}{\partial \tau_j} = \beta_1 \omega_{ij}$ and $\frac{\partial T_i}{\partial z_j} = \gamma_1 \omega_{ij}$, and assuming every country exhibits a **uniform response** to the weighted average tax rates of the other countries, $\bar{\tau}_i$ and \bar{z}_i :

$$\tau_{i,t} = \beta_1 \bar{\tau}_{i,t} + \gamma_1 \bar{z}_{i,t} + \eta'_1 \mathbf{X}_{it} + \phi_{1i} + T_{1it} + \varepsilon_{1it} \quad i = 1, \dots, n$$

Regression results

	Statutory rate, τ_{it}	Eff. tax wedge, w_{it}
$\bar{\tau}_{it}$	0.678 (2.5)	-0.012 (0.19)
\bar{w}_{it}	-1.362 (1.04)	0.766 (2.35)
Income tax rate	0.16 (2.95)	0.007 (0.84)
Size	0.54 (2.55)	-0.02 (0.22)
Public cons./GDP	0.007 (0.03)	0.07 (0.99)
Observations	378	378
R-squared	0.93	0.77

Figure: regression results, Devereux et al. (2008)

The main effects come from $\bar{\tau}_{it}$, the income tax rate and the size.

Control variable data	1983	1997	1997	1983
Capital control data	1983	1997	1983	1997
Actual average tax rates	46.60%	36.30%	n.a.	n.a.
Nash eq. avg. stat. tax rates	44.20%	35.80%	44.50%	36.70%

Figure: comparison between hypothetical Nash eq. rates with fixed capital controls and actual ones, Devereux et al. (2008)

They compare the actual average tax rates with hypothetical Nash equilibrium ones built fixing the capital control levels.

Overview

It has been described how governments are influenced in setting their corporate tax rates as part of a strategic game with other countries.

I have wondered about the **effects** of such a sharp reduction in tax rates on governments' tax **revenues**.

This second paper, titled "Corporate tax revenues in OECD countries" by Clausing (2007), investigates tax revenue trends by breaking down their components to make policymakers aware of the determinants of tax revenues.

Elements that build up tax revenues

Tax revenues are certainly determined by tax rates, but not only:

$$\frac{\text{Corporate Tax Revenue}}{\text{GDP}} = T \times f \times \Pi \times CS$$

Deriving for T , it can be generalized the effect of a change in the statutory tax rate on the corporate tax revenues:

$$\frac{\partial \text{Revenue}}{\partial T} = \underbrace{f \times \Pi \times CS}_{(1)} + \underbrace{T \times \frac{\partial f}{\partial T} \times \Pi \times CS}_{(2)} + \underbrace{T \times f \times \frac{\partial \Pi}{\partial T} \times CS}_{(3)} + \underbrace{T \times f \times \Pi \times \frac{\partial CS}{\partial T}}_{(4)}$$

The first term represents the marginal increase in revenues due to the higher T , however, firms behave to increased tax rates, and the following terms describe their **behaviour** (i.e. tax avoidance activities).

Testing the theory I

EQUATION

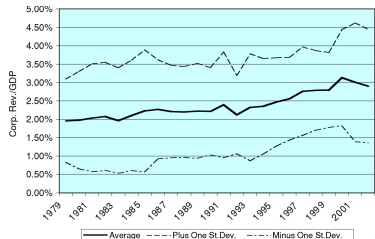
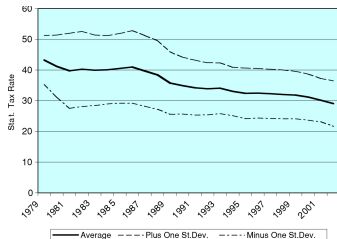
To empirically estimate the effects of all the components just described on tax revenues, the author constructs the following regression equation:

$$\left(\frac{\text{CorporateTaxRevenue}}{\text{GDP}} \right)_{it} = \alpha + \beta_1 \text{TaxRate}_{it} + \beta_2 \text{TaxRate}_{it}^2 + \beta_3 \text{CorporateProfitability}_{it} + \beta_4 \text{SizeCorporateSector}_{it}$$

- Tax base f omitted
- TaxRate_{it}^2 to capture any nonlinear effects between tax rate and tax revenues

Testing the theory II

DATA: panel data from 29 OECD countries between 1979 and 2002.



