4th problem set due 5/25/06

(v_i, Z_i) characteristics of an individual
summarized by v_i.

Let $V_i = \{v_i : v_i$ is feasible for $i\}$

$U_i(z|v_i) = U_i(z : z \in Z_i(v_i))$

v_i becomes the strategic choice you are making.

$\mathbb{V} = (v_1, \dots, v_n)$ strategy n-tuple

When V_i is finite, this reduces to a simple normal form game.

Everyone chooses $\mathbb{V} = (v_1, \dots, v_n)$

$\Rightarrow \ell(\mathbb{V}) \subset \{1, \dots, \ell\}$, the commodities that can be traded

$\Rightarrow \mathbb{R}^{\ell(\mathbb{V})}$ is the relevant commodity space

Each individual has a v_i, $Z_i(\mathbb{V})$ where $Z_i(\mathbb{V}) = Z_i(v_i) \cap \mathbb{R}^{\ell(\mathbb{V})}$

$\mathbb{V} \Rightarrow \ell(\mathbb{V}), p(\mathbb{V}) \Rightarrow v_i^*(p(\mathbb{V})) \equiv \pi_i(\mathbb{V})$

ie choosing strategies $\mathbb{V}$ determines payoffs $\pi_i(\mathbb{V})$

"How can you affect me? You have to work through the price system."

Note: $v_i^*(p(\mathbb{V})) = \max\{v_i(z) - p(\mathbb{V})z : z \in Z_i(\mathbb{V})\}$

Define $V = V_1 \times \dots \times V_n$, $\mathbb{V} \in V$

Defn: $\mathbb{V}$ is an occupational equilibrium if

$\pi_i(\mathbb{V}) \geq \pi_i(\mathbb{V}_{-i}, v_i') \;\; \forall v_i' \in V_i \;\; \forall i$.

Efficiency:

Define the maximum gains from trade in $\mathcal{V}$ as

$$g(\mathcal{V}) = \max_{(z_i)} \left\{ \sum_{i=1}^{n} v_i(z_i) : z_i \in Z_i(\mathcal{V}), \sum_{i=1}^{n} z_i = 0 \right\}$$

- given $\mathcal{V}$, this is an efficient allocation of resources.

But now that we can alter $\mathcal{V}$, the definition of efficiency becomes

$$\max\{g(\mathcal{V}) : \mathcal{V} \in V\}$$

- This tells us which commodities to produce.

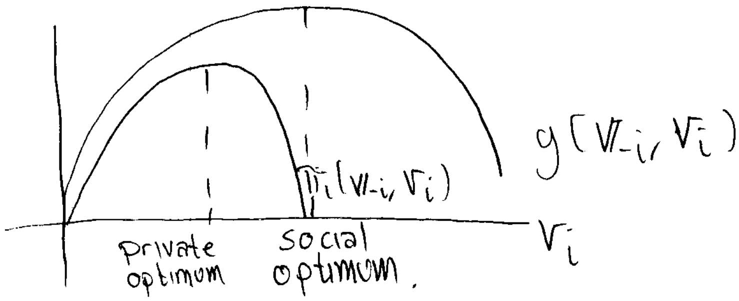
Defn: $\Delta\pi_i(\mathcal{V}; v_i') \equiv \pi_i(\mathcal{V}_{-i}, v_i') - \pi_i(\mathcal{V})$ is the private benefit to i of switching from v_i to v_i'.

Defn: $\Delta g(\mathcal{V}; v_i') \equiv g(\mathcal{V}_{-i}, v_i') - g(\mathcal{V})$ is the social benefit of i switching from v_i to v_i'.

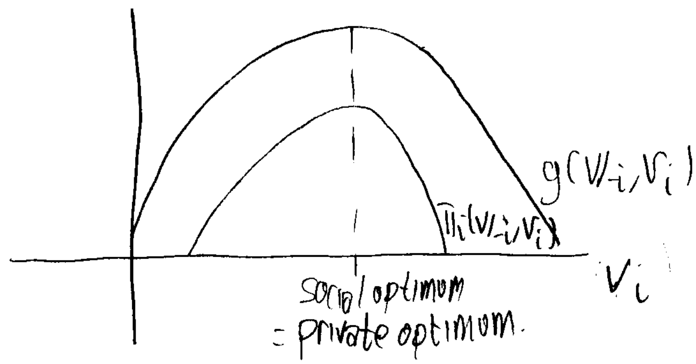
Suppose $\Delta\pi_i(\mathcal{V}; v_i') \cdot \Delta g(\mathcal{V}; v_i') < 0$.

- Private and social incentives are not properly aligned. Private benefit goes in the opposite direction as social benefit.
- If this is the case, we will probably not have an efficient outcome.

