Public Economics
Tax distorsions

I. Ortuño

2015

Distorsions

- AGZ 2.1. and Stiglitz. pg 488, and notes in Aula Global

Distorsions

- Why do taxes create inefficiencies?
- Competitive Equilibrium -$>$ Eficient allocation of resources (FFTWE).
- Consumers and produces -$>$ same prices
- Tax-$>$ consumer's price diiferent from producer's price

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$
- Prices (constant): p_x, p_y. Wage: w (Frontier of production possibilities-$>$ linear function. In the notes we have a more general model)

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$
- Prices (constant): p_x, p_y. Wage: w (Frontier of production possibilities-$>$ linear function. In the notes we have a more general model)
- Tax function: $T(x, y, l)$

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$
- Prices (constant): p_x, p_y. Wage: w (Frontier of production possibilities-$>$ linear function. In the notes we have a more general model)
- Tax function: $T(x, y, l)$
- The agent solves:

$$Max_{x,y,l} \; U(x, y, 1 - l)$$

$$\text{s.t.} \qquad p_x l + p_y y = wl - T(x, y, l)$$

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$
- Prices (constant): p_x, p_y. Wage: w (Frontier of production possibilities-$>$ linear function. In the notes we have a more general model)
- Tax function: $T(x, y, l)$
- The agent solves:

$$Max_{x,y,l} \; U(x, y, 1 - l)$$
$$\text{s.t.} \qquad p_x l + p_y y = wl - T(x, y, l)$$

- Comment: Where is the tax revenue?

Basic Model

- Consumption goods x and y. Leisure h.Labor $l = 1 - h$
- Utility: $U(x, y, h)$
- Prices (constant): p_x, p_y. Wage: w (Frontier of production possibilities-$>$ linear function. In the notes we have a more general model)
- Tax function: $T(x, y, l)$
- The agent solves:

$$Max_{x,y,l}\ U(x, y, 1 - l)$$
$$\text{s.t.} \qquad p_x l + p_y y = wl - T(x, y, l)$$

- Comment: Where is the tax revenue?
- We obtain the same results if such revenue is included

Basic model

- FFTWE -> Pareto efficient conditions (draw a figure to see it)

$$RMS_{xy} = \frac{p_x}{p_y} = RMT_{xy} \quad (1)$$

$$RMS_{hx} = \frac{w}{p_x} = RMT_{hx} \quad (2)$$

$$RMS_{hy} = \frac{w}{p_y} = RMT_{hy} \quad (3)$$

Lump-sum tax

- A lump-sum tax is
$$T(x, y, l) = T$$

Lump-sum tax

- A lump-sum tax is

$$T(x, y, l) = T$$

- The above conditions are satisfied

Lump-sum tax

- A lump-sum tax is
$$T(x, y, l) = T$$
- The above conditions are satisfied
- This is an efficient tax.

Excise tax

- $T(x, y, l) = t_x p_x x$

Excise tax

- $T(x, y, l) = t_x p_x x$
- Budget constraint:

$$(1 + t_x)p_x x + p_y y = wl$$

Excise tax

- $T(x, y, l) = t_x p_x x$
- Budget constraint:

$$(1 + t_x)p_x x + p_y y = wl$$

- The new equiluibrium is given by:

$$\begin{aligned} RMS_{xy} &= \frac{p_x(1+t_x)}{p_y} \neq \frac{p_x}{p_y} = RMT_{xy} \\ RMS_{hx} &= \frac{w}{p_x(1+t_x)} \neq \frac{w}{p_x} = RMT_{hx} \end{aligned}$$

Excise tax

- It doesn't affect the marginal cost of production. It creates a distorsion on consumption
- The consumer will reduce x and increase y and h.