- Downward movement of the tax rate, specifically from almost 45% in 1979 to slightly below 30% in 2002.
- The average of the fiscal revenues grows over time, from 2% in 1979 to almost 3% in 2002
 - **Corporate profitability** over the period examined from 33% to 39%.
 - **Tax base broadening**, also supported by Devereux et al. (2002).

Empirical results

	(1)	(2)	(3)
Tax	0.147 (0.022)**	0.186 (0.025)**	0.154 (0.026)**
Tax ²	-0.221 (0.039)**	-0.236 (0.051)**	-0.185 (0.052)**
Profit rate		0.106 (0.014)**	0.105 (0.013)**
Corp. share		0.053 (0.011)**	0.042 (0.009)**
Credit			0.005 (0.002)**
Mixed			-0.000 (0.001)
Constant	0.002 (0.003)	-0.077 (0.011)**	-0.067 (0.009)**
Observations	587	282	282
R-squared	0.13	0.43	0.46

Figure: regression results, Clausing (2007)

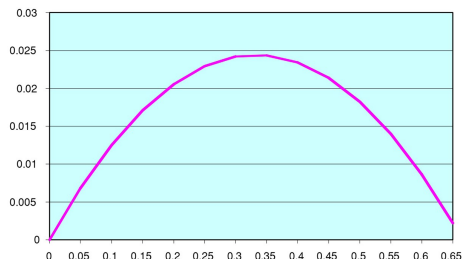


Figure: estimated revenue-tax curve, Clausing (2007)

With the estimated coefficient for the tax rate in Equation (1), estimate the **hypothetical** revenues/GDP for every tax rate.

Links and notes I

As part of the **internationalization** process of the last decades, to encourage capital inflows and facilitate international trade and investments, countries have loosened their **capital controls**.

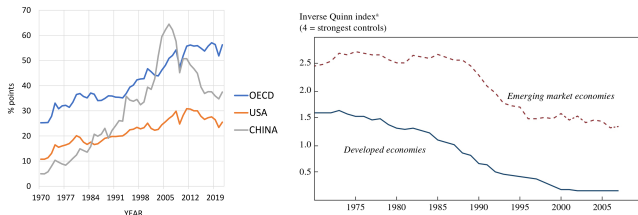


Figure: left: own work, right: Klein et al. (2012)

Other authors come to different conclusions. For instance, Swank (1998) suggests that tax cuts actually result from a **shift** in tax policy paradigms.

Links and notes II

- Clasing (2007) estimates a revenue-maximizing corporate income tax rate of around **33%**: far from current rates. Would be interesting to investigate what is the current profit-maximizing corporate income tax rate for OECD countries.
- Despite that, with such low tax rates, how can governments continue to **provide public goods**?
 - Policymakers have broadened tax bases by reducing tax exemptions and deductions or credits.
 - Tax revenues generated from corporate income represent only a small portion of the whole

Policy intervention

We modelled tax competition as a strategic "**game**". However, in the real world, this interaction on tax rates between countries may be **hostile**.

The tax heavens phenomenon (also within EU) brings **fairness problems** to the system since because, for instance, the law generally requires profits to be taxed in the country where they are generated.

Since 2013, OECD has intensified its tax coordination efforts with the ambitious **Base Erosion Profit Shifting** (BEPS) two-pillar project.

- Pillar Two: global minimum tax of 15%. To my mind:
 - Increases the tax burden in jurisdictions where the rate is below 15%.
 - Countries with a higher tax burden than 15% may act ambiguously or more likely not react.

Takeaways

"Do countries compete over corporate tax rates?", Devereux et al. (2008)

- Jurisdictions **strategically interact** in setting their corporate income tax rate, with the ultimate goal not to lose taxable corporate income.
- This interaction occurs among countries where capital controls are lower, eventually exerting downward pressure on taxation levels.

"Corporate tax revenues in OECD countries", Clausing (2007)

- Also **firms' behaviour** plays a role in determining tax revenues.
- The average corporate income tax revenues have remained almost constant thanks to policies that broadened the tax base.

Need for **international tax coordination** and harmonization efforts.
The upcoming **Base Erosion Profit Shifting** project, among others, will introduce a breakthrough 15% global minimum tax on the corporate income of given firms.