George J. Stigler

THE THEORY OF PRICE

third edition

THE THEORY OF PRICE

third edition

George J. Stigler

The University of Chicago

The Macmillan Company
Collier-Macmillan Limited, London

PRINTING 15 16 17 18 YEAR 6789

Earlier editions copyright 1942, 1946, 1952
by The Macmillan Company.

Library of Congress catalog card number: 66-19406

THE MACMILLAN COMPANY
866 THIRD AVENUE, NEW YORK, NEW YORK 10022
COLLIER-MACMILLAN CANADA, LTD., TORONTO, ONTARIO

Printed in the United States of America

Preface

Not only a man's ideas, but also his ways of expressing them, have a strong persistence over time, so it is possible for the statisticians to determine disputed authorship (as in the case of the *Federalist Papers*) by the pattern of words and the structure of sentences. I have rewritten the present edition almost completely, but I have no doubt that it is the same book, and by only a slightly different author. Its distinguishing feature continues to be its concentration upon the traditional central core of economic theory—the theory of value. I thank Sam Peltzman for helpful suggestions, Julius Schlotthauer and Richard West for doing much of the graphical work, and Claire Friedland for her assistance at every turn.

G. J. S.

Contents

chapter one

Introduction to Economic Analysis

A THEORY

Suppose a person wishes to buy a new automobile, and has decided upon the make, the body style, and the accessories that he desires. If now, in an excess of diligence, the buyer higgled with every dealer in a large city, he would encounter a considerable array of prices. In one such experiment in Chicago, thirty dealers offered prices for an identical automobile ranging from $2,350 to $2,515, with an average price of $2,436. Obviously the buyer would purchase at the lowest price, if the services of dealers were identical.

But this buyer was atypical and foolish. That he was atypical is a statement of fact, easier to believe than to prove. That he was foolish is an economic-statistical proposition: if shopping for low prices is not a sheer pleasure, the buyer will soon find that the probable savings from searching further do not compensate for the cost. To visit only thirty dealers requires at least two or three days; if we had chosen a hardware staple the number of dealers would have been in the hundreds and a full canvass would have required several weeks.

So the costs of semiexhaustive search (what of the suburbs?) would be high. The returns would show "diminishing returns"—the lowest price the buyer found would fall more slowly as he expanded the number of dealers canvassed. This is the statistical proposition, which need not be proved here, and is in any case plausible: as one canvasses additional dealers, the lowest price he finds will on average fall but each additional dealer is more likely to quote a higher price than the lowest price already encountered.

This is simple common sense, which the economist translates into the language:

> To maximize his utility, the buyer searches for additional prices until the expected saving from the purchase equals the cost of visiting one more dealer. Then he stops searching, and buys from the dealer who quotes the lowest price he has encountered.

That this rule maximizes utility may be shown, the economist says, by considering its failure. If the canvass of an additional seller will save more (on average) than the cost of the canvass, the buyer gains by making the search. Contrariwise, if the cost of a search exceeds the prospective gain, the buyer would gain by searching less. And here the trouble begins—for the noneconomist.

For, first of all, where did maximizing utility come from? The answer, which is that it came from experience with similar problems, will not satisfy a noneconomist. He will say that people typically do not maximize anything—that the consumer is lazy or dominated by advertisers or poor at arithmetic. And indeed there are consumers who not only suffer from these disabilities but are also downright confused. Why attribute to them the cold-blooded, logical approach of a well-built modern computer?

Second, what precisely is the cost of canvassing one more seller? All one had to do is drive over to another dealer and talk to him for a few minutes. How can a monetary value be placed upon these actions—which are pleasant for some people and distasteful to others?

Finally, does not the economist merely say, in language that is rather pretentious (when he does not use formidable mathematical symbols), that the buyer will visit as many dealers as he visits—no more, no less? The rule does not say whether he visits one or every seller.

This is a wholly typical economic theory and a wholly typical reaction to it. Since economics is still taught, we economists must have replies to these criticisms which we think are adequate. What are they? The basic reply, which is directed chiefly to the third complaint (that the theory merely says people do what they do), is that that the theory does more than this: it enables us to predict how consumers (and markets) will behave. Consider again the proposition:

To maximize his utility, the buyer searches for additional prices until the expected saving from the purchase equals the cost of visiting one more dealer. Then he stops searching, and buys from the dealer who quotes the lowest price he has encountered.

