

Coles et al. JAR Forthcoming Firms' Response to Tax Rates

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Outline

Overview of Coles et al. (Forthcoming)

A motivating model of a firm's response to a change in tax rates

Take to the data

Take-away

Big picture question: how does firms respond to tax rate changes

- ▶ Provides an estimation of the firms' elasticity to taxable income based on a motivating model, new data and new empirical methodologies.
- ▶ Taxes generate both real distortions and accounting distortions (e.g., shifting of taxable income, conditional on economic operations being the same)
- ▶ A complete estimation of elasticity has to take both distortions into account.

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Model setup

- ▶ One firm, single shareholders, 2 periods, capital being the only input.
- ▶ The firm starts period 1 with E retained earnings. The firm chooses the amount of investment I , resulting in a capital level of $K = E + I$.
- ▶ Total capital level of K generates a pre-tax income of

$$\pi(K) = \frac{1+e}{e} K^{\frac{e}{1+e}}$$

with $e > 0$. For example, when $e = 1$, $\pi(K) = 2\sqrt{K}$, a commonly used concave production function.

- ▶ Taxable income, which is directly observed in the data, is given by

$$Y(K, \rho) = \pi(K) - \rho,$$

where ρ represents the amount of income shifting. Shifting ρ costs the firm $c(\rho)$ where $c(\rho)$ is strictly increasing and convex.

The firm's optimization problem

- Optimization problem of the firm:

$$\max_{\{K, \rho\}} V = -rK + (1 - \tau)Y(K, \rho) + \rho - c(\rho) \quad (1)$$

where r is the risk-free untaxed rate of return.

- FOC results in

$$\frac{\partial V}{\partial K} = -r + (1 - \tau) \frac{\partial \pi(K)}{\partial K} = 0,$$

and

$$\frac{\partial V}{\partial \rho} = -(1 - \tau) + 1 - c'(\rho) = 0.$$

(Partial) Closed-form solutions

- ▶ Inserting in the expression of $\pi(K)$ results in

$$K^* = \left(\frac{1-\tau}{r}\right)^{1+e}, \quad (2)$$

$$c'(\rho^*) = \tau, \quad (3)$$

and

$$Y = \frac{1+e}{e} r^{-e} (1-\tau)^e - \rho^*(\tau). \quad (4)$$

Comparative statics and implications

- ▶ Equation (2) implies that $\frac{\partial K^*}{\partial \tau} < 0$, that is, higher tax rates reduces the marginal benefit of capital therefore results in lower investment, that is, economic responses.
- ▶ Equation (3) implies that $\frac{\partial \rho^*}{\partial \tau} > 0$, that is, higher tax rates increases the marginal benefit of income shifting therefore results in higher income shifting, that is, accounting responses.
- ▶ Equation (4) implies that $\frac{dY}{d\tau} < 0$, that is, higher tax rates decreases taxable income by both economic responses (first term) and accounting responses (second term).

Connecting to elasticity of taxable income (CETI)

- ▶ The joint effect of economic and accounting responses are summarized by CETI,

$$\varepsilon_Y = \frac{\Delta Y / Y}{\ln\left(\frac{1-\tau_0}{1-\tau_1}\right)}. \quad (5)$$

with $\Delta Y / Y$ being the percent change in taxable income and $\ln\left(\frac{1-\tau_0}{1-\tau_1}\right)$ being the percent change in the net-of-effective-tax rate.

- ▶ Saez (2010) shows that $\Delta Y / Y$ can be estimated using the bunching of firms at a kink point in a tax schedule. More bunching is associated with a larger percent change in income and a large elasticity, *ceterus paribus*.

How to separate the economic and accounting responses

- Estimate

$$\ln\left(\frac{Y}{R}\right) = \beta_0 + \beta_1 I_{\{Y \geq \kappa\}} + \text{controls} + \text{fixed effects} + \text{error}$$

where R is the revenue and κ is the threshold below which bunching occurs, that is, there is a kink of marginal tax rate at κ (e.g., for a firm with 10,000 NOL carried over from past, $\kappa = 10,000$).

- The accounting response elasticity is thus

$$e_{\tau} = \frac{\frac{d\rho}{Y}}{\ln\left(\frac{1-\tau_0}{1-\tau_1}\right)} = \frac{\beta_1}{\ln\left(\frac{1-\tau_0}{1-\tau_1}\right)},$$

and the economic response elasticity is

$$e_r = \varepsilon_Y - e_{\tau}.$$

Justification for the empirical specification

- ▶ Assume that $\frac{dC}{C} = \frac{dR}{R}$ (verified by data), where C is the deduction and R is the revenue.
- ▶ Note that $Y = R - C - \rho$ (i.e., $R - C$ as an empirical proxy for $\pi(K)$).
- ▶ Assuming that the marginal tax rate is zero for firms to the left of the kink, then

$$\begin{aligned}\beta_1 &= d \log\left(\frac{Y}{R}\right) = \frac{dY}{Y} - \frac{dR}{R} \\ &= \frac{R}{Y} \frac{dR}{R} - \frac{C}{Y} \frac{dC}{C} - \frac{d\rho}{Y} - \frac{dR}{R} \\ &= \frac{R - C - Y}{Y} \frac{dR}{R} - \frac{d\rho}{Y} = -\frac{d\rho}{Y}\end{aligned}$$

where the last step follows from $R - C - Y = 0$ when marginal tax rate is equal to zero (the d is small deviation from a marginal tax rate of zero).

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Empirical proxies of theoretical constructs

- ▶ Data source: tax return data of C-corps.
- ▶ Profit, that is, π , is defined as *Net Income* less *Special Deductions*.
- ▶ Taxable income, that is, Y , is π less *NOL Deduction*.
- ▶ Based on sample distribution of taxable income, focus on the kink at taxable income of 0.

Estimating the change in income and the change in the net-of-effective tax rate

- ▶ Even though the kink of taxable income is at 0, firms have different kinks of profit due to different amounts of NOLs carried forward. Use firms with similar (but not identical) NOLs carried forward as controls (Maydew 1997).
- ▶ Use simulations of future taxable income to estimate the change in expected tax rate (discounted using appropriate discount rates) left and right of the kinks.
- ▶ The paper finds that CETI estimate using actual tax return data and marginal tax rate is much larger (9.1% decrease of taxable income in response to a 10% increase in expected marginal tax rate) and majority (about two-thirds) of the responses comes from accounting responses.

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- ▶ An elegant model of tax avoidance that combines the real and accounting distortions of corporate taxes.
- ▶ Separation of economics and accounting response is interesting.
- ▶ Attribution of all changes in (taxable) profit margin to accounting response seems too much and a possible overestimation of the contribution of accounting response.
- ▶ In addition, the independence of accounting response from economic response, a result of the model, may not be realistic (higher tax rate results in lower firm scale, lower profit for a firm of decreasing returns to scale, and thus perhaps a lower marginal benefit of avoiding taxes).
- ▶ Some further documentation of the difference regarding how small and large firms avoid taxes would be beneficial.