Asymmetric Information: Adverse Selection and Moral Hazard
Asymmetric Information

- asymmetric information or incomplete information
- adverse selection: life insurance
- moral hazard: car insurance, fire insurance
- “hidden information” versus “hidden action”
The Market for Lemons

- an object (a used car) with value
  \[ v \sim \mathcal{U} [0, 1] \]
  is offered by the seller (based on Akerlof (1970))
- valuations are for seller
  \[ u_s = \theta_s v \]
  and for buyer
  \[ u_b = \theta_b v \]
  with
  \[ \theta_b > \theta_s \]
• suppose value of object, say quality $\theta$, is complete information
• if trade occurs for object with value $\theta$ at price $p$ then the net utility is 
  $$p, \quad \theta_b v - p$$
• if trade does not occur then net utility is 
  $$\theta_s v, \quad 0$$
• in consequence trading is always pareto-optimal and as trade has to be voluntary
  $$\theta_s v \leq p \leq \theta_b v$$
Incomplete Information

- suppose value of object, say quality $\theta$, is only known to the seller
- by contrast, buyer only knows prior distribution $\theta \sim U[0, 1]
- we ask is there a price at which trade occurs
- suppose at a price $p$ trade would occur, what properties would the price have to induce trade?
Trade under Incomplete Information

• seller sells if

\[ \theta_s v \leq p \]

and thus by selling the object he *signals* that

\[ v \leq \frac{p}{\theta_s} \]  (1)

• buyer buys the object if

\[ \theta_b \mathbb{E}[v] \geq p \]  (2)

• he knows that (1) has to hold, he forms a conditional expectation, that

\[ \theta_b \mathbb{E}[v | p] \geq p \iff \theta_b \frac{p}{2\theta_s} \geq p \]  (3)
Market Failure under Incomplete Information

- thus for the sale to occur
  \[ \theta_b \geq 2\theta_s. \]
- thus unless, the tastes differ substantially, the market breaks down completely
- market mechanism in which a lower prices increases sales fails to work as lowering the price decreases the average quality, lower price is “bad news”.
- market may not disappear but display lower volume of transaction than socially optimal
• a continuum of identical consumers:

\[ u = \theta \nu - p \]

• the monopolist can provide low and high quality:

\[ \nu = \{0, 1\} \]

at cost

\[ 0 < c_0 < c_1. \]
the monopolist selects price and quality simultaneously
assume that
\[ \theta > c_1 \]
so that it is socially efficient to produce the high quality good
Incomplete Information

- assume that the consumers do not observe quality before purchasing
- claim: an equilibrium in which the monopolist sells and provides high quality cannot exist
• some consumers are informed about the quality of the product, say a fraction $\alpha$
• if the informed consumers are buying then the uninformed consumer are buying as well
• when is the seller better off to sell to both segments of the market:
  $$p - c_1 \geq (1 - \alpha) (p - c_0)$$
  or
  $$\alpha p \geq c_1 - (1 - \alpha) c_0$$
we can then make two observations
high quality is supplied only if price is sufficiently high, “high price can signal high quality”.
a higher fraction, $\alpha$, of informed consumers favors efficiency as it prevents the monopolist from cutting quality
the informational externality favors government intervention as individuals only take private benefit and cost into account.
• we considered “hidden information” or “hidden action” models
• asymmetry in information may reduce or end trade completely
• in contrast to the canonical model of goods, i.e. “search goods”, where we assert the quality by inspection
• we considered “experience goods”, where the quality can only be ascertained after the purchase
• the situation is only further acerbated with “credence goods”
there is room for a third party, government or other institution, to induce pareto improvement

an improvement in the symmetry of information lead to an improvement in the efficiency of the resulting allocation

look for optimal or equilibrium arrangements to reduce the asymmetry in information, either through:

- costly signalling
- contracting to avoid moral hazard, or
- information extraction through a menu of contract (i.e. mechanism design).