The cost of searching out one more price varies—it will be more with higgling than without, for example. But it will vary much less among commodities than the gain from a 1 per cent saving in price varies among commodities. On an automobile, 1 per cent is perhaps **$25**; on a washing machine 1 per cent is perhaps **$2**. So any person, the theory predicts, will search more for low prices when buying an automobile than when buying a washing machine. A person who enjoys shopping may visit 10 automobile dealers and three appliance stores; one who does not may visit three automobile dealers and one appliance store—but in each case the consumer will search longer before buying the automobile. This is a testable implication, and if the facts contradict the prediction, the theory underlying the proposition is wrong.

Again, since buyers will search more for low prices on commodities which take more of their income, any seller who quotes a price that is high relative to other sellers' prices will sell little—most buyers will search on to find a lower price. So the theory predicts that the range of prices of washing machines quoted in a city's retail outlets will vary more (relative to their average) than the prices of automobiles. This too is testable—and much less obvious than the first prediction.

Suppose we make the tests and find that the predictions of the theory are right. Then clearly the other two objections which were raised also lose their force. The consumer has indeed been acting "rationally"—which is another way of saying that he has been maximizing utility. (The reasons for introducing utility will be discussed in Chapter 4.) No doubt some silly people have even paid the higher price after canvassing two sellers, but the dominant tendency must have been to search to a degree governed by costs and expected returns, and act sensibly on the information, or the tests would not have been passed. The consumer must have been able to attach a workable meaning to costs, or the predictions would have been contradicted: the dispersion among sellers on prices of commodities like washing machines would have been as small as for automobiles.

Let us now actually test the theory. The standard statistical measure of relative dispersion is the coefficient of variation: the standard deviation of a group of observations divided by the average of the observations. One illustrative but real set of data for the second test may be given:

COMMODITY	AVERAGE PRICE	COEFFICIENT OF VARIATION
Automobile	$2,436.00	1.72%
Automatic Washing Machine	223.45	3.42

One other objection to this theory, of the many that can be contrived, now deserves notice. It may be said, that the facts were already known and all the economist has done is make out a fancy explanation for them. The answers are various. This objection is not factually correct: the theory was contrived first and the facts then sought. But it is not necessary for the reader (economist or non-economist) to decide whether I am telling the truth.[1] The real reply is that there are infinitely many sets of data that can be used to test the predictions. The reader can go out in his city and collect prices of automobiles and washing machines or (since this general theory applies to all homogeneous goods) prices of refrigerators and paring knives. There are many other testable predictions of the theory. So a competent scientist need not, and should not, accept theories (whether economic or physical) on faith.

And anyway, although a fancy theory is not so good as a simple one (more things can go wrong with the fancy one), a fancy theory is better than none. Let the reader try to contrive an alternative explanation of the fact that prices of washing machines vary relatively more than prices of automobiles. He may come up with a rule such as: the more expensive the commodity, the less its price varies, that seems to fit our facts—in fact it makes the same prediction. But quite aside from the fact that it has no logical basis, it will be wrong: the price of sugar varies much less than that of tea, although sugar costs less per pound. This is *not* a contradiction of our theory, which in a fuller version says that the aggregate amount spent on a commodity governs the amount of search.[2]

[1] The data are from two articles by Allen F. Jung, *Journal of Business* (October 1958 and January 1960).

[2] And also, in this fuller version, tells us over what time period the purchases should be added. See my "The Economics of Information," *Journal of Political Economy* (June 1961).

SCIENCE AS FICTION

A useful general rule, which is all that a scientific theory is, has two properties. First, it ought to be more or less true. Second, it ought to apply to a fairly large number of possible events. Most of the anguish that people have with scientific theories arises because these two conditions are moderately incompatible.

It is easy to make up empirically valid rules: for example, the Dow-Jones average always falls on January 25, 1960. It is even easier for a trained person to make up broad rules: for example, business declines always begin in odd-numbered years.[3] The combination of the two characteristics is more difficult to achieve.

