LXIV. Introduction: some market implications of imperfect and costly information

A. The same sorts of informational problems that affect decisions within the firm also affect consumer decisions to shop, firm decisions to enter or exit markets, and even the kind of markets that tend to exist. Although the text book version of the perfectly competitive model neglects the economic impact of information and transactions costs on the operation of open market economies, this is largely a consequence of various abstractions made to facilitate analysis. Many aspects of transactions and information costs can be analyzed within the neoclassical optimizing framework.

B. It is worth mentioning that information problems have long been subjects of analysis by economists. For example, F. A. Hayek's "The Use of Knowledge in Society," (AER, 1945) argues the fundamental problem that an economy must solve is "how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. Or to put it briefly, it is a problem of the utilization of knowledge which is not given to anyone in its totality."

  i. Solving informational aspects of "the coordination problem" played an important role in the Austrian critique of central planning (Von Mises).

  ii. The possibility of manipulating information costs in order to induce "fiscal illusion" played a role in the Italian school of public finance (Puvianni).

C. An early modern attempt to think about the effects of information on markets was the work of George Stigler: "The Economics of Information" (JPE, 1961).

  i. He argued that people economize on price information, and that because of that the law of one price does not hold in all markets. People gather price information only up to the point where the expected marginal benefit from further search equals the marginal cost of further search.

  ii. The marginal benefit in Stigler's model is a lower price for the units of a good that consumers plan to purchase. The extent to which additional search pays varies with the *variance* of the price distribution.

  iii. Note that one variable that affects the savings that can be obtained via gathering price information is the *variance* of the distribution of price information. The greater the initial price variance of a distribution with a given mean, the smaller the sample MINIMUM tends to be, and consequently the more money one can save by searching (by increasing one's sample size).

  iv. On the other hand, *the more people search the smaller* the price variance tends to be.

  v. Thus the equilibrium price distribution (centered about the "true" equilibrium price) is the result of equilibrium search levels.

D. This equilibrium can be modeled as a Nash Game, where players independently select search levels which in turn determine the variance of the price distribution.

  i. $U = u(X,Y)$ where $W = P_x X + P_y Y + S_x C_x + S_y C_y$ where;

  ii. $P_y^{min} \sim p_y(S_y, V_y)$ and $P_x^{min} \sim p_x(S_x, V_x)$

  iii. Individual's take the market price distribution as given, but jointly their efforts determine the variance of that distribution. $V_y = v(\Sigma S_y)$ and $V_x = u(\Sigma S_x)$.

  iv. [Characterize the individual optimization problem, and the Nash/market equilibrium of this market. See Notes. What variables determine how much you search in which market? Discuss]

  v. [Note that too little information may be gathered in equilibrium. Why?]

LXV. Affects of Uncertainty on Market Structure: Akerlof's "Lemon's Problem"

A. Individuals may be uncertain about the quality of goods that can be purchased in markets, but have an idea about the quality distribution that they face.

B. Akerlof's "The Market for Lemons: Quality Uncertainty and the Market Mechanism" (QJE, 1970) argues that in some cases, uncertainty about quality may cause some markets to disappear. The reasoning goes as follows:

  i. Suppose that prior to purchase buyers can not distinguish the quality level of, say, some brand of used cars. But, sellers know the quality of the car from personal experience.

  ii. In this case, the amount that a buyer is prepared to pay for a car (his reservation price) is based on the expected or average quality of the cars that are for sale.

  iii. Consequently owners of superior cars sell at "a loss" while owners of below average cars sell at "a profit."

  iv. In some cases, the owners of superior cars will simply withhold them from the market.

  v. This of course reduces the average quality of automobiles, which lowers the price consumers are willing to pay. This price adjustment causes more "cream puff" owners to withhold their cars from the market, and so on.

  vi. In the limit some markets may disappear entirely. In other cases, some market segments may disappear--e.g. markets for "cream puffs" will disappear.

  vii. Akerlof's analysis is one explanation for the big price difference between new and late model used cars. New cars become much less valuable "used cars" the moment they are driven from the lot.

  viii. [How might auto dealers attempt to deal with this problem? Would warrantees help? What would limit the extent to which warranties could be used to address this problem? Is there a moral hazard problem here?]

LXVI. Informational Competition: Signaling Games

A. Of course in real markets firms try to tell consumers about the quality of their merchandise and about their prices. If such information can be "filtered" by consumers, subsidized information may reduce many of the above information problems.

