

Symposium on Economics of Information: Introduction

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Most of the papers in this symposium were presented at a conference on the economics of information held at Stanford in April 1975, under the auspices of the National Science Foundation—National Bureau of Economic Research (four of the papers, those by Heal, Salop, Spence and Stiglitz, had been submitted to the Review earlier, but because of the similarity of topic, are published with the conference papers).

The papers, though all related to the problems arising from costly information, are diverse both with respect to the question addressed, the techniques of analysis employed and the particular markets investigated.

A basic theme running through most of the papers is that imperfect information alters, in a fundamental way, the conventional notion of a market, with buyers and sellers coming together to trade; in a full information equilibrium there is a single price, markets clear and all individuals and firms view themselves as price takers. The price charged is independent of the quantity purchased.

Although the notion of the market-place is often thought of as an idealization, even when there is not a single market-place at which all transactions occur, the economy behaves as if there were a single market-place; this will be true so long as there are some arbitrageurs to make sure that the “law of single price” prevails.

Finally, conventional theory has shown that under fairly weak conditions such a competitive equilibrium exists and is Pareto Optimal.

Recent developments in the economics of information, including the papers presented here, have shown that all of these statements are questionable. In the papers presented here, there is not a single price in equilibrium; firms do not act as price takers; prices do more than just clear markets—they convey information; prices charged may depend on the quantity purchased; competitive equilibrium may not exist and may not be Pareto Optimal. The basic character of how we ought to view the competitive economy is altered if we take seriously imperfections of information.

The papers in this symposium represent a major development in the state of the art even when compared to the papers presented at the 1973 Princeton Conference on the economics of information (the proceedings of which are published in [3], the *Quarterly Journal of Economics*, 1976). The papers in that symposium were primarily concerned with screening—the differentiation of individuals by abilities, riskiness, quit rates, etc.—in competitive markets; it was shown how, for instance, the choice of an insurance contract might reveal information about the individual's accident probability; or the choice of a job without a seniority salary structure might reveal information about the individual's propensity to quit; or the choice of the “speed of an assembly line” might reveal information about an individual's ability; or the amount an individual would be willing to borrow at a given interest rate might reveal information about the borrower's default probability. These are all examples of what has been called self-selection mechanisms. The papers in the *QJE* symposium not only established that competitive equilibrium might not exist but provided a characterization of competitive equilibrium (e.g. the price of insurance not being independent of the quantity purchased) when it did.

The first two papers of this symposium continue that line of research, extending it to non-competitive situations. The motivation for screening is different from that in the competitive economy and there may be a richer set of mechanisms for screening. Salop in his ingenious paper shows that under certain circumstances it would pay a firm to randomize its price, in order, in effect, to price discriminate against individuals with high search costs (if these individuals, say, have more inelastic demands). Stiglitz analyses the role of quantity discounts and premia and tied sales and bundling in screening by a monopolist; he argues that, as in the competitive situation, equilibrium will in general be characterized by non-linear price schedules. A detailed comparison with the competitive insurance market is also provided.

The next set of papers returns to the analysis of competitive markets. In markets with imperfect information prices may convey information. Assume, for instance, there are some individuals who know the size of the crop before others do; then the uninformed will observe that when the crop is going to be large (and the price next period accordingly will be low), the price in the future's market will reflect that. This, in fact, has traditionally been considered one of the important aspects of an efficient speculative market, but as Stiglitz [4] and Green [2] observed earlier this may raise serious problems for the existence of equilibrium (and the incentives for obtaining information). Grossman shows that only if future prices are "noisy", i.e. are not perfect predictors of next period's spot prices, can there be a futures market. The reason that there may not be a futures market for a particular commodity is not that there is too little information (too much risk) but that there is too much information. The conclusion—the impossibility of "perfect markets"—clearly raises fundamental problems.