Indeed the combination is, on a strict view, impossible. Every event, every situation to which a theory can be applied, must differ in a thousand respects from every other. Consider our proposition that consumers canvass more sellers for a lower price when their expenditures on the commodity are larger. Does this apply literally to an invalid, or to a man who wishes to buy something the morning after a 30-in. snowfall? Does it apply literally to the man who gets things "wholesale" from his brother-in-law, or to the young man and young lady who urgently seek the services of a justice of the peace? Or does it apply *equally* to the millionaire and the pauper seeking a cup of coffee or to the same man whether buying a meal on his own or on an expense account? Or to postage stamps?

Clearly a general theory must ignore a thousand detailed variations or it cannot possibly be general. Yet only general theories are useful. In fact general theories are the only useful theories even if they are to be used only once. Suppose, to use a reprehensible example, I embezzle a fortune with which I shall (1) engage in a bold speculation and (2) prosper and reimburse the bank or (3) spend my declining years in custody. I wish a theory of capital gains, whether from horse racing or roulette or futures in soybeans. If the "theory" I act on says only that soybean futures rise next week, there is no possible way to test its reliability in advance. But if the theory says that a particular inventory level relative to sales leads to a price rise, I can test it against a dozen previous instances and get some idea of its reliability.

[3] Such as 1837, 1873, 1907, 1929, 1937, and 1960.

For the scientist seeking to construct or improve a theory, this fact that theories cannot be "realistic" in the sense of being descriptive, is a source of endless charm and frustration. It inevitably poses the question: what common trait in the phenomena should be incorporated in the theory? Should we, to revert to the search for low prices, emphasize the nationality of consumers, their possession of automobiles, their years of formal education or—as we did—the amount they spend on the commodity?

The user of a theory has a simpler task: his is not to reason why, his is but to sigh and try. If the right element in the diverse situations has been isolated, the theory will work: it will yield predictions better than those which can be reached with any alternative theory.

Suppose the alternative theory is very poor: it may be, for example, that the amount of search for lower prices is a random event, normally distributed, and that it yields predictions which have hardly any relevance to the facts?[4] The answer is that it takes a theory to beat a theory: if there is a theory that is right 51 per cent of the time, it will be used until a better one comes along. (Theories that are right only 50 per cent of the time are less economical than coin-flipping.)

When we assume that consumers, acting with mathematical consistency, maximize utility, therefore, it is not proper to complain that men are much more complicated and diverse than that. So they are, but if this assumption yields a theory of behavior which agrees tolerably well with the facts, it must be used until a better theory comes along.

Economic theories are infinitely diverse in their predictive power. Entirely too many have zero predictive power—they are statements of tautologies. Thus, the statement that to maximize profits one should operate a firm where marginal revenue equals marginal cost is a mere mathematical theorem. Some theories have negative power: they predict the opposite of what happens (and then become useful in the hands of a sophisticated user). Thus the statement of a chancellor of the exchequer that the nation will never devalue the currency is a traditional prelude to devaluation. At the other

[4] Such simple alternatives—another is that whatever happened last time will happen next time—are called "naive" models, a terminology due to Milton Friedman.

extreme, the simple rule that people buy more of a thing at a lower than at a higher price is (properly used) a completely universal truth. The essence of scientific progress is to edge up this ladder from ignorance to knowledge, and it is complicated by the fact that the ladder keeps getting longer!

SOME APOLOGIES

The goal of the economist is not merely to train a new generation in his arcane mystery: it is to understand this economic world in which we live and the other ones which a million reformers of every description are imploring and haranguing us to adopt. This is an important and honorable goal.

