

Capital-tax incidence in the presence of monopoly

TheoryGuru applications

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Background

Obama administration economists Furman and Summers claimed that only a fraction of the revenue loss from a corporate-income tax cut benefits labor. But the standard supply and demand model says the opposite.

Summers, as well as Nobel Laureate Paul Krugman, rejected this result, asserting that it depends on “what share of corporate profits represents monopoly rents rather than returns to capital.”

But the presence of monopoly profits can strengthen the standard result, rather than weaken it. Here a machine proves the supply-demand result holds with imperfect competition, without assuming any functional form for the aggregate production function. What is special is how monopoly-rent seeking is situated in the model; this issue is discussed extensively here.

Setup

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Get@"http://economicreasoning.com"
```

Proof & Logic Tools 6.1

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Equilibrium

$$F[k, L] = L f\left[\frac{k}{L}\right]; (* \text{ homogeneous production function } *)$$

Equilibrium = { (* 1. long-run factor demands, distorted by market power *)

$$\begin{aligned} D[F[k, L], L] &= (1 + \mu) w, \\ (1 - \tau) (D[F[k, L], k] - \delta) &= (1 + \mu) \rho, \end{aligned}$$

(* 2. output price and aggregate labor each normalized to one.

Equilibrium rent-seeking costs.

Assume: no rent seeking attempting

to influence the treasury's use of the tax revenue. *)

$$w (1 - L) (* \text{ labor-intensive rent seeking costs } *) =$$

(* markup revenue *)

$$F[k, L] - w L - (\rho + \delta) k - \text{TaxRevenue};$$

Taxation

(* 3. tax formula: note that both L and 1-L are tax deductible *)

$$\text{TaxRevenue} = \tau (F[k, L] - w - \delta k);$$

$$\text{TaxExperiment} = \frac{d\rho}{d\tau} = \frac{d\delta}{d\tau} = \frac{d\mu}{d\tau} = 0$$

(* the tax does not affect the willingness to supply capital, the depreciation rate, or the markup rate *)

Sign conditions

$$\text{signconditions} = \{0 \leq \tau < 1, \delta > 0, \rho > 0, \mu \geq 0, k > 0, 0 < L \leq 1,$$

$$F[k, L] - w - \delta k > 0, w > 0,$$

$$f''\left[\frac{k}{L}\right] < 0\};$$

Interesting but unnecessary assumptions

$$\text{wrongsideoflaffercurve} = \frac{d\text{TaxRevenue}}{d\tau} \leq 0;$$

$$\text{PerfectCompetition} = \mu = 0;$$

$$\text{addedsignconditions} = \{f'\left[\frac{k}{L}\right] > 0, f\left[\frac{k}{L}\right] > 0\};$$

Assertion by Furman, Krugman, and Summers

$$\text{FurmanKrugmanSummersAssertion} = \frac{d(w + \text{TaxRevenue})}{d\tau} > 0;$$

(* the tax raises revenue more than it depresses labor income *)

Results: The Tax Reduces Labor Income More than It Raises Revenue

$$\text{TheoryGuru}\left[\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium}, \text{signconditions}, \text{TaxExperiment}\right\},\right.$$

$\text{FurmanKrugmanSummersAssertion}$

False

False means there is not even a special case in which FurmanKrugmanSummersAssertion is True.

“Perfect competition” case

$$\text{TheoryGuru}\left[\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium}, \text{signconditions}, \text{TaxExperiment}, \text{PerfectCompetition}\right\},\right.$$

$$\left.\frac{d(w + \text{TaxRevenue})}{d\tau} \leq 0\right]$$

True

The equality case occurs only in the neighborhood of zero tax

$$\text{TheoryGuru}\left[\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium}, \text{signconditions}, \text{TaxExperiment}, \text{PerfectCompetition}\right\},\right.$$

$$\left.\text{SameSign}\left[\frac{d(w + \text{TaxRevenue})}{d\tau}, -\tau\right]\right]$$

True

Imperfect competition case

TheoryGuru[$\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium, signconditions, TaxExperiment, Not[PerfectCompetition]}\right\},$

$$\frac{d(w + \text{TaxRevenue})}{d\tau} < 0]$$

True

Note that the result is stronger with imperfect competition: there is no equality case to deal with.

In this model, the corporate tax may either increase or decrease rent-seeking activity

RentSeekingActivity = 1 - L;

TheoryGuru[$\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium, signconditions, TaxExperiment, Not[PerfectCompetition]}\right\},$

$$\frac{d\text{RentSeekingActivity}}{d\tau} \geq 0]$$

True for some, False for others

TheoryGuru[$\left\{\frac{d\text{Equilibrium}}{d\tau}, \text{Equilibrium, signconditions, TaxExperiment, Not[PerfectCompetition], Not[wrongsideoflaffercurve], addedsignconditions}\right\},$

$$\frac{d\text{RentSeekingActivity}}{d\tau} \geq 0]$$

True for some, False for others

The tax increases the profit share

$$\text{ProfitShare} = \frac{F[k, L] - wL - (\rho + \delta)k - \text{TaxRevenue}}{F[k, L]};$$

```
TheoryGuru[{ $\frac{d\text{Equilibrium}}{d\tau}$ , Equilibrium, signconditions,  
TaxExperiment, Not@PerfectCompetition},
```

```
 $\frac{d\text{ProfitShare}}{d\tau} > 0]$ 
```

```
True
```

Variable interpretations