Tax on consumption

- $T(x, y, l) = t_c(p_x x + p_y y)$

Tax on consumption

- $T(x, y, l) = t_c(p_x x + p_y y)$
- The new budget constraint:

$$(1 + t_c)(p_x x + p_y y) = wl$$

Tax on consumption

- $T(x, y, l) = t_c(p_x x + p_y y)$
- The new budget constraint:

$$(1 + t_c)(p_x x + p_y y) = wl$$

- The equilibrium is given by (1) and

$$\begin{aligned} RMS_{hx} &= \frac{w}{(1+t_c)p_x} \neq \frac{w}{p_x} = RMT_{hx} \\ RMS_{hy} &= \frac{w}{(1+t_c)p_y} \neq \frac{w}{p_y} = RMT_{hy} \end{aligned}$$

Tax on consumption

- $T(x,y,l) = t_c(p_x x + p_y y)$
- The new budget constraint:

$$(1+t_c)(p_x x + p_y y) = wl$$

- The equilibrium is given by (1) and

$$\begin{aligned} RMS_{hx} &= \frac{w}{(1+t_c)p_x} \neq \frac{w}{p_x} = RMT_{hx} \\ RMS_{hy} &= \frac{w}{(1+t_c)p_y} \neq \frac{w}{p_y} = RMT_{hy} \end{aligned}$$

- Leisure is not taxed -> taxation creates a welfare inefficiency

A tax on labour income

- $T(x, y, l) = t_w wl$

A tax on labour income

- $T(x, y, l) = t_w wl$
- The budget constraint:

$$p_x x + p_y y = (1 - t_w) wl$$

A tax on labour income

- $T(x, y, l) = t_w wl$
- The budget constraint:

$$p_x x + p_y y = (1 - t_w) wl$$

- The new equilibrium is given by (1) and

$$RMS_{hx} = \frac{w(1-t_w)}{p_x} \neq \frac{w}{p_x} = RMT_{hx}$$
$$RMS_{hy} = \frac{w(1-t_w)}{p_y} \neq \frac{w}{p_y} = RMT_{hy}$$

A tax on labour income

- $T(x, y, l) = t_w wl$
- The budget constraint:

$$p_x x + p_y y = (1 - t_w) wl$$

- The new equilibrium is given by (1) and

$$\begin{aligned} RMS_{hx} &= \frac{w(1-t_w)}{p_x} \neq \frac{w}{p_x} = RMT_{hx} \\ RMS_{hy} &= \frac{w(1-t_w)}{p_y} \neq \frac{w}{p_y} = RMT_{hy} \end{aligned}$$

- This is equivalent to a general tax on consumption.

A tax on labour income

- $T(x, y, l) = t_w wl$
- The budget constraint:

$$p_x x + p_y y = (1 - t_w)wl$$

- The new equilibrium is given by (1) and

$$RMS_{hx} = \frac{w(1-t_w)}{p_x} \neq \frac{w}{p_x} = RMT_{hx}$$
$$RMS_{hy} = \frac{w(1-t_w)}{p_y} \neq \frac{w}{p_y} = RMT_{hy}$$

- This is equivalent to a general tax on consumption.
- Only labor income; no savings -> t_c is equivalent to $t_w = t_c/(1+t_c)$

Production inefficiencies

- Two production sectors x and y.

Production inefficiencies

- Two production sectors x and y.
- L_i, K_i : labor and capital in sector $i, i = x, y$.

Production inefficiencies

- Two production sectors x and y.
- L_i, K_i : labor and capital in sector $i, i = x, y$.
- Perfect competiton without taxation: factor price= marginal productivity