It is not an easy goal, however, nor one which is now or ever will be fully achieved. A modern economic system is of extraordinary complexity. Imagine a three dimensional jig-saw puzzle, consisting of roughly 100 million parts. Some parts touch against, let us say, 1,000 other parts. (That is, each family deals with that many employers, banks, retail stores, domestic servants, and so on.) Other parts touch, let us be conservative, 50,000 other parts. (Firms that sell to retailers and buy from other firms and hire laborers, and so on.) It would be enough of a task to fit these 100 million pieces together, but the real difficulties have yet to be mentioned. The pieces change shape quite often—a family has twins, a firm does the next best thing and invents a new product. The economist has the interesting task of predicting (in the aggregate) each of these movements. Meanwhile a busy set of people—congressmen, members of regulatory bodies, central bankers, and the like—are changing the rules on who the jig-saw pieces will be and how they are shaped. And of course there are other jig-saw puzzles of comparable complexity, and these other puzzles (foreign economies) are connected at literally a million points with our puzzle.

This analogy is imperfect in many ways—for example, it suggests the fitting together of units of economic life when in fact it is the working together of parts (some sort of gigantic set of gears) that would be more appropriate. Its biggest deficiency is that it does not portray the fact that a change in the relation between two pieces will affect other pieces which touch neither of them: thus a change in wage rates in the steel industry will affect (through

a variety of economic relationships) the output of crude petroleum. Yet even with its deficiencies it may convey some sense of the complexity of a modern economic system.

The economist, and his brethern in the social sciences, have a second level of difficulty not shared by the physical sciences. Our main elements of analysis are people, and people who are influenced by the practices and policies we analyze. Imagine the problems of a chemist if he had to deal with molecules of oxygen, each of which was somewhat interested in whether it was joined in chemical bond to hydrogen. Some would hurry him along; others would cry shrilly for a federal program to drill wells for water instead; and several would blandly assure him that they were molecules of argon. And this chemist, who in analogy would also be a chemical element, could never be absolutely certain that he was treating other elements fairly. Several elements would hire their own chemists to protect their interests. We economists have always had the advantages and disadvantages of this lively participation by our "units of analysis."

It requires no special apologies, therefore, that many important economic phenomena cannot be explained, or explained only imperfectly. In this respect all sciences are alike. That some important and pervasive phenomena can be understood is sufficient justification for the set of theories and techniques which comprise modern economic analysis.

To a much greater degree than the other social sciences, economics has developed a formal and abstract and coherent corpus of theory. The standards of both logical precision and empirical evidence are steadily rising. Splendid as this trend is, it makes life no easier for the writer of a textbook. Adam Smith, the founder of the science, could (in his *Wealth of Nations*) write in these words about the immense increase in output achieved through division of labor in Western societies:

> if we examine, I say, all these things, and consider what a variety of labour is employed about each of them, we shall be sensible that without the assistance and co-operation of many thousands, the very meanest person in a civilized country could not be provided, even according to, what we very falsely imagine, the easy and simple manner in which he is commonly accommodated. Compared, indeed, with the more extravagant luxury of the great, his accommodation must no doubt appear extremely simple and easy; and yet it may be true, perhaps, that the accommodation of a Euro-

pean prince does not always so much exceed that of an industrious and frugal peasant, as the accommodation of the latter exceeds that of many an African king, the absolute master of the lives and liberties of ten thousand naked savages.

A modern economist who hopes to maintain the respect of his colleagues will rewrite this:

> The difference between the mean income of Habsburg males (1871–1917), not counting uniforms, and the mean income (after taxes) of farmers owning an equity of at least 10 per cent in a farm with no more than 12 hectares (11 in Bavaria), excluding dairy farmers, in 1907–15 was $1,800 (in 1914 dollars). The income of African tribal leaders, using the mean of Paasche and Laspeyres indexes (which diverge enormously) fell short of that of the farmers (in 1904–10) by $2,400 (but only $1,400 if we use Kuznets' estimate of the value of a second wife) in 1914 prices. The difference between the means of $1,800 and $2,400 is significant at the 3 per cent level. Incidentally, a tribal leader had an average of 10,000 (±721) members of the tribe in 1908, and they were clothed only by an average of 6.2 sq. in. of cotton bagging. [14 footnotes omitted.]

