Eminent Domain: Compensation and Incetives

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Lecture 3-4

July 29, 2015

Efficient Outcome ? I

Let

- $C(x) = \bar{C}$ be the Compensation paid by the G to the O; $C'(x) = 0$

Suppose, the G will acquire land iff $B \geq m\bar{C}$. So, acquisition set

$$AS(x) = \{B | B > m\bar{C}\}$$

Now, the owner will choose x, to solve

$$\max_x \left\{ \int_0^{m\bar{C}} V(x) f(B) dB + \int_{m\bar{C}}^{\bar{B}} \bar{C} f(B) dB + \int_{m\bar{C}}^{\bar{B}} [b - t] f(B) dB - x \right\}$$

That is, O solves:

$$\max_x \left\{ F(m\bar{C}) V(x) + (1 - F(m\bar{C})) \bar{C} + \int_{m\bar{C}}^{\bar{B}} [b - t] f(B) dB - x \right\}, i.e.,$$

Efficient Outcome ? II

x^{FC} solves

$$F(m\bar{C})V'(x) - 1 = 0.$$

Suppose:

- $C = V(x^*) = V^*$, where x^* is the FB level of x.

Now, we get

$$AS(x) = \{B|B > mC = mV(x^*)\}.$$

That is, O solves:

$$\max_x \left\{ F(mV(x^*))V(x) + (1 - F(mV(x^*)))V(x^*) + \int_{mV(x^*)}^{\bar{B}} [b - t]f(B)dB - x \right\}, i$$

x^{FC} solves

$$F(mV(x^*))V'(x) - 1 = 0.$$

That is, the O will make FB choice of x.

Efficient Outcome ? III

Suppose:

- $C = 0$. But
- The G will acquire land iff $B > mV(x^*)$

Now, we get

$$AS(x) = \{B | B > mV(x^*)\}.$$

O will solve:

$$\max_x \left\{ F(mV(x^*))V(x) + (1 - F(mV(x^*)))0 + \int_{mV(x^*)}^{\bar{B}} [b - t]f(B)dB - x \right\}, i.e.,$$

Again, O will choose x to solve

$$F(mV(x^*))V'(x) - 1 = 0.$$

That is, $x^{FC} = x^*$.

Incentives for the Govt I

Let

- G provide several public goods for a population of n individuals
- m parcels/acres are needed
- per-person benefit from the public goods is $b(m)$; such that $b'(m) > 0$, $b''(m) < 0$.
- $\pi(m)$ be the probability that land of an owner will NOT be required; $\pi'(m) < 0$
- $1 - \pi(m)$ be the probability that land of an owner will be required;

Incentives for the Govt II

TWO Possible interpretations of m:

- There are n identical individuals in the society, and m is number of randomly chosen owners whose land will be acquired. In this case

$$1 - \pi(m) = \frac{m}{n}$$

- m is the total number of land parcels needed for all public goods. There is uncertainty about location of projects.
- In either case, $\pi'(m) < 0$ holds.

We assume:

- $\pi(m)$ is the same across all individuals.

First Best I

Note: At date $t = 2$, G should acquire m acres iff

$$nb(m) > mV(x)$$

So, given x, opted by the owner, the G should chose m that solves:

$$\max_{m}\{nb(m) - mV(x)\}$$

That is, m^*, solves

$$nb'(m) - V(x) = 0 \tag{1}$$

Assumptions: At $t = 1$, each owner takes the following as given

- m chosen by the G
- x opted by the other owners

First Best II

For given m, the owners should choose x to solve

$$\max_x \{b(m) + \pi(m)V(x) - x\}, \textit{i.e.},$$

$$\pi(m)V'(x) - 1 = 0. \tag{2}$$

Let m^* and x^* solve (1) and (2), simultaneously.
Assume $m^* > 0$ and $x^* > 0$.

Question

What is the sign of $\frac{\partial x^*}{\partial m}$, where x^* solves (2)?

Question

Is the assumption about behaviour of owners plausible?

Outcome Under Eminent Domain I

Let

- $C(x)$ be the Compensation paid by the G to the O, if land is acquired
- t be the lump sum tax per-person to finance the public goods.

Given x opted by the owners, and given the compensation rule $C(x)$, suppose G will acquire m acres iff

$$nb(m) > mC(x)$$

In that case, for given x opted by the owners, the G will solve:

$$\max_{m}\{nb(m) - mC(x)\}$$

That is, m^{SB}, solves

$$nb'(m) - C(x) = 0 \tag{3}$$

Outcome Under Eminent Domain II

Taking m as given, the owners will choose x to solve

$$\max_x \{\pi(m)V(x) + (1 - \pi(m))C(x) + b(m) - t - x\}, i.e.,$$

$$\pi(m)V'(x) + (1 - \pi(m))C'(x) - 1 = 0. \tag{4}$$

CASE 1: $C(x) = V(x)$:
In this case, the owners will choose x that solves

$$V'(x) - 1 = 0. \tag{5}$$

That is,

- the govt will choose $m^*(x)$
- however, x opted by the owners will be excessive, i.e., $x > x^*$.

Outcome Under Eminent Domain III

CASE 2: $C(x) = \bar{C}$, where $\bar{C} \geq 0$ is a constant.
In this case,

- Given x, opted by the owner, the G will solve

$$\max_m \{nb(m) - m\bar{C}\}, i.e.,$$

m^{SB} will solve

$$nb'(m) - \bar{C} = 0$$

Outcome Under Eminent Domain IV

- however, the owners will choose x to solve

$$\max_x \{\pi(m)V(x) + (1-\pi(m))\bar{C} + b(m) - T - x\}, i.e.,$$

$$\pi(m)V'(x) - 1 = 0.$$

Question

Is there a trade-off between higher (ex-post) full compensation and incentives of O and G?

Question

What will be outcome if $\bar{C} = V(x^*)$?