The Social Value of Expertise

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Questions

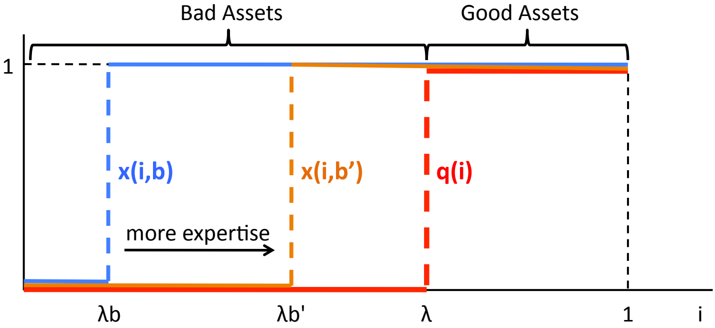
- How to think about expertise in financial markets
  - Rent-seeking vs. value-creation
  - "Are too many smart people going to Wall Street?"

- Expertise $\equiv$ ability to evaluate assets
  1. Competitive equilibrium in lemons market with heterogeneous expertise
  2. Compare private vs social value of expertise

The Economy

- Assets $i \in [0,1]$ pay $q(i)$ at $t = 2$
  - $q(i) = \mathbb{I}(i > \lambda)$
  - Fraction λ are "lemons"
- Buyers b
  - Preferences $u(c_1, c_2) = c_1 + c_2$
  - Endowment: $w(b)$ of goods at $t = 1$
- Sellers v
  - Preferences $u(c_1, c_2, v) = c_1 + \beta(v) \cdot c_2$. $\beta(v)$ increasing w.l.o.g.
  - Endowment: 1 unit of each possible asset
- Information:
  - Sellers: know i and therefore $q(i)$
  - Buyer b: observes signal $x(i,b) = \mathbb{I}(i > b\lambda)$ but not index i
  - b exogenous for now; later: incentive to increase b

Expertise



Markets

- A large set of "markets" m. A market specifies
  - the price at which assets trade
  - "clearing algorithm" for assigning assets to buyers. Sellers may get rationed

- Sellers choose which assets to supply in each market
  - No exclusivity

- Buyers choose which markets to buy from
  - Impose an *acceptance rule*

$$\chi(i) : I \to \{0,1\}$$

s.t.

$$\chi(i) = \chi(i') \quad \text{whenever} \quad x(i,b) = x(i',b)$$

  - $\chi(i) = 1$ means "I am willing to accept asset i in this market"

Clearing Algorithms: Example

i	$q(i)$	$\chi(i)$ of buyer 1	$\chi(i)$ of buyer 2	$S(i)$
Black	0	0	0	1.5
Red	0	1	0	1.5
Green	1	1	1	1.5

- Option 1: buyer 1 picks first (at random)

i	Buyer 1 gets	Buyer 2 gets	Prob of selling
Black	0	0	0
Red	0.5	0	$\frac{1}{3}$
Green	0.5	1	1

- Option 2: buyer 2 picks first (at random)

i	Buyer 1 gets	Buyer 2 gets	Prob of selling
Black	0	0	0
Red	0.75	0	$\frac{1}{2}$
Green	0.25	1	$\frac{5}{6}$

Equilibrium

- Define each possible {price,algorithm} as a separate market
- Sellers:
  - choose what markets (if any) to offer their assets in
  - take as given the probability of selling each asset in each market
- Buyers
  - choose what markets to buy from and what acceptance rules to impose
  - take as given the distribution of assets they'll get in each market with each rule
- Allocation: in each market
  - probability of selling each asset
  - distribution of assets for each acceptance rule
  - result from applying clearing algorithm to supply and demand

Equilibrium Characterization

- Markets:
  - All trades take place in the same market
  - Clearing algorithm: "less-restrictive-first"
- Sellers:
  - Try to sell all bad assets
  - Try to sell good assets iff

$$\beta(v) \leq p^* \Rightarrow \text{defines cutoff } v^*$$

- Buyers:
  - Impose rule

$$\chi(i,b) = x(i,b)$$

  - Only participate if sufficiently expert $(b \geq b^*)$
- Trades
  - All good assets offered do get sold
  - Bad assets get rationed depending on how many active buyers they mislead