I will not say, and you would not believe, that this change is an unmixed blessing. It is an advance from the scientific viewpoint, however, and the example itself will serve to show this. My own version is pure fiction, but as soon as one starts to think of numbers it is obvious that Smith's statement was wrong. The income of a peasant family in Europe in 1776 (when Smith wrote) was surely less than (say) $500 of present-day dollars, and that of an African king was surely not less than zero; so Smith is asserting that princes had incomes less than $1,000. Even nonstatistical evidence sheds lavish doubt on this.[5]

[5] The following quotations—from W. H. Bruford, *Germany in the Eighteenth Century* (Cambridge, England: The University Press, 1935)—may serve:

On peasants he quotes several contemporaries: "The fields and the livestock provided the necessary food and clothing. . . . Women spun wool into coarse cloth; men tanned their own leather. Wealth only existed in its simplest forms. . . . From morning till night [the peasant] must be digging the fields, whether scorched by the sun or numbed by the cold. . . . The traveller comes to villages where children run about half-naked and call to every passer-by for alms. Their parents have scarcely a rag on their backs. . . . Their barns are empty and their cottages threaten to collapse in a heap any moment." (pp. 118–21)

One noble will do: "Graf Flemming, for instance, Generalfeldmarschall under Augustus the Strong, the soldier and diplomat who secured for his master the throne of Poland, . . . had [in 1722] about a hundred domestics

The corresponding illustration of the need for formal analytical methods to ensure reaching correct conclusions will be illustrated at many points in subsequent chapters. Here let us give a century-old statement of a theory that is still very popular:

> For the most part, [employers] so far accept the principle of "live and let live" as to be willing that their labourers should have any wages that will not sensibly encroach on their own profit. In fact, it is of little consequence to them how high the wages of labour may be, provided the price of the produce of labour be proportionably high. But if among many liberal employers there be one single niggard, the niggardliness of that single one may suffice to neutralise the liberality of all the rest. If one single employer succeed in screwing down wages below the rate previously current, his fellow-employers may have no alternative but to follow suit, or to see themselves undersold in the produce market.[6]

The first sentence is merely cruel, the second sentence is wrong, and the third and fourth are grossly fallacious. Yet ask a person untrained in economics what the merits of these views are, and he will usually be unable to arrive at any persuasive judgment. At a later point we shall analyse the fallacy with the assistance of fairly elementary analytical techniques.

Some frequently-employed quantitative concepts and relationships in economic analysis are presented in Appendix A; mastery of this material is a wise investment.

---

of different grades. There were twenty-three 'superiores,' from an Oberhofmeister, secretaries and tutors down to an equerry responsible for ninety-two horses; and over seventy 'inferiores,' from the five pages and a 'Polish gentleman' who played the Bandor and waited at table, the eight musicians and their Italian leader, ... The count's salaries and wages bill came to 13,534 Thalers a year [say $60,000]. The appointments of the count's palaces were correspondingly magnificent; he lived on a scale that would make the life of a Hollywood millionaire look tawdry." (pp. 77–78)

[6] W. T. Thornton, *On Labour* (London: Macmillan, 1868), p. 81.

chapter two

The Tasks of an Economic System

The list of things that one can "demand" of an economic system is limited only by the human imagination, itself a fairly outrageous thing. Madmen and/or reformers have insisted that the economy must produce quite impossible things, such as more than the average amount of housing for everyone. Even calm men, well-acquainted with the laws of arithmetic, have assigned tasks which are adequately diverse. Some wish the economy to elevate the tastes of consumers—drawing them away from comic books toward conic sections, from gadgets (mechanical devices not worth their price to the speaker) toward symphony orchestras (which produce music worth less than its cost, and hence is almost everywhere subsidized). Others, again, wish the economy to foster political values: such estimable entities as Thomas Jefferson and modern Switzerland have believed that an independent agricultural class would be the mainstay of a stable democratic system.[1]

Ambitious views of the role of the economic system are based upon a sound, although often an exaggerated, instinct. An economic system assuredly influences much of what people call "non-economic" aspects of life. For example, the systems of reward for personal efforts will surely influence the kinds of education that the population desires and receives. When one pauses to realize that well over half the waking hours of mankind have been devoted to earning a livelihood—the fraction fell below a half in the United

[1] Karl Marx carried this approach to the extreme of asserting that an economic system had within it a set of forces which irresistibly transformed all society. His peculiar limitation on this view—that only one more transformation would take place (to communism)—changed the view from a hypothesis into propaganda.