Subject: Public finance
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Topic: Partial Equilibrium Analysis Efficiency
M.A. Economics (2nd Semester)

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Partial Equilibrium Incidence

▶ Two goods: x and y

  ▶ Government levies an excise tax on good x

    ▶ DEF: excise taxes are levied on a quantity (gallon, pack, ton, ...). Typically fixed in nominal terms (therefore subject to declines in real terms)

    ▶ DEF: ad-valorem taxes are a fraction of prices (e.g. sales tax), marked automatically to inflation.

▶ Let p denote the pre-tax price of x and $q = p + t$ denote the tax inclusive price of x.(statutory incidence is on demander)

▶ Good y, the numeraire, is untaxed.

Partial Equilibrium Incidence

▶ Consumer has wealth Z and has utility u(x, y).

▶ Price-taking firms use c(S) units of the numeraire y to produce S units of x (Cost function is c(S) and is expressed in units of the numeraire).

  ▶ The marginal cost of production is weakly increasing: $c'(S) > 0$ and $c''(S) \geq 0$.

  ▶ The representative firm's profit at pre-tax price p and level of supply S is p(S)-c(S).

  ▶ Assuming that firms optimize perfectly, the supply function for good x is implicitly defined by the marginal condition $p = c'(S(p))$.

       (price=marginal cost)

Partial Equilibrium Incidence

▶ Equilibrium condition: Q = S(p) = D(p + t) defines an equation p(t).

▶ We want to characterize dp/dt - effect of a tax increase on price, which determines who bears effective burden of tax.

▶ Fully differentiating equilibrium condition w.r.t. t and solving for dp/dt

gives
$$\text{dp/dt} = \frac{\frac{\partial D}{\partial p}}{(\frac{\partial S}{\partial p} - \frac{\partial D}{\partial p})}$$
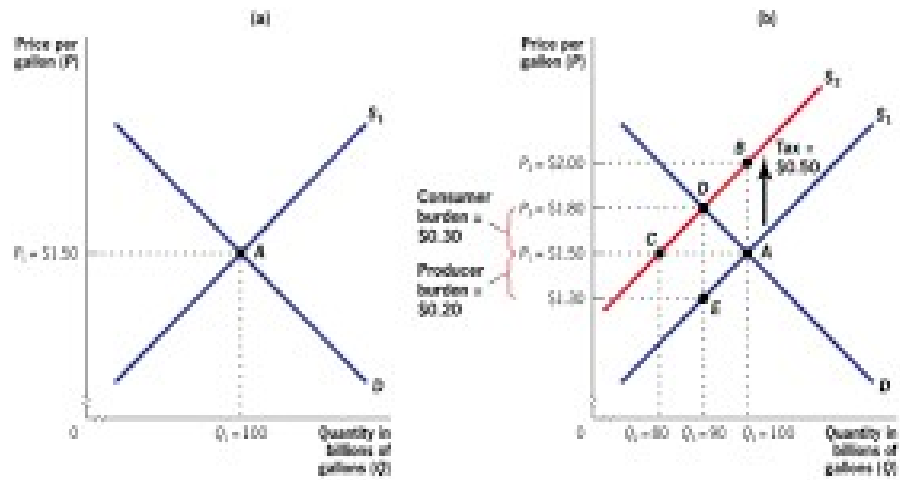
Partial Equilibrium Incidence

▶ Converting partial equilibrium result to elasticities (handy since independent of scaling)

▶ Elasticity: percentage change in quantity when price changes by one percent

  ▶ $\varepsilon D = \frac{\partial D}{\partial p}$ q/D(p) denotes the price elasticity of demand.

    ➢ (consumer faces q = p + t)

  ▶ $\varepsilon S = \frac{\partial S}{\partial p}$ q/S(p) denotes the price elasticity of supply.

    ▶ dp/dt = εD/(εD – εS)

▶ Note: -1< dp/dt < 0 and dq/dt = 1 + dp/dt

Partial Equilibrium Incidence

- Examples:
  - Figure 1: Tax Levied on Producers (Gruber)

Partial Equilibrium Incidence

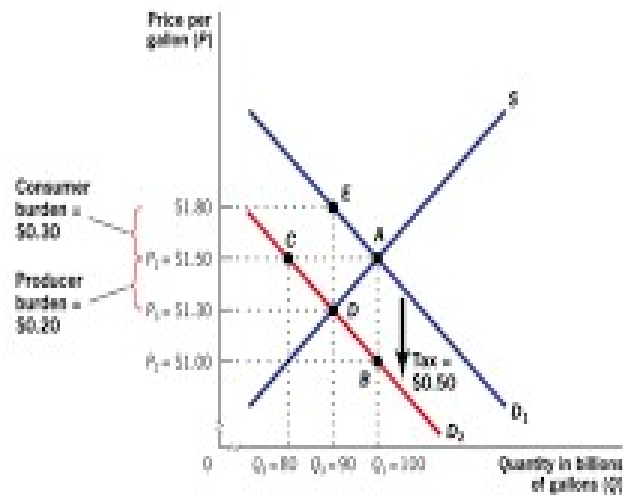▶ Examples

  ▶ Figure 2: Tax Levied on Consumers (Gruber)

Figure : (Gruber) Tax Levied on Consumers

Partial Equilibrium Incidence

- dp/dt = εD/(εD – εS)

- When do consumers bear the entire burden of the tax?

  - εD = 0 [inelastic demand]

    - ❖ example: short run demand for gas (need to drive to work)

  - εS = ¥ [perfectly elastic supply]

    - ❖ example: perfectly competitive industry

- When do producers bear the entire burden of the tax?

  - εS = 0 [inelastic supply]

    - ❖ example: fixed quantity supplied (housing)

  - εD = -∞ [perfectly elastic demand]

    - ❖ example: there is a close substitute, and demand shifts to this substitute if price changes.

Partial Equilibrium Incidence

▶ key intuitions:

   ▶ 1 statutory incidence not equal to economic incidence

   ▶ 2 equilibrium is independent of who nominally pays the tax

   ▶ 3 more inelastic factor bears more of the tax

▶ These are robust conclusions that hold with more complicated models

▶ Extensions to partial equilibrium incidence:

   ▶ Standard analysis assumes prices and taxes affect demand in the same way: $dx/dt = dx/dp$. Chetty, Looney & Kroft (AER 2008) generalize theory to allow for salience effects. We will talk about this paper later.

   ▶ Market rigidities: Suppose there is a minimum or maximum price: then former analysis may not be correct.

      ▶ Example: minimum wage. Social security taxes 7.5% on employer and 7.5% on employee. In principle the share of each should not matter as long as total is constant but minimum wage is computed on net wage (gross wage - employer tax = net wage + employee tax).

Partial Equilibrium Incidence

▶ Extensions to partial equilibrium incidence (continued):

  ▶ Imperfect competition such as monopoly (Salanie book). Possible to get an increase in after-tax price bigger than the level of the tax. Ad valorem and excise taxation are no longer equivalent.

  ▶ Ignores effects on other markets:

    ▶ Example: Suppose tax on cigarettes increases, if people substitute cigarettes for cigars then price of cigars increases and part of the burden is shifted to the cigar market and cigarette demand curves will move.

    ▶ Revenue effects on other markets: tax increases, I am poorer, I have less to spend on other markets.

    ▶ For small, narrow markets such as cigarettes, partial eq. analysis is a reasonable approximation (although effects on substitutes could be important).