

# Microeconomic Theory I

## 6. Aggregation. Partial Equilibrium. Taxation

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**Aggregation: the representative consumer**

## Representative Consumer (as in Macro)

- Macroeconomists typically assume the existence of a **representative consumer**: it is possible to analyze the aggregate economy treating all the different consumers in the economy as **one average consumer** or one aggregate consumer.
- Question: When is this approach valid?
- Answer: rarely.

### Example

- There are two consumers,  $A$  and  $B$ , who face the same prices and  $w$ , i.e. they have the same budget constraint.
- There is a price change and both consumers are rational.
- On the other hand, the average consumer may violate WARP

# Representative Consumer (done properly)

- Question: when does a rational representative consumer exist?

## Definition

**Representative consumer:**

$$X(p, \sum_j w_j) = \sum_j x_j(p, w_j)$$

$j$ : the number of people

- Note: the representative consumer's demand shouldn't depend on how wealth is distributed.
- If everyone's demand changes but total wealth remains constant, the representative consumer's demand should not change

# Representative Consumer (done properly)

- Take a disturbance vector such as  $dw = \begin{bmatrix} \varepsilon \\ -\varepsilon \\ \vdots \\ -2\varepsilon \end{bmatrix}$  with  $\sum_j dw_j = 0$
- $\forall$  good  $l$

$$\sum_j \frac{\partial x_{lj}(p, w_j)}{\partial w_j} dw_j = 0$$

- This should be true for every disturbance vector!

$$\Rightarrow \frac{\partial x_{lj}(p, w_j)}{\partial w_j} = \frac{\partial x_{li}(p, w_i)}{\partial w_i}$$

- The two Engel's curve have the same slope.
- But we know that  $x_{lj}(p, 0) = x_{li}(p, 0) = 0$ : Engel's curve and IEP are identical across all consumers.

# Representative Consumer (done properly)

$$\frac{\partial X_I(p, \Sigma w)}{\partial w_i} = \frac{\partial x_{li}(p, w_i)}{\partial w_i}$$

$$\Downarrow$$

$$\frac{\partial X_I(p, \Sigma w)}{\partial w_i} = \frac{\partial x_{lj}(p, w_j)}{\partial w_j} = \frac{\partial x_{li}(p, w_i)}{\partial w_i}$$

$$\frac{\partial^2 X_I(p, \Sigma w)}{\partial w_i^2} = \frac{\partial^2 x_{li}(p, w_i)}{\partial w_i^2} = 0$$

- Engel's curve and IEPs are all identical *straight lines*

# Representative Consumer (done properly)

## Claim

Engel's curves and IEP are identical straight lines if and only if all consumers have the same homothetic utility function.

- $g$  is homothetic if I can write  $g(x) = f(t(x))$ , where  $f$  is strictly increasing and  $t(x)$  is  $O^1$
- For homothetic utility,

$$x \sim x' \Rightarrow 2x \sim 2x'$$

- if at  $p, w$  the agent chooses  $x(p, w)$ , if wealth doubles we have  $x(p, 2w) = 2x(p, w) \Rightarrow$  IEP and Engel's curves are straight lines.
- The reverse is also true ...

# Representative Consumer (done properly)

## Conclusion

$X(p, \sum_j w_j) = \sum_j x_j(p, w_j) \iff$  preferences are homothetic and identical

- This is a very restrictive condition



**Aggregation: market equilibrium for 1 good**

# Partial equilibrium

## Definition

The market of good  $l$  is in equilibrium if the aggregate demand for  $l$  equals the aggregate supply of  $l$ .

- **Partial Equilibrium analysis:** find the  $p_l$  such that the demand for  $l$  equates the supply for  $l$ , **ignoring the effect of changes in  $p_l$  on all the other markets.**
- Correct if all utility functions are quasilinear and we have an interior solution,
  - why?

# Partial equilibrium

- Consumer Surplus: area below the demand curve and above the price line.
- Producer Surplus: area above the supply curve and below the price line.
- Claim: the equilibrium price maximizes total surplus.
- Taxes, Price floors, price ceiling decrease welfare by creating a **dead weight loss**

# The effect of taxation

- Who pays the tax?
  - HINT: not the side who mails the check to the government
- Claim: the side whose function is more **inelastic** around  $p^*$  pays **more**
- Example:  $D$  perfectly inelastic
  - Consumers pay the whole tax
  - No dead weight loss. Why?