Equilibrium Characterization

1. Indifference for buyer b^*
   - Accepts all good assets. Measure: $v^*(1-\lambda)$
   - Accepts bad assets that look good: $i \in [\lambda b^*, \lambda]$. Measure: $\lambda(1-b^*)$
   - Indifference:

$$p^* = \frac{v^*(1-\lambda)}{v^*(1-\lambda)+\lambda(1-b^*)} \tag{1}$$

2. Indifference for seller v^*

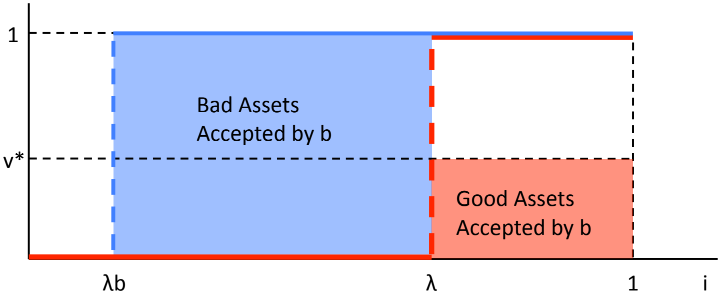
$$p^* = \beta(v) \tag{2}$$

3. Good assets get sold
   - Good assets bought by buyer b:

$$\frac{w(b)}{p^*}\frac{v^*(1-\lambda)}{v^*(1-\lambda)+\lambda(1-b)}$$

   - If good assets are all sold:

$$\int_{b^*}^{1} \frac{w(b)}{p^*}\frac{v^*(1-\lambda)}{v^*(1-\lambda)+\lambda(1-b)}db = v^*(1-\lambda) \tag{3}$$


1
v*
Bad Assets
Accepted by b
Good Assets
Accepted by b
λb
λ
1
i

Welfare Exercise

- Take $w(b)$ (welath/expertise distribution) as given
- Consider single buyer with 1 unit of wealth and expertise b
- Compute marginal value of increasing expertise to b'
  - Marignal private value
  - Marginal social surplus
- For any cost-of-expertise function, efficiency depends on private vs. social

Private Value

- Utility of buyer b:

$$U = \frac{1}{p^*}\left[\frac{v^*(1-\lambda)}{v^*(1-\lambda)+\lambda(1-b)} - p^*\right]$$

- Marginal value of expertise:

$$\frac{\partial U}{\partial b} = \frac{1}{p^*}\frac{\lambda(1-\lambda)v^*}{[(1-\lambda)v^* + \lambda(1-b)]^2}$$

Social Value

- Social surplus

$$S = (1-\lambda)\int_0^{v^*}[1-\beta(v)]\,dv$$

- Marginal social value of expertise

$$\frac{\partial S}{\partial b} = (1-\lambda)(1-\beta(v))\frac{\partial v^*}{\partial b}$$

- Effects of more expertise ($\frac{\partial v^*}{\partial b}$):
  - buy more good assets and fewer bad assets
  - $\Rightarrow$ (If nothing were to adjust) good assets run out
  - $\Rightarrow$ Higher equilibrium price (and marginal buyers withdraw)
  - $\Rightarrow$ Marginal sellers sell assets
- Computing:

$$\frac{\partial v^*}{\partial b} = \frac{\lambda(1-\lambda)v^*}{\left[\begin{array}{c} w(b^*)\left[[(1-\lambda)v^*+\lambda(1-b^*)]\beta'(v^*) - \frac{\lambda(1-\lambda)(1-b^*)}{(1-\lambda)v^*+\lambda(1-b^*)}\right] \\ +\lambda(1-\lambda)v^*\beta'(v^*)+\lambda(1-\lambda)v^*\int_{b^*}^{1} w(b)\frac{(1-\lambda)}{[(1-\lambda)v^*+\lambda(1-b)]^2}db \end{array}\right]}\frac{\lambda}{[(1-\lambda)v^*+\lambda(1-b)]^2}$$

Comparison of Private and Social Value

- Ratio of private to social value:

$$\frac{\frac{\partial S}{\partial b}}{\frac{\partial U}{\partial b}} = \frac{p^*(1-p^*)}{\left[\begin{array}{c} w(b^*)\left[\left[\frac{v^*}{\lambda}+\frac{1-b^*}{1-\lambda}\right]\beta'(v^*)-\frac{(1-b^*)}{(1-\lambda)v^*+\lambda(1-b^*)}\right] \\ +v^*\beta'(v^*)+v^*\int_{b^*}^{1} w(b)\frac{(1-\lambda)}{[(1-\lambda)v^*+\lambda(1-b)]^2}db \end{array}\right]}$$

- Social value is relatively high when:
  1. $\beta'(v^*)$ is low
     - ★ Many marginal sellers
  2. $w(b^*)$ is low
     - ★ Expertise of marginal buyer very sensitive
  3. p^* away from 0 or 1
     - ★ $p^* \approx 1$: marginal trades create little surplus
     - ★ $p^* \approx 0$: large private return to expertise
- The ratio $\frac{\frac{\partial S}{\partial b}}{\frac{\partial U}{\partial b}}$ does not depend on b
  - (Same for semi-experts and super-experts)