We want $\Delta\pi_i(\mathcal{V}; v_i') \cdot \Delta g(\mathcal{V}; v_i') \geq 0$



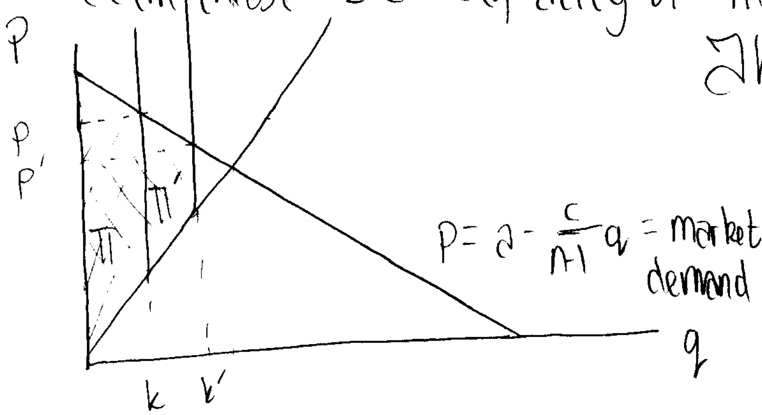
Suppose we have
- This is a "good" reward system necessary for efficiency.



$$v_b(z_b) = a z_b - \frac{1}{2} c z_b^2 \qquad z_b \geq 0 \qquad n-1 \text{ of these people}$$

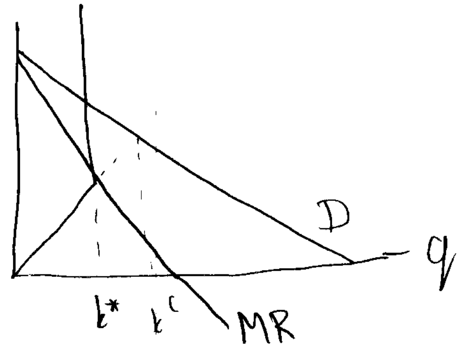
$$v_s^k(z_s) = -\frac{1}{2} z_s^2 \qquad z_s \in [-k, 0] \qquad 1 \text{ of these people}$$

(can choose the capacity of his plant)



The seller can choose his cost function.
- The seller is the only person with a strategic capacity

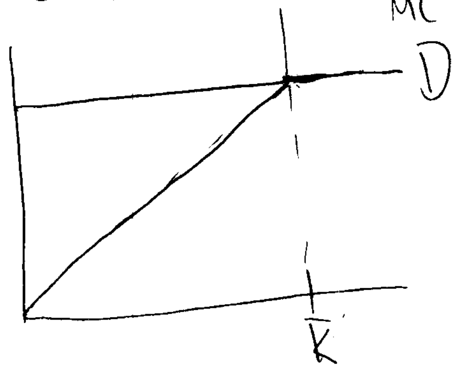
The seller will look at the marginal revenue curve and choose $k = k^*$



The monopolist <u>should</u> have chosen $k^c > k^*$.

The problem with monopoly is that $\Delta \pi_i(v; v_i') \Delta g(v; v_i') < 0$.
- The incentives are not properly aligned.

Suppose instead we have that demanders have perfectly elastic demand.



Then the seller will optimally choose $k = \bar{k}$, which is the social optimum.

Thus, perfect elasticity of demand leads to alignment of private and social incentives.
$\Delta\pi_i(v;v_i') \cdot \Delta g(v;v_i') \geq 0$.

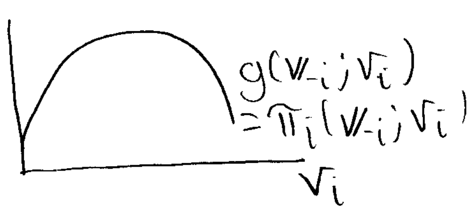
Hayek: markets work precisely because there is massive amounts of incomplete information.

In the above cases, we have that $p(v) \neq p(v_{-i}, v_i)$

- Individuals <u>can</u> affect prices. In price-taking interpretation, we say that prices preceed maximization. $p \longrightarrow v_i^*(p)$
- Here, we are taking a step back and allowing maximization to preceed prices: $v \rightarrow p(v) \rightarrow v_i^*(p(v))$

If $p(v_{-i}, v_i') = p(v)$ $\forall v_i' \in V_i$, then i is a <u>perfect competitor</u>.

<u>Defn</u>: If $\forall v, \forall i, \forall v_i' \in V_i$, $\Delta\pi_i(v;v_i') = \Delta g(v;v_i')$, then we have <u>full appropriation</u>.



We can achieve this only when $\sum_{i=1}^{n} MP_i(v) = g(v) \ \forall v \in V$.
or when there are no externalities.

- a monopolist produces positive externalities and thus underproduces.

FA implies that OE satisfies a necessary condition for efficiency: $\Delta g(v; v_i') \leq 0 \ \forall \ v_i' \in V \ \forall i$.

- any one person change in strategic choice will not increase social gains.
- individual by individual, everyone is doing the right thing.

FA is not sufficient, though. We also need that $\Delta g(v; v') \leq 0 \ \forall \ v' \in V$.

- Consider the innovation example.
- We start out with a market for every commodity in the standard PT model. This rules out these coordination failures.