A natural question to ask is, even if there is sufficient noise that prices do not perfectly convey information from the informed to the uninformed, will there necessarily be an equilibrium? Green's paper establishes that there may not be. (Several other examples of non-existence of competitive equilibrium in competitive markets with imperfect information have been noted; for a survey and interpretation, see Dasgupta and Maskin [1].)

Although there is a sense in which with imperfect information prices do more than is suggested by traditional theory—they convey information as well as clear markets—in another sense they do less; for with imperfect information, market equilibrium may be characterized by a price distribution rather than by a single price; thus the price system will fail to equate the marginal rates of substitution of different individuals; moreover, it is not the case (as has sometimes been suggested) that all that it takes is for there to be some well-informed (low search cost) individuals to make the market function well. High search cost individuals may have to pay high prices, even when there are low search cost individuals.

There are two different explanations of price distributions. The first is that, because of costly information, the market is imperfectly arbitrated, i.e. it does not adjust instantaneously and perfectly to outside disturbances. In the second set of explanation the "noise" is entirely endogenous. The two models of price distribution presented here (as well as the earlier model of Stiglitz [5]) are of this kind. In the Butters model advertising messages are distributed randomly; the individual goes to the store with the lowest price from which he obtains an advertisement. Firms which send out more advertisements are able to get some customers even if they charge a higher price; Butters is able to show that there exists an equilibrium price distribution where the additional cost of obtaining customers exactly offsets the additional price that they can charge.

In the Salop and Stiglitz paper it is the attempt to exploit the fact that it is costly to obtain information which leads firms to charge high prices. The firms which charge higher prices have higher average costs—because they sell to fewer customers—and again the additional costs precisely offset the higher price.

Both the Butters and Salop-Stiglitz papers can be thought of as questioning the usefulness of the concept of a "market-place" when there is imperfect information; firms act as price setters. There is still, of course, considerable interaction among the firms: the

sales of one firm depend quite critically on the actions of the other firms. The bidding process represents an alternative way in which prices are determined in markets with imperfect information. In open bidding the bid of one bidder conveys information to other bidders in much the same way that prices conveyed information in the study of Grossman discussed above. In closed bidding there is still some information contained in the actual process of winning the bid: for the winning bid, say for an oil lease, represents the most "optimistic" judgment about the quantity of oil and winning, therefore, conveys some information about one's judgment relative to that of other bidders. This needs to be taken into account in bidding. In the paper presented here Wilson provides an ingenious analysis of the competitive bidding process.

Information has value to the extent that it changes actions. The precise calculation of the value of information is not easy, particularly when the general equilibrium effects are taken into account. The Bradford-Kelejian paper describe one such set of calculations in an area of some policy importance (the value of weather forecasting). The Grossman-Kihlstrom-Mirman paper provides another and shows, in addition, that if there is some information acquired from the purchase of a commodity it will lead to an increased consumption of the commodity.

The papers discussed so far have primarily been concerned with the processes by which information is acquired and the consequences of this for the market equilibrium. The next two papers take the information structure as given but ask what implications the imperfect information has. Heal analyses the role of guarantees as a method of risk-sharing (say, when there is uncertainty about the quality of a commodity); he argues that there may be a tendency for excessive use of guarantees. Spence is concerned with the consequences of misperceptions on the part of consumers, and argues that guarantees are not sufficient to protect the consumer's interests.

The papers contained in this symposium as well as other on-going research in the economics of information have made it clear that, for at least certain important situations, the conventional full information paradigm is not even a good approximation; markets with even a little bit of imperfect information may look distinctly different from markets with perfect information. At the same time, there are undoubtedly situations where the traditional theory will suffice as a good approximation. The relative domains of the alternative theories remain a subject for discussion.

REFERENCES

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- [4] Stiglitz, J. E. "Perfect and Imperfect Capital Markets" (Paper presented to the Econometric Society Meetings, New Orleans, 1971).
- [5] Stiglitz, J. E. "Equilibrium Wage Distributions" (Cowles Foundation Discussion Paper, 1973).

