Can We Induce Truthful Reporting of Individual Valuation?

Ram Singh

Lecture 10

August 19, 2015

Land Assembly Context I

Suppose

- there are 100 parcels - of possible different sizes
- there are 100 individual owners - each owner has one parcel
- utility of land for the owner i is given by

$$U_i(L_i, x_i),$$

where L_i is the size of his parcel, and x_i is his money endowment.

Let, v_i^* solve

$$U_i(L_i, x_i) = U_i(0, x_i + v_i), i.e.,$$

- v_i^* denotes the valuation (monetary worth of land) for the owner $i = 1, ..., 100$.
- v_i^* is privately known to the owner

Second Best Mechanism I

Mechanism is

- an auction with three sides - the owners, the buyers and an intermediary
- announcement of individual share α_i of the potential sales prices; $\alpha_i > 0$ and $\sum_{i=1}^{i=100} \alpha_i = 1$
- a reserve price $\bar{r}$,

Question

- will owners participate in auction and report truthfully?
- will bidders participate and report truthfully?
- will the land transfer be efficient - (Pareto or K-H)?

Second Best Mechanism II

Owners:

- report their individual valuation of the own land, say v_i.
- reports are made to the Intermediary - who Does Not disclose them at any time

Buyers/Bidders:

- submit their privately known valuation of all 100 parcels combined.
- reports are made to the Intermediary - who Does Not disclose them at any time

Intermediary:

- Receive all reports
- Determines the reserve price
- Allows sales iff second highest bid is greater than the reserve price

Second Best Mechanism III

Let $\bar{r} = \max\{r_i\}$ denote the reserve price; $r_i = \frac{v_i}{\alpha_i}$, i.e.,

$$\bar{r} = \max\{r_i\} = \max\left\{\frac{v_i}{\alpha_i}\right\},$$

where v_i is the reported individual value by the owner i.
i will be called pivotal if

$$r_i = \bar{r}$$

If sale happens:

- the highest bidder gets land and pays total amount P, which is the second highes bid
- each owner gets $\alpha_i \times P$
- Note: $P \geq \bar{r}$

Second Best Mechanism IV

Buyers/Bidder' behaviour:

- Auction is Second-price Vickrey auction
- Participation is incentive compatible and reporting is truthful. Why?

Given Bidder' behaviour, Owners' behaviour:

- Participation is incentive compatible. Why?
- Reporting is truthful. Why?

Recall, $r_i = \frac{v_i}{\alpha_i}$. Let $r_i^* = \frac{v_i^*}{\alpha_i}$.

Misreporting by owner i can potentially be beneficial

- if it affects the sale decision or the price P,
- that is, when i turns out to be pivotal

Second Best Mechanism V

Consider Over-reporting, i.e., $r_i^* < r_i$. If i is pivotal, and

- $r_i^* < r_i = \bar{r} < w_2^* < w_1^*$ no effect on decision and price $P = w_2^*$
- $r_i^* < w_2^* < r_i = \bar{r} < w_1^*$ no sale takes place. i's payoff
  - $U_i(L_i, x_i)$ from misreporting
  - $U_i(0, x_i + \alpha_i P) = U_i(0, x_i + \alpha_i w_2^*)$ if truthful reporting
- Note: $r_i^* < w_2^* \Rightarrow [\frac{v_i^*}{\alpha_i} < w_2^*]$, i.e.,

$$U_i(0, x_i + \alpha_i w_2^*) > U_i(0, x_i + v_i^*)$$

Note: The above mechanism

- Respects property rights
- Allows a sale only if it is Pareto superior to status quo
- Balances the budget

Second Best Mechanism VI

Question

Do all efficient sale happen under the above mechanism?

Other Limitations:

- Bidding by Buyers may not be competitive
- If α_is are not proportional to v_i^*s, there will be too little sales
- Disproportional α_is will reduce frequency of efficient sales