B. Spence's "Market Signaling" (Harvard U Press, 1974) analyzes the kinds of "signals" people may use.

i. For example, individuals may invest in expensive college degrees to signal their talent, firms may spend money on advertising to signal their confidence in the quality or low price of their goods and services.

ii. Spence's most provocative finding is that there may be an infinite number of signaling equilibria, although this is not a necessary consequence of signaling games.

C. The essential signaling game can be represented as a non-cooperative game with a Nash equilibrium.

i. Consider a simple version where two firms compete to capture a group of customers who are initially indifferent between the two firms because the expected price difference equals the transactions cost of shopping at the two stores.

ii. If information (advertising) can be used to change the price or quality expectations of this group it will pay both firms to attempt to do so.

iii. [Note that the result may be that too much information will be provided by these firms.]

iv. [Nelson has argued that advertising expenditures can be used by consumers as a proxy for the confidence that they have in the appeal of their product in the case where purchasers learn the quality of products *ex post*. Does this make sense?]

D. The signaling model may be combined with a "screening model" where a some natural or designed process sorts out people by ability or signals.

E. In public economics and public choice, the problem of securing unbiased information about personal costs and benefits (via surveys) faces the problem that individuals will "strategically signal" their costs and benefits if they expect those signals to influence the level of public services or taxes burdens. Tullock and Tideman (JPE, 1976) develop a clever tax system to solve the "preference revelation problem."

LXVII. Affects of Transactions Costs on Substitution and Prices

A. Any sort of transactions cost gives firm owners some degree of monopoly power, which might be exploited in the manner predicted in ordinary monopoly models.

B. To see this, "add" a transactions cost distribution to the demand curve faced by an other wise competitive firm.

i. Suppose that consumers are indifferent between the products of several l stores, as assumed in ordinary competitive models.

ii. Now assume that each consumer faces a somewhat different transactions cost.

iii. Consumers may differ in their willingness to pay for products at various stores, even if the *product* to be bought is identical. Consumers may have different "reference stores," different information about alternative places to shop, or different opportunity costs for shopping at an alternative store. (At a minimum, stores and consumers clearly have a unique locations, so the opportunity cost of driving to the next farthest store will differ.)

iv. Note that if one adds transactions costs--arranged from high cost of switching to low cost of switching consumers--to a "horizontal" competitive firm demand curve

one creates a downward sloping demand curve for each firm. [E. G., now the "competitive" firm's demand is $T(Q) + P^*$ rather than P^*.]

v. The usual calculus of monopoly pricing and output can now be applied. [What does such an analysis imply about pricing? Can such an argument be used to explain the existence of monopolistic competition?]

LXVIII. Monopolistic Price Competition and Competition in the Limit

A. Many of these informational problems imply that firms will have some degree of monopoly power. Yet, if there is free entry, competitive forces may still lead to approximately competitive results.

B. To see this consider the following linear model of monopolistic competition.

i. Suppose that firms in a market face a single inverse demand curve: $P = A - bQ$

ii. Further suppose that output can be produced using a constant returns to scale technology so that $C = cQ$

iii. Given any output level by other firms in the market, say Q_o, the remaining firm can choose his output to maximize his profits by including the effect of his output on the prevailing market price.

iv. Maximizing $\Pi = Q (A - b(Q_o+Q)) - cQ$ requires Q^* such that $A - b Q_o - 2bQ^* = c$

v. If there are N identical firms in the market, in equilibrium $Q_o = (N-1)Q^*$

vi. Consequently, a Nash equilibrium occurs when all firms produce such that
$$A - b(N-1) Q^* - 2bQ^* = c \quad or \quad Q^* = (A - C) / (N+1)b$$

vii. Note that total industry output is $NQ^* = (N/N+1) (A-C)/b$

viii. In the limit, as N approaches infinity industry output and price approaches that of the perfectly competitive market, e. g. where $c = a - bQ$.

ix. [What does this simple model imply about profits and output by each firm as entry occurs? Are their any natural limits entry?]

LXIX. Questions/Homework

A. Consider the purchase of lottery tickets. First, characterize an M person equilibrium where the prize is amount Z and the probability that "person i" wins the prize is $P = (N_i/N)$ where N is total ticket sales, and tickets cost C dollars each. Assume that all purchasers are risk neutral. What would determine the maximum number of persons who would purchase lottery tickets? Now suppose that there is a tax of 50% on lottery ticket sales. How would this affect your result? What would be the tax revenue maximizing tax rate on lottery tickets?

B. Articulate and mathematically develop an Akerlof "lemons model" of the market for motor oil. Explain the various market and non-market methods that can be or could have been used to reduce this particular lemons problem.