Production inefficiencies

- Two production sectors x and y.
- L_i, K_i : labor and capital in sector $i, i = x, y$.
- Perfect competiton without taxation: factor price= marginal productivity
- The equilibrium condition with efficient allocation of capital and labor:

$$RMTS^x_{KL} = \frac{r}{w} = RMTS^y_{KL}$$

Production inefficiencies

- Suppose a tax on wages on sector x, t_{wx}, (the tax is paid by the firms in sector x)

$$RMTS^x_{KL} = \frac{r}{w(1+t_{wx})} \neq \frac{r}{w} = RMTS^y_{KL}$$

Production inefficiencies

- Suppose a tax on wages on sector x, t_{wx}, (the tax is paid by the firms in sector x)

$$RMTS^{x}_{KL} = \frac{r}{w(1+t_{wx})} \neq \frac{r}{w} = RMTS^{y}_{KL}$$

- -> ineffecient allocation

Production inefficiencies

- Suppose a tax on wages on sector x, t_{wx}, (the tax is paid by the firms in sector x)

$$RMTS_{KL}^{x} = \frac{r}{w(1 + t_{wx})} \neq \frac{r}{w} = RMTS_{KL}^{y}$$

- -$>$ ineffecient allocation
- What about a general tax on wages?

Production inefficiencies

- Suppose a tax on wages on sector x, t_{wx}, (the tax is paid by the firms in sector x)

$$RMTS^{x}_{KL} = \frac{r}{w(1 + t_{wx})} \neq \frac{r}{w} = RMTS^{y}_{KL}$$

- -> ineffecient allocation
- What about a general tax on wages?
- No ineffiecienies in production (make sure you see it).

Production inefficiencies

- Suppose a tax on wages on sector x, t_{wx}, (the tax is paid by the firms in sector x)

$$RMTS^{x}_{KL} = \frac{r}{w(1 + t_{wx})} \neq \frac{r}{w} = RMTS^{y}_{KL}$$

- -> ineffecient allocation
- What about a general tax on wages?
- No inefficienies in production (make sure you see it).
- But we still have distorsions in comsumption

Notes in "aula global"

- Two consumption goods,x and y.
- One production factor l.
- Two firms

$$\begin{aligned} X^s &= F_k(l_x) \\ Y^s &= F_y(l_y) \end{aligned}$$

- Fixed labor supplu l^*
- Consumer $U(x, y)$
- Frontier of possibilities of production: $y = T(x)$
- $MRT(x, y)$
- $MRS(x, y)$

Notes in "aula global"

- One can prove the following

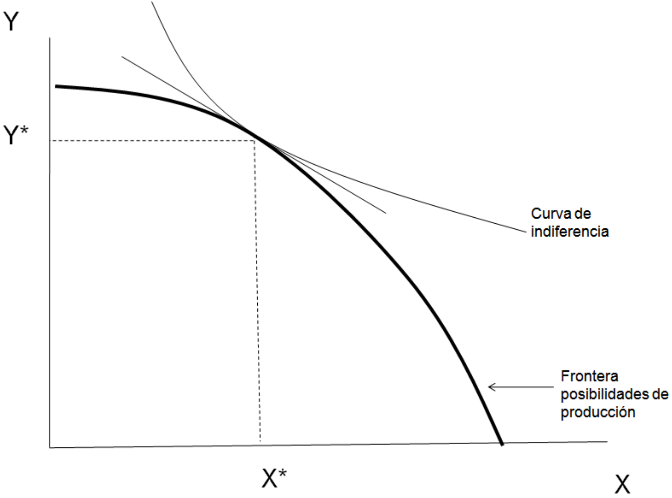
Theorem

If the allocation $\{(x^D, y^D), (x^S, l_x), (y^S, l_y)\}$ *is effcient,then*

$$\begin{aligned} l_x + l_y &= l^* \\ x^D &= x^S \\ y^D &= y^S \\ MRS_{x,y}(x^D, y^D) &= MRT_{x,y}(x^S, y^S) \end{aligned}$$

Theorem

If $[(p_x, p_y, w), \{(x^D, y^D), (x^S, l_x), (y^S, l_y)\}]$ *is a competitive equilibrium, then the allocation* $\{(x^D, y^D), (x^S, l_x), (y^S, l_y)\}$ *is effcient.*


Y
Y*
Curva de
indiferencia
Frontera
posibilidades de
